

Master of Business Administration Semester-II

MBCII-5- COST ACCOUNTING

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PROGRAM EDUCATIONAL OBJECTIVES (PEO)

Our program will create graduates who:

1. Will be recognized as a creative and an enterprising team leader.
2. Will be a flexible, adaptable and an ethical individual.
3. Will have a holistic approach to problem solving in the dynamic business environment.

Course Objective:- MBCII-5- Cost Accounting

CO1: Enable the student to make a classification of cost on the basis of Function, variability and traceability etc.

CO2: Make the student enable to estimate and evaluate Quotations and Tender.

CO3: Enable the student to choose suitable product mix for an organisation to maximize the profit.

CO4: Student will be able to analyze variances with reference to cost and profit.

CO5: Student will be able to estimate profit earned on incomplete contract and portion of that profit to be transferred to Profit & Loss Account of Business

CO6: Enable the student to estimate cost of running a certain vehicle and fare should be charged to an individual passenger in Passenger Transport Business.

Syllabus

MBCII - 5 - COST ACCOUNTING

Unit I: Introduction to Cost Accounting and Unit and Output costing:

Meaning of Cost, Costing and Cost Accounting, Features, Scope and Functions of Cost Accounting, Advantages and Limitations of Cost Accounting; Concept of Cost; Analysis and Classification of Costs; Elements of Cost; role of accounting information in planning and control. Unit Output Costing: Preparation of Cost Sheet (Statement of Cost); Quotations and tender.

Unit II: Marginal Costing and Decision Making: Introduction, Application of Marginal costing in terms of cost control, profit planning, closing down a plant, dropping a product line, charging general and specific fixed costs, fixation of selling price, make or buy decisions, key or limiting factor, selection of suitable product mix, desired level of profits, diversification of products, closing down or suspending activities, level of activity planning-Break-even-analysis: Application of BEP for various business problems.

Unit III: Standard Costing and Variance Analysis: Introduction, Meaning and limitations of Standard Costing, Standard costing as a management Tool, Historical costing, Estimated Costing and Standard Costing, Standard Cost and Budgeted Cost, Determination of Standard Cost for Direct Material, Direct Labour and Overhead Cost. Variance Analysis: Cost Variance, Direct Material Variance, Direct labour Variance, Overhead Variance, Sales Variance, Variance with reference to Profit. Practical Problems on Variance

Unit IV: Contract and Operating Costing: Salient clauses and accounting features of Contract costing, Retention money clause and Escalation clause, Profit of incomplete Contract, WIP in balance sheet. Features of operating costing: Transport costing (Standing charge, Repair and Maintenance Charge and Running charges and log sheet), Canteen, Hospital and hotels costing

Suggested Readings:

1. Cost and Management Accounting V. K. Saxena & C. D. Vashist, Sultan Chand & Sons Publication.
2. Management Accounting, Bhagwati & Pillai, Second Edition, S. Chand & Company Ltd.
3. Cost Accounting Theory and Practice, Bhahatosh Banerjee, PHI
4. Cases In Management Accounting & Control System, Allen, Pearson
5. Cost & Management Accounting, Ravi M Kishore, Taxmann Publications Pvt. Ltd.
6. Management Accounting: Theory and Problems, M.Y. Khan, P.K. Jain, TMH

Unit I

In the modern days of cut throat competition, any business organization has to pay attention towards their cost of production. Computation of cost on scientific basis and thereafter cost control and cost reduction has become of paramount importance. Hence it has become essential to study the basic principles and concepts of cost accounting.

Cost:-

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

Costing:- Costing may be defined as 'the technique and process of ascertaining costs'.

'Costing is classifying, recording, allocation and appropriation of expenses for the determination of cost of products or services and for the presentation of suitably arranged data for the purpose of control and guidance of management. It includes the ascertainment of every order, job, contract, process, service units as may be appropriate. It deals with the cost of production, selling and distribution.

If we analyze the above definitions, it will be understood that costing is basically the procedure of ascertaining the costs.

'Costing' is precisely the procedure which helps management to find out the costs of products or services.

Cost Accounting:-

Cost Accounting primarily deals with collection, analysis of relevant of cost data for interpretation and presentation for various problems of management.

Cost Accounting is defined as, 'the establishment of budgets, standard costs and

actual costs of operations, processes, activities or products and the analysis of variances, profitability or the social use of funds'.

Cost Accountancy:-

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

SCOPE OF COST ACCOUNTING

The Scope of Cost Accounting is Very Wide and Includes:

(a) Cost Ascertainment: The main function of cost accounting is the ascertainment of cost of product or services rendered. It includes collection, analysis of expenses and measurement of production at different stages of manufacture. The collection, analysis and measurement requires different methods of costing for different types of production such as Historical costs, Standard costs, Process cost, Operation cost etc.

It can be done in two ways, namely

(i) Post Costing, where the ascertainment of cost is done based on actual information as recorded in financial books.

(ii) Continuous Costing, where the process of ascertainment is of a continuous nature i.e. where cost information is available as and when a particular activity is completed, so that the entire cost of a particular job is available the moment it is completed.

(b) Control of Costs: In the era of competition, the goal of every business is to sustain; in costs at the lowest point with efficient operating conditions. To sustain, It is essential to examine each individual item of cost in the light of the services or benefits obtained so that maximum utilisation of the money expended or- it may be recovered. This requires planning and use of standard for each item of cost for locating deviations, if any, and taking remedial measures.

(c) Proper matching of cost with revenue: In cost accounting manager prepares monthly or quarterly statements to reflect the cost and income data identified with the sale of that period.

(d) Aids to Management Decision-making: Decision-making is a process of choosing between two or more alternatives, based on the resultant outcome of the various alternatives. A Cost Benefit Analysis also needs to be done. All this can be achieved through a good cost accounting system.

NATURE OF COST ACCOUNTING

The nature of cost accounting can be brought out under the following headings:

1. Cost accounting is a branch of knowledge: Though considered as a branch of financial accounts, cost accounting is one of the important branch of knowledge, i.e., a discipline by itself. It is an organised body of knowledge consisting of its own principles, concepts and conventions. These principles and rules of course vary from industry to industry.

2. Cost accounting is a science : Cost accounting is a science as it is a body of systematic knowledge relating to not only cost accounting but relating to a wide variety of subjects such as law, office practice and procedure, data processing, production and material control, etc. It is necessary for a cost accountant to have intimate knowledge of all these field of study in order to carry on his day-to-day activities. But it is to be admitted that it is not a perfect science as in the case of natural science.

3. Cost accounting is an art : Cost accounting is an art in the sense it requires the ability and skill on the part of cost accountant in applying the principles, methods and techniques of cost accountancy to various management problems. These problems include the ascertainment of cost, control of costs, ascertainment of profitability, etc.

4. Cost accounting is a profession : In recent years cost accounting has become one of the important professions which has become more challenging. This view is evident from two facts. First, the setting up of various professional bodies such as National Association of Accountants (NAA) in USA. The Institute of Cost and Management Accountants in UK, the Institute of Cost and Works Accountants in India and such other professional bodies both in developed and developing countries have increased the growing awareness of costing profession among the people. Secondly, a large number of students have enrolled in these institutes to

obtain costing degrees and memberships for earning their livelihood.

Functions of Cost Accounting

The functions of cost accountant may be enumerated under the following:

Traditional Functions

The traditional functions comprise of the routine functions of cost accountant. Such functions are as follows:

- (a)** To establish various cost centres in the organisation.
- (b)** To ascertain the cost of every product, job or process both in terms of total and per unit of product.
- (c)** To design suitable system for defining responsibilities and controlling cost.
- (d)** To provide necessary data to enable management in fixing the price.
- (e)** To prepare reports on wastages of material, loss of labour time, idle capacity of machines so as to improve profitability of business.
- (f)** To implement cost control techniques such as budgetary control and standard costing.
- (g)** To prepare cost schedules to assist management in making decisions and in formulating policies.
- (h)** To design suitable forms for organising an effective system of reporting which ensures provision of adequate cost data to all levels of management.
- (i)** To assist management in the valuation of closing stock of raw materials and work-in-progress so that too much of capital is not locked up in unnecessary inventories.
- (j)** To prepare periodical cost statements and profit and loss account.

Modern Functions

In recent times the functions of a cost accountant are not only confined to ascertain and control cost but extend far beyond these functions. This is on account of the additional responsibilities arising from the various branches of accounting, works organisation, office management and administration, methods of statistical analysis, system analysis These modern functions are as follows:

- (i)** Supervising the functions of mechanised accounting.
- (ii)** Organisation of internal audit in the field of accounting.

(iii) To work in close co-ordination with various departmental managers so as to implement cost reduction programmes and methods of improvement.

(iv) To undertake cost audit programmes as per the directives issued by the government and the provision of the Companies Act of 2013.

PURPOSES OR OBJECTS OF COST ACCOUNTS

Costing serves number of purposes among which the following are considered to be most important:

1. Ascertainment of cost: This was considered to be the primary objective of cost accounting in the initial stages of its development. Cost ascertainment involves the collection and classification of expenses at the first instance. Those items of expenses which are capable of charging directly to the products manufactured are allocated. Then the other expenses which are not capable of direct allocation are apportioned on some suitable basis. Thus the cost of production of goods manufactured is ascertained. In this process, cost accounting involves maintenance of different books to record various elements of cost. Cost of production is ascertained by using any of the costing technique such as historical costing, marginal costing, etc.

2. Cost control: At one time cost control was considered as secondary objective of cost accounts. But in modern times it constitutes the primary purpose because of its utmost importance in all business undertakings. Cost control is exercised at different stages in a factory, viz., acquisition of materials, recruiting and deployment of labour force, during the production process and so on. As such we have material cost control, labour cost control, production control, quality control and so on. However, control over cost is exercised through the techniques of budgetary control and standard

costing. The control techniques enable the management in knowing the operating efficiency of a business.

3. Determination of selling price: Every business organisation aims at maximising profit. Total cost of production constitutes the basis on which selling price is fixed by adding a margin of profit. Cost accounting furnishes both the total cost of production as well as cost incurred at each and every stage of production. No doubt other factors are taken into consideration before fixing price such as market

conditions, the area of distribution, volume of sales, etc. But cost plays the dominating role in price fixation.

4. Frequent preparation of accounts and other reports: The management of every business constantly rely upon the reports on cost data in order to know the level of efficiency relating to purchase, production, sales and operating results.

Financial accounting provides information only at the end of the year because closing stock value is available only at the end of the year. But cost accounts provide the value of closing stock at frequent intervals by adopting a "continuous stock verification system". Using the value of closing stock it is possible to prepare final accounts and know the operating results of the business.

5. To provide a basis for operating policy:

Cost data to a great extent helps in formulating the policies of a business and in decision-making. As every alternative decisions involve investment of capital outlay, costs play an important role in decision-making. Therefore availability of cost data is a must for all levels of management. Some of the decisions which are based on cost are (a) make or buy decision,(b) manufacturing by mechanisation or automation, (c) whether to close or continue operation in spite of losses.

Advantages of Cost Accounting: Good costing system serves the needs of a large sections of people. The advantages of cost accounting are discussed below:

Advantages Of Cost Accounting To Management

1. Fixation of responsibility: Whenever a cost centre is established, it implies establishing a kind of relationship between superior and subordinates. Thus, responsibilities are fixed on every individual who is concerned with incurrence of cost.

2. Measures economic performance: By applying cost control techniques such as budgetary control and standard costing it helps in knowing the performance of business.

3. Fixation of price: By providing cost data it helps management to fix the selling price in advance. Hence, quotations can be supplied to prospective customers to secure orders.

4. Aids in decision-making: It helps management in making suitable decisions such

as make or buy, replace manual labour by machines, shut down or continue operations based on cost reports.

5. Helps in the preparation of interim final accounts: By the process of continuous stock taking it enables to know the value of closing stock of materials at any time. This facilitates preparation of final accounts wherever desired.

6. Helps in minimising wastages and losses: Cost accounting system enables to locate the losses relating to materials, idle time and under utilisation of plant and machinery.

7. Facilitates comparison: It facilitates cost comparison in respect of jobs, process, and departments and also between two periods. This reveals the efficiency or otherwise of each job, process or department.

8. Assists in increasing profitability: Costing reports provide information about profitable or unprofitable areas of operation. The management can discontinue that product line or that department which are responsible for incurring losses and only profitable line of activities alone are retained.

9. Reconciliation with financial accounts: A well maintained cost accounting system facilitates reconciliation with financial accounts to check the arithmetical accuracy of both the systems.

10. It guides future production policy: Cost data help management in determining future production policy. Any expansion or contraction of production for the future is based on past cost data.

Advantages to Employees

1. Cost accounting system enables employees to earn better wages through overtime wages and incentive systems of wage payment.
2. By providing better facilities it ensures job security to employees.
3. Employees benefit by merit rating techniques which is conducted by scientific process.

Advantages To Creditors

1. It increases the confidence of creditors in the capital employed in the business.
2. The frequent preparation of reports and statements help in knowing solvency position of the business.

Advantages To Government

1. It helps government in formulating policies regarding export, import, taxation, price control measures, wage fixation, etc.
2. It helps in assessing excise duty, sales tax and income tax of the business.
3. Costing information helps in preparing national plans.

Advantages To Society

1. Cost reduction and cost control programmes go to minimise cost of production of goods and services. A portion of the reduced cost of production is shared by customers by paying less price for goods and services.
2. It offers employment opportunities in the cost accounting department in the capacity of cost accountants and cost clerks.

Limitations of Cost Accounting

- 1. It is expensive:** The system of cost accounting involves additional expenditure to be incurred in installing and maintaining it. However, before installing it, care must be taken to ensure that the benefits derived is more than the investment made on this system of accounting.
- 2. The system is more complex:** As the cost accounting system involve number of steps in ascertaining cost such as collection and classification of expenses, allocation and apportionment of expenses, it is considered to be complicated system of accounts. Moreover the system makes use of several documents and forms in preparing the reports. This will tend to delay in the preparation of accounts.
- 3. Inapplicability of same costing method and technique:** All business enterprises cannot make use of a single method and technique of costing. It all depends upon the nature of business and type of product manufactured by it. If a wrong technique and method is used, it misleads the results of business.
- 4. Not suitable for small-scale units:** A cost accounting system is applicable only to a large-sized business but not to small-sized one. Hence, there is limitation to its application to all types of business.
- 5. Lack of accuracy:** The accuracy of cost accounts get distorted owing to the use of notional cost such as standard cost, estimated cost, etc.
- 6. It lacks social accounting:** Cost accounting fails to take into account the social

obligation of the business. In other words, social accounting is outside the purview of cost accounts.

Criticisms OR Objections Levelled Against Cost Accounts

Despite several benefits offered by cost accounts, critics have levelled the following criticisms against it:

- 1. Cost accounting is merely a system of estimates and probabilities:** Though the main purpose of cost accounting is to ascertain the cost of production with a reasonable degree of accuracy, yet absolute accuracy is not possible owing to the two reasons. (a) Indirect expenditures are absorbed on the basis of predetermined rates instead of actual rates, and (b) The material cost and labour cost is inflated so as to cover the normal loss and wastage of materials and normal idle time of workers.
- 2. Cost accounting is unnecessary** in such business enterprises which make large profit: It is argued that industries which earn large amount of profit need not have a system of cost accounting. This statement is absolutely wrong. Earning of more profit by industry does not necessarily mean that its cost of production is lowest and there is no scope for further reduction in the cost. Profit represents the difference between the selling price and the cost of a product. Profit earned by a business may be high because of increased price prevailing in the market. Two or more than two products manufactured by business may earn profit for one line of product and loss by other. The profit earned by one product may out weight the loss suffered by other product thus resulting in overall profit. So it is wrong to judge the efficiency of the business on the basis of overall profitability of the business. If necessary steps are taken to reduce or eliminate losses suffered by a second line product, the industry would earn more amount of profit. It is in this context that a system of costing is felt.
- 3. It is unnecessary:** This criticism is levelled owing to lack of understanding of the objectives and advantages of costing. In the present-day competitive world, every manufacturer must know the cost of production for each article so that he can fix selling price on a reliable and reasonable basis. Further he can also compare his selling price thus fixed with the price prevailing in the market. Cost ascertainment involves application of certain principles and techniques. Having ascertained the cost, control techniques are used to keep the costs under check and thereby increase

the profit. Thus it can be said that cost accounting is necessary in most of the concerns.

4. It is expensive: This criticism is true as long as the benefits derived from this system are not commensurate with the investment made on it. But by carefully designing the system so as to suit the business, the criticism can be nullified.

5. Competition governs price and hence there is no need for costing system: Some critics contend that in these days of competition prices are determined by the forces of demand and supply as against fixation of selling price by adding a desired margin of profit on the cost price. This argument is incorrect. Even in this situation cost accounts disclose the margin of profit that is earned by comparing the market price and cost of production. It impresses upon management the need to reduce cost by increasing the volume of production or by elimination of losses and wastages if any. If the cost price tends to be higher than the market price, it is desirable to abandon such product line and pay attention to profitable line of products.

6. There is no need for costing where production efficiency is high: The statement is misleading as without a yardstick to measure the efficiency it is not possible to appraise the efficiency of a business. Cost accounting system offers number of techniques such as standard costing, budgetary control, inter-firm comparison and so on. The cost of production can also be compared between two periods of time to know whether business is currently running efficiently when compared to previous year. In case of inefficient operation remedial measures can be taken to improve the business.

7. Other objections: Some other objections that are raised against the installation of cost accounting system are as follows:

(a) It is a mere matter of forms and rulings: Often it is argued that the cost accounting system degenerates into a matter of mere forms and rulings. This is not the defect of cost accounting system but the way in which the system is maintained. No doubt different forms are necessary under costing system but they must be simplified and altered to meet the changing condition.

(b) Failure in many cases: The system of cost accounting is often condemned as defective in as much as it has failed to produce the desired result. The defect does

not lie in the costing system but for some other reasons such as indifferent attitude of the management, lack of adequate facilities, non-cooperation's or opposition from employees. These defects can be overcome by reversing the above trend.

(c)For want of necessity: It is contended by some that costing is of recent origin and that its application was not felt in the past. Though it was not used earlier, still many industries prospered. So it is felt by some critics that the installation of costing involves unnecessary expenditure. However, it is to be remembered that today's business functions in a competitive conditions and every manufacturer must know the actual cost of production in order to reduce the selling price.

Many industrial failures in the past may be attributed to the lack of knowledge on the part of management relating to the actual cost of production thereby selling product below cost.

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

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

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

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

a given unit of product and hence these are the examples of indirect materials.

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

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

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

C. Classification according to behavior :- Costs can also be classified according to their behavior.

This classification is explained below.

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

ii. Variable Costs :- These costs are variable in nature, i.e. they change according to the volume of production. Their variability is in the same proportion to the production the increase is exactly in the same proportion of the production. Another feature of the variable cost is that per unit variable cost remains same while the total variable costs will vary. Examples of variable costs are direct materials, direct labor etc.

iii. Semi-variable Costs :- Certain costs are partly fixed and partly variable. In other

words, they contain the features of both types of costs. These costs are neither totally fixed nor totally variable. Maintenance costs, supervisory costs etc are examples of semi-variable costs. These costs are also called as 'stepped costs'.

D. Classification according to functions :- Costs can also be classified according to the functions/activities. This classification can be done as mentioned below.

i. Production Costs :- All costs incurred for production of goods are known as production costs.

ii. Administrative Costs :- Costs incurred for administration are known as administrative costs. Examples of these costs are office salaries, printing and stationery, office telephone, office rent, office insurance etc.

iii. Selling and Distribution Costs :- All costs incurred for procuring an order are called as selling costs while all costs incurred for execution of order are distribution costs. Market research expenses, advertising, sales staff salary, sales promotion expenses are some of the examples of selling costs. Transportation expenses incurred on sales, warehouse rent etc are examples of distribution costs.

iv. Research and Development Costs :- In the modern days, research and development has become one of the important functions of a business organization. Expenditure incurred for this function can be classified as Research and Development Costs.

E. Classification according to time :- Costs can also be classified according to time. This classification is explained below.

I. Historical Costs :- These are the costs which are incurred in the past, i.e. in the past year, past month or even in the last week or yesterday. The historical costs are ascertained after the period is over. In other words it becomes a post-mortem analysis of what has happened in the past. Though historical costs have limited importance, still they can be used for estimating the trends of the future, i.e. they can be effectively used for predicting the future costs.

II. Predetermined Cost :- These costs relating to the product are computed in advance of production, on the basis of a specification of all the factors affecting cost and cost data. Predetermined costs may be either standard or estimated. Standard Cost is a predetermined calculation of how much cost should be under specific

working conditions. It is based on technical studies regarding material, labor and expenses. The main purpose of standard cost is to have some kind of benchmark for comparing the actual performance with the standards. On the other hand, estimated costs are predetermined costs based on past performance and adjusted to the anticipated changes. It can be used in any business situation or decision making which does not require accurate cost.

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

I. Marginal Cost: - Marginal cost is the change in the aggregate costs due to change in the volume of output by one unit. For example, suppose a manufacturing company produces 10,000 units and the aggregate costs are Rs. 25,000, if 10,001 units are produced the aggregate costs may be Rs. 25,020 which means that the marginal cost is Rs. 20. Marginal cost is also termed as variable cost and hence per unit marginal cost is always same, i.e. per unit marginal cost is always fixed. Marginal cost can be effectively used for decision making in various areas.

II. Differential Costs :- Differential costs are also known as incremental cost. This cost is the difference in total cost that will arise from the selection of one alternative to the other. In other words, it is an added cost of a change in the level of activity. This type of analysis is useful for taking various decisions like change in the level of activity, adding or dropping a product, change in product mix, make or buy decisions, accepting an export offer and so on.

III. Opportunity Costs :- It is the value of benefit sacrificed in favor of an alternative course of action. It is the maximum amount that could be obtained at any given point of time if a resource was sold or put to the most valuable alternative use that would be practicable. Opportunity cost of goods or services is measured in terms of revenue which could have been earned by employing that goods or services in some other alternative uses.

IV. Relevant Cost :- The relevant cost is a cost which is relevant in various decisions

of management. Decision making involves consideration of several alternative courses of action. In this process, whatever costs are relevant are to be taken into consideration. In other words, costs which are going to be affected matter the most and these costs are called as relevant costs. Relevant cost is a future cost which is different for different alternatives. It can also be defined as any cost which is affected by the decision on hand. Thus in decision making relevant costs plays a vital role.

V. Replacement Cost :- This cost is the cost at which existing items of material or fixed assets can be replaced. Thus this is the cost of replacing existing assets at present or at a future date.

VI. Abnormal Costs: - It is an unusual or a typical cost whose occurrence is usually not regular and is unexpected. This cost arises due to some abnormal situation of production. Abnormal cost arises due to idle time, may be due to some unexpected heavy breakdown of machinery. They are not taken into consideration while computing cost of production or for decision making.

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

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

IX. Capacity Cost :- These costs are normally fixed costs. The cost incurred by a company for providing production, administration and selling and distribution capabilities in order to perform various functions. Capacity costs include the costs of

plant, machinery and building for production, warehouses and vehicles for distribution and key personnel for administration. These costs are in the nature of long-term costs and are incurred as a result of planning decisions.

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

Costing Methods and Techniques :-

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

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

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

II. Batch Costing :- This method of costing is used in those firms where production is made on continuous basis. Each unit coming out is uniform in all respects and production is made prior to the demand, i.e. in anticipation of demand. One batch of production consists of the units produced from the time machinery is set to the time when it will be shut down for maintenance. For example, if production commences on 1st January 2007 and the machine is shut down for maintenance on 1st April 2007, the number of units produced in this period will be the size of one batch. The total

cost incurred during this period will be divided by the number of units produced and unit cost will be worked out. Firms producing consumer goods like television, air-conditioners, washing machines etc use batch costing.

III. Process Costing :- Some of the products like sugar, chemicals etc involve continuous production process and hence process costing method is used to work out the cost of production. The meaning of continuous process is that the input introduced in the process I travels through continuous process before finished product is produced. The output of process I becomes input of process II and the output of process II becomes input of the process III. If there is no additional process, the output of process III will be the finished product. In process costing, cost per process is worked out and per unit cost is worked out by dividing the total cost by the number of units. Industries like sugar, edible oil, chemicals are examples of continuous production process and use process costing.

IV. Operating Costing :- This type of costing method is used in service sector to work out the cost of services offered to the consumers. For example, operating costing method is used in hospitals, power generating units, transportation sector etc. A cost sheet is prepared to compute the total cost and it is divided by cost units for working out the per unit cost.

V. Contract Costing :- This method of costing is used in construction industry to work out the cost of contract undertaken. For example, cost of constructing a bridge, commercial complex, residential complex, highways etc is worked out by use of this method of costing. Contract costing is actually similar to job costing, the only difference being that in contract costing, one construction job may take several months or even years before they are complete while in job costing, each job may be of a short duration. In contract costing, as each contract may take a long period for completion, the question of computing of profit is to be solved with the help of a well defined and accepted method.

Technique of Costing :- As mentioned above, costing methods are for computation of the total cost of production/services offered by a firm. On the other hand, costing technique help to present the data in a particular format so that decision making becomes easy. Costing techniques also help for controlling and reducing the costs.

The following are the techniques of costing.

I. Marginal Costing :- This technique is based on the assumption that the total cost of production can be divided into fixed and variable. Fixed costs remain same irrespective of the changes in the volume of production while the variable costs vary with the level of production, i.e. they will increase if the production increases and decrease if the production decreases. Variable cost per unit always remains the same. In this technique, only variable costs are taken into account while calculating production cost. Fixed costs are not absorbed in the production units. They are written off to the Costing Profit and Loss Account. The reason behind this is that the fixed costs are period costs and hence should not be absorbed in the production.

Secondly they are variable on per unit basis and hence there is no equitable basis for charging them to the products. This technique is effectively used for decision making in the areas like make or buy decisions, optimizing of product mix, key factor analysis, fixation of selling price, accepting or rejecting an export offer, and several other areas.

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

III. Budgets and Budgetary Control :- Budget is defined as, 'a quantitative and/or a monetary statement prepared prior to a defined period of time for the policies during that period for the purpose of achieving a given objective.' If we analyze this

definition, it will be clear that a budget is a statement, which may be either in monetary form or quantitative form or both. For example, a production budget can be prepared in quantitative form showing the target production, it can also be prepared in monetary terms showing the expected cost of production. Some budgets can be prepared only in monetary terms, e.g. cash budget showing the estimated receipts and payments in a particular period can be prepared in monetary terms only. Another feature of budget is that it is always prepared prior to a defined period of time which means that budget is always prepared for future and that too a defined future.

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

Budget and Budgetary Control is one of the important techniques of costing used for cost control and also for performance evaluation.

Unit or output costing

The unit of output costing is suitable for the industry, where goods are manufactured in units and are identical in nature. As its name implies, unit or output costing is a method of costing under which cost of a single product, which is produced, by a continuous manufacturing process, is ascertained or determined. It also determines the amount of each element constituting such cost.

“Unit costing method is a method of costing applied to ascertain the cost per unit or production where standard and identical products are manufactured.”

Meaning of unit or output costing

Unit or output costing is a method of costing, which is applied in those undertakings where units of output are identical and the cost units are physical and natural. It is ideally used in those concerns, which produce only one product or two or more grades of one product in large scale continuously. This method is, therefore, most commonly used in case of industries like mines, queries, collieries, breweries, brick-kilns, cement works, proper mills, sugar milks, textile industry, electrical appliances etc.

The basic concept of this method of costing is to ascertain the cost per unit of output. The cost per unit is ascertained by dividing the total cost incurred on the production of a product by the number of unit of that product. In other words, under this method, total cost is determined by adding all kinds of incurred costs first the total production units to determine cost per unit. This basis concept of this method can be expressed as follows:

Cost per unit or unit cost = total cost of production/ total quantity or number of units produced

This costing method is also known as single costing since the process of production includes only one stage or a single operation. Under this method, generally a statement called cost sheet is prepared to determine cost per unit or total cost.

Importance of unit or output costing

Unit or output costing helps both in ascertainment and control of cost. It determines cost per unit of the products on the basis of which the selling price of products can be fixed. Thus, a unit or output costing has the following importance:

- 1. Ascertainment of cost:** it helps in ascertainment of total and cost and cost per unit at different stages of production.
- 2. Controlling costs:** it helps in controlling and reducing costs since time to time costs are compared from previous period and leakages and wastage are checked.
- 3. Fixation of selling price:** it provides data about the cost of a job or product and on the basis of such data appropriate selling price of the product can be fixed.
- 4. Submitting tenders:** it also helps the business in ascertaining the tender price by providing information about estimated cost on the basis of part data.
- 5. Formulating production policy:** it acts as a guide to the manufacturer and helps him in formulation a profitable production policy.

Limitations of unit or output costing

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

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

Methods of unit or output costing

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

- Cost sheet
- Manufacturing account

Cost sheet

Cost sheet is "a document which provides for the assembly of the estimated detailed cost in respect of a cost center pool a cost unit". It is a period's document of cost designed to exhibit the total cost and the unit cost of products in an analytically and

detailed form. In other words, a cost sheet present cost information in such a manner that it can show cost of total production, quantity of production and per unit cost of production.

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

Purposes of cost sheet

A properly prepared statement of cost serves the following purposes:

- a. It helps in fixing selling prices more accurately.
- b. It helps comparisons of costing of similar jobs or between costs of similar periods.
- c. It gives information for compilation of estimates. Quotations or tenders.
- d. It provides useful information to trace wastage, losses and inefficiencies and those affect economics.
- e. It acts as a guide to the producer and help him in formulation a definitive production policy.

Tender or quotation sheet

A manufacturing concern is frequently required to give tenders or quotations for supply of goods manufactured by it. Again sometimes, it needed to make and estimate of the price of the product to plan the production wisely. The price at which a manufacturing concern agrees to supply its goods is known as tender or quotation price. Similarly, an estimation of the price of the product in advance is known as price estimation.

A tender or quotation is a formal written to supply goods or services or to do a job for an agreed price i.e. tender or quotation price.

Preparation of tender sheet

Tender or quotation price is estimated price for future period. For determination of tender or quotation price generally the following based are used:

One the basis of percentages of overheads

When separate materials and labor costs, other overheads are given and information for units are not given. Then tender or quotation price is determined on the basis of percentages of overheads'. In this situation, the following formulae are used to determine the percentages of overheads:

On the basis of output units

When units or quantity of production for previous period and units or quantity for tender or quotation are given but not the separate materials and labor costs for tender or quotation, then tender or quotation price is determined on the basis of per unit cost. In this situation, the following steps are used:

- (i) **The period cost-sheet is prepared by taking by previous period data and by determining cost per unit of different components of costs.**
- (ii) **Then after, an estimated cost sheet (i.e. statement of tender or quotation) is prepared by multiplying tender or quotation units by cost per unit of each components of past cost-sheet.**

COST SHEET

Production: XXX

Period: xxx

Sr. No.	Particulars	Amount	Amount
	Opening stock of raw material	xxx	
+	Material purchased	xxx	
+	Carriage inward (Carriage on purchase)	xxx	
+	Octroi on purchase	xxx	
+	Royalty	xxx	
(-)	Closing stock of raw material	xxx	
(-)	Sale of scrap	xxx	
(-)	Sale of gunny bag	xxx	
A	Raw Material Consumed		xxx
+	Direct Wages/Manufacturing wages/direct labour wages		xxx
+	Direct Expenses :		xxx
B	Prime Cost		xxx
+	Factory on cost or Factory overhead or Works on cost:		
	Indirect expenses	xxx	
	Indirect wages; Unproductive wages	xxx	
	Machine repairing	xxx	
	Factory Rent & Factory Lighting	xxx	
	Estimating expenses (Forecasting Exp.)	xxx	
	Drawing room expenses/Drawing office salary	xxx	
	Salary of Factory Manager	xxx	
	Depreciation of factory (Dep. Of Fact. Building)	xxx	
	Depreciation & Maintenance of machinery	xxx	
	Any expenses connected with factory	xxx	
	Factory insurance & Taxes	xxx	
	Printing & stationary for factory	xxx	
	Director fee for factory	xxx	
	Factory cleaning	xxx	
	Loose tools consumed	xxx	
	Depreciation of loose tools	xxx	
	Indirect material	xxx	
	Gas, coal, oil, grease, lubricants & water for factory	xxx	
	Internal transporting expenses/ haulage	xxx	xxx
			xxx

+	Opening stock of Work-in-progress:		xxx
(-)	closing Stock of work-in-progress :		xxx
C	Factory Cost (Work Cost) :		xxx
	Office on cost or office overhead :		xxx
	Director fee for office		xxx
	Printing & stationery for office		xxx
	Legal expenses for office		xxx
	Depreciation of office furniture		xxx
	Salary of office employee		xxx
	Depreciation of office building		xxx
	Office rent, Sundry office, Management expenses		xxx
	Administrative expenses		xxx
	Office insurance		xxx
	Salary of office manager		xxx
	General expenses and any expenses of office		xxx
	Bank fees	xxx	xxx
D	Office Cost (Cost of Production) :		xxx
+	Opening Stock of Finished Goods:		xxx
(-)	Closing Stock of Finished Goods:		xxx
E	Cost of Goods Sold:		xxx
+	Selling and Distribution on cost :		
	Advertisement		xxx
	Commission to selling agent		xxx
	Carriage outward expenses (Carriage on sale)		xxx
	Godown rent (Exp. Of finished Goods/godown)		xxx
	Bad debt		xxx
	Repairing and maintenance of delivery vans		xxx
	Counting expenses/counting office salary		xxx
	Traveling expenses		xxx
	Rent of sales department		xxx
	Salary of sales manager		xxx
	Any expenses of sales department		xxx
	Lighting bill of sales department		xxx
	Exp. On stall in Industrial fair		xxx
	Exp. On show room	xxx	xxx
	Total Cost :		xxx
+	Profit		xxx
	Sales		xxx

Important points

- (1) If the production in units is given in the problem, in that problem we have to calculate per unit cost and for that we have to prepare the column of per unit.
- (2) If the work-in-progress is given in the problem, in that problem don't prepare the column of per unit.
- (3) Selling and distribution expenses will be charge on only sold out goods (not on production).
- (4) In the problem of bricks and slate carriage inward will be include in factory on cost.
- (5) In the problem of cloth and T.V. manufacturing company scrap will be deduct from Factory oncost (and not from material)
- (6) **Formula for calculating production :**

Sales (in units)	xxx
(+) Closing stock of finished goods (in units)	<u>xxx</u>
	xxx
(-) Opening Stock of finished goods (in units)	<u>xxx</u>
Production (in units)	xxx

- (7) **Formula for calculating the sales in units**
- | | |
|--|------------|
| Opening stock of finished goods (in units) | xxx |
| (+) Production (in units) | <u>xxx</u> |
| | xxx |
| (-) Closing Stock of finished goods (in units) | <u>xxx</u> |
| Sales (in units) | xxx |

- (8) If the opening and closing stock of finished goods in units is given in the problem but valuation of that stock is not given, in that case this valuation will be taken on office cost.
- (9) At the time of adding the opening stock of finished goods and at the time of deducting the closing stock of finished goods, in that case don't take the calculations in the column of per unit.
- (10) Following expenses will not be include in cost sheet :
 - a. Interest on capital
 - b. Income tax
 - c. Loss on sale of fixed assets / investment
 - d. Goodwill / Preliminary expenses / Discount on issue of share / Under writers commission, written off
 - e. Cash discount
 - f. Donation
 - g. Interest on bank loan / debenture

- h. Provision for general reserve
 - i. Dividend paid
 - j. Office transfer expenses
- (11) Following income will not be include in cost sheet :
- a. Discount / Dividend / Interest / Commission received
 - b. Share transferred fees received
 - c. Miscellaneous receipt
 - d. Profit on sale of fixed assets / Investment.

* * * * *

UNIT OUTPUT COSTING AND TENDER

- 1) From the following information you are required to prepare a statement of cost.

Raw material Purchased	66,000	Stock of work-in-progress (30 th Sept. 2011)	35,000
Direct wages	52,500	Sales	2,11,000
Indirect wages	2,750	Factory rent & insurance	15,000
Stock of Raw material (1 st Sept 2011)	91,500	Depreciation of plant	3,500
Stock of finished goods (1 st Sept 2011)	54,000	Other factory expenses	10,000
Stock of finished goods (30 th Sept 2011)	31,000	Wages & commission (selling dept)	6,500
Stock of Raw Material (30 th Sept 2011)	75,000		
Stock of work-in-progress (1 st Sept 2011)	28,000	Advertisement	3,500
Carriage inward	1,500	Carriage outward	2,500
Other office expenses	6,500	Office rent & taxes	2,500

- 2) M/s Pande & Sons has furnished you the following information prepare Statement of cost.

Raw material consumed	33,000	Factory lighting	2,200
Productive wages	35,000	Factory heating	1,500
Unproductive wages	10,500	Motive power	4,400
Direct expenses	3,000	Haulage	3,000
Factory rent, rates & taxes	7,500	Advertisement	300
Salary of selling department	1,500		
Directors fees (factory)	1,000	Depreciation of office Equipment	600
Directors fees (office)	2,000	Office Printing stationary	900
Factory cleaning	500	Office rent	500
Misc. expenses	200	Water supply	1,200
Dep. Of office building	1,000	Factory insurance	1,100
Bad debts written off.	100	Office insurance	500
Commission	1,500	Legal expenses	400
Factory printing & stationary	750	Bank charges	50
Depreciation of delivery van	900		

- 3) Prashant Products Ltd. has furnished you the following information.

Stock of Raw material (31 st Dec 2011)	47,000	Depreciation of factory building	7,100
Stock of Raw material (31 st Dec 2012)	50,000	Depreciation of furniture	600
Purchase of Raw material	2,08,000	Director fees	6,000
Drawing office salary	9,600	Fuel & water (factory)	1,500
Counting office salary	14,000	Fuel & water (office)	300

Carriage inward	8,200	General expenses	5,000
Carriage outward	5,100	Manager salary	12,000
Cash discount	3,400	Repair, renewal of factory building	10,600
Productive wages	1,40,000	Rent, taxes & insurance (factory)	3,000
Rent, taxes & insurance (office)	1,000	Bad debts written off.	4,700
Traveling expenses	3,100	Traveling agents salary	8,400

During the week Manager is spending 40 hours in a factory and 8 hours in office out of 48 hours duty, throughout the year.

- 4) The following extract of costing information relates to commodity for the half year ended 30th June 2012

Purchase of raw material	1,32,000	Stock on 30 th June 2012	
Direct wages	1,10,000	Raw material	24,464
Carriage inward	1,584	Finished goods (3200 tons)	35,200
Stock on 1 st Jan 2012		Work in progress	17,600
Raw material	22,000	Cost of factory supervision	8,800
Finished goods (1600 tons)	17,600	Sale of finished goods	3,30,000
Work in progress	5,280	Office rent	44,000

Advertising & selling cost 75 paisa per ton sold. 25,600 tons of commodity was produced during the period. You are required to prepare a statement showing the cost & profit.

- 5) A manufacturer makes two kinds of pens XA and XB. The following particulars relate to these pens for the month of Dec. 2012.

Particulars	XA	XB
Pens manufactured in units	25,000	12,000
Direct costs (in Rs.):-		
Material	3,140	2,650
Wages	9,400	5,700
Power etc.	2,100	1,410
	14,640	9,760

Other Costs:- Factory supervision Rs.3,600; Packing wages & expenses Rs.400; Management expenses Rs.4,440. You are required to prepare a statement showing the cost of each kind of pen when ready for dispatch taking the following into consideration :-

- i) Factory supervision to be charged in proportion to direct costs.
 - ii) Packing expenses to be apportioned in the ratio that direct costs plus factory supervision cost of XA bear to similar costs of XB.
 - iii) Management expense to be charged in proportion to the pens manufactured.
- 6) Jolly Shoes Co. manufactures two types of shoes A and B. Production costs

for the year ended 31st March 2012 were:

Direct Material	15,00,000
Direct wages	8,40,000
Production overheads	3,60,000
	27,00,000

There was no work in progress at the beginning or at the end of the year. It is ascertained that (a) Direct material in type A consist twice as much as that in type B shares. (b) The direct wages for type B shoes were 60% at those of type A shoes. (c) Production overhead was the same per pair of A and B type (d) Administrative overhead for each type was 150% of direct wages. (e) Selling expenses was Rs.1.50 per pair. (f) Production during the year were. Type A :- 40,000 pairs of which 36,000 were sold. Type B :- 1,20,000 pairs of which 1,00,000 were sold. (g) Selling price was Rs.44 for Type A and Rs.28 for Type B. Prepare statement showing cost and profit.

- 7) X and Y Shoes Polish Company Ltd. Manufacturer's Black and Brown Polish in one standard size of tin retailing at Rs.1.08 and Rs.1.20 respectively. Following data are supplied to you.

Direct Material : Polish	Rs.7,38,000
Tins	Rs.2,88,000
Direct wages	Rs.2,44,800
Production overheads	Rs.3,67,200
Administrative & selling overheads	Rs.1,22,400

Sales for the year were Black 14,40,000 tins and brown 6,00,000 tins. The details of opening and closing stock in units are given below :

Particulars	Black	Brown
Opening stock	48,000	1,60,000
Closing stock	1,08,000	60,000

The opening stock of black and brown polish was valued at its production cost of Rs.0.804 per tin and Rs.0.864 per tin respectively. The cost of raw material for brown polish is 10% higher than that for black but there is no difference in the cost of tins. Direct wages for brown are 8% higher than those of black polish and production overheads are considered to vary with direct wages. Administrative and selling overhead is absorbed at a uniform rate per tin of polish sold.

Prepare a statement to show the cost and profit per tin of polish.

- 8) The Sanika Toys company manufacturers of two types of toys X and Y. Manufacturing cost for the year ended 31st Dec. 2012 were.

Direct Material	Rs.2,00,000
Direct wages	Rs.1,12,000
Production overheads	Rs.48,000
Manufacturing cost	Rs.3,60,000

There is no work in progress at the beginning or at the end of the year. It is ascertained that:-

- (A) Direct Material in type X, cost twice as much as Direct Material in type Y.
(B) The Direct wages for type Y were 60% of those for type X. (C)
Administration overhead for each grade was 200% of Direct Labour. (D)
Selling cost was 25 paisa per toy for each type of toy. (E) Production during
the year was: - Type X:- 40,000 toys of which 36,000 were sold. Type Y:-
1,20,000 toys of which 1,00,000 were sold. (F) Selling price were Rs.7 per toy X
and Rs.5 per toy Y.

Prepare statement showing the total cost per toy for each type of toy and the profit made on each type of toy.

- 9) Manasi Manufacturing Co. manufactures two types of Products A and B, The information for the year ended on 31st March 2012 is as under :

Rs.	
Material	6,75,000
Wages	9,90,000
Works overhead	1,95,000

- (1) Direct material used per unit in Product A were, 3 times that of Product B.
(2) Wages per unit in Product B were $2/3^{\text{rd}}$ that of Product A.
(3) Works overhead per unit were the same for both the products.
(4) Administration overheads were 100% of the prime cost in each of the products.
(5) Selling and Distribution cost was Rs.6 per unit sold for both A and B.
(6) 35000 units of A were produced out of which 32000 units were sold @ Rs.100 per unit.
(7) 30000 units of Product B were produced out of which 25000 units were sold @ Rs.65 per unit.

Prepare a cost-sheet showing cost and profit in total as well as in per unit.

TENDER

- (1) Titan company has furnished you the following information during the period of 3 months, within which company has manufactured 5000 wrist watches of one size and one type.

Stock of Wrist watches on 1 st Jan 2012	Nil
Stock of wrist watches on 31 st Mar. 2012	20,000
Stock of Raw material on 1 st Jan 2012.	15,000
Stock of Raw material on 31 st Mar. 2012	5,000
Purchase of raw material	65,000
Direct wages	1,50,000
Indirect wages	35,000
Sales	3,00,000

Company is required to place a tender for 1,500 wrist watches of the same size and type. If the company wants to earn the same percentage of profit, state the cost of tender to be mentioned.

- (2) BSA-SLR Co. wants to submit the tender for 500 bicycles to earn the same percentage of profit from the output of last 6 months. The details are as under.

Stock of material on 1 st Jan 2012	50,000
Stock of material on 30 th June 2012.	7,000
Raw material purchased during 6 months	75,000
Direct wages paid during 6 months	1,50,000
Indirect expenses	25,000
Stock of finished goods 1 st Jan 2012.	Nil
Stock of finished goods 30 th June 2012.	50,000

During the period of 6 months 2000 bicycles were manufactured and sold. It is assumed that from 1st July increase in the cost of wages will be 10% and increase in the cost of material will be 15%. The 2000 bicycles manufactured in last 6 months were sold for Rs.2,70,000.

- (3) GSC company has manufactured 4000 electric pump. The particulars of expenses are as follows.

Stock of Raw material 1 st Oct. 2011.	35,000
Stock of Raw material 31 st Mar. 2012.	4,900
Stock of finished goods 1 st Oct 2011.	Nil
Stock of finished goods 31 st Mar, 2012.	35,000
Purchases	52,500
Factory on cost	17,500
Sales	1,89,000
Wages	95,000
Office on cost	10,000

From 1st April 2012 expected rise in the cost of material will be 15% and in wages 10%. You are required to prepare a tender for 1000 electric pumps to gain same percentage of profit.

- (4) The following figure relate to the costing of manufacturer of electric fan of uniform size and quality for a period of 3 months.

Complete stock 1 st October 2012	Nil
Complete stock 31 st December 2012.	20,250
Stock of Raw material 1 st October 2012.	5,000
Stock of Raw material 31 st December 2012.	3,500
Factory wages	75,000
Indirect charges	12,500
Material purchased	32,500
Sales	1,12,500

The number of fans manufactured during the three months was 3000. Prepare a statement showing the cost per fan and the price to be quoted for 750 fans to realize the same percentage of profit as well realized during the months referred above assuming identical costs.

- (5) Wox cooler company has provided you the following information Prepare a statement of cost & tender.

Stock of raw material 31 st Dec. 2011	42,000
Stock of raw material 31 st Dec 2012.	20,400
Stock of finished goods 31 st Dec. 2011.	19,200
Stock of finished goods 31 st Dec. 2012.	45,000
Wages	2,98,200
Purchases	4,45,500
Sales	8,88,000
Factory on cost	65,604
Office on cost	53,286

Company wants to submit a tender for a machinery which will require material of Rs.30,000 and wages of Rs.18,000 and which will show a profit of 20% on sales. Factory overheads based on direct wages and an office overhead is based on factory cost.

- (6) The books of Account of ABC Company Ltd. engaged in the manufacturing of electric pumps shows for 2012; the followings. Material Rs.1,00,000; Direct wages Rs.2,00,000. Work overheads exp. Rs.50,000; office overheads exp. Rs.35,000.

Show the Prime cost, the work cost and the total cost of manufacture, the percentage that the work overheads expenses bear to direct wages and percentage the office overheads expenses bear to the work cost. What price

should the company quote to manufacture electric pump. Which will require material worth Rs.800 and Rs.1000 for wages, so that it will yield a profit of 10% on selling price?

- (7) In respect of a factory the following figures have been obtained for the year 2012. Cost of material Rs.6,00,000; wages for labour Rs.5,00,000; Factory overheads Rs.3,00,000; Administration charges Rs.3,36,000; selling charges Rs.2,24,000; Distribution charges Rs.1,40,000; Profit Rs.4,20,000. A work order has been executed in 2013 and the following expenses have been incurred. Material Rs.8000; Wages Rs.5000. Assuming in 2009 the rate of factory overhead has gone up by 20%. Distribution charges have been gone down by 10% and Selling and Administration charges each gone up by 12% at what price should the product be sold, so as to earn the same rate of profit on the selling price as in 2012. Factory overhead is based on direct labour and Administration selling & distribution charges on factory cost.
- (8) The following cost data are available from the books for the year ended 31st March 2012. Direct material 9,00,000; Direct wages 7,50,000; Profit 6,09,000 selling & Distribution overhead 5,25,000; Administration overhead Rs.4,20,000, Factory overhead 4,50,000. Prepare a cost sheet. In 2011 - 12 the factory has received an order for a number of jobs. It is estimated that the direct material would be Rs.12,00,000 and direct labour would cost 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 & distribution overhead has gone up by 15%. The factory recovers factory overhead as a percentage of direct wages and administration and selling & distribution overheads as a percentage of work cost, based on the cost rates prevalent in the previous year?
- (9) A scooter manufacturer had produced 100 scooter at a total cost of Rs.3,08,000 during the year 2012. and sold for Rs.4000 each. Particulars of expenses are as follows (1) Material Rs.1,00,000 (2) Direct wages Rs.1,50,000 (3) Factory on cost Rs.30,000 (4) Office on cost Rs.28,000. For the year 2013 he estimates as follows:-
- a) Each scooter will require material of Rs.1,000 and wages of Rs.1,500.
- b) Ratio of factory on cost to wages & office on cost with factory cost. The percentage for both the expense will be same for 2018. If selling price will increase by Rs.80. Show the profit that will earn by per scooter.
- (10) Vijay scooter Ltd. has manufactured 175 scooter in the year 2012 and sold out for Rs.5,400 per scooter. The cost was made up of.

Material	2,82,000
Direct wages	3,24,000
Factory on cost	48,600
Office on cost	65,460

Total	7,20,060
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For the next year 2013, he estimates:-

- a) That each scooter will require material of Rs.1,600 and wages of Rs.1800.
- b) That the percentage of factory on cost to wages and office on cost to factory cost as of the last year. (c) Prepare statement of cost showing the profit he should earn per scooter, if selling price is reduced by Rs.200.

- (11) Bharat electronics company has manufactured 10,000 T.V. sets in year 2012. The particulars of expense are as follow.

Material	90,000	Sale of scrap	2,000
Motive power	10,000	Plant repairs	11,500
Indirect wages	15,000	Direct wages	60,000
Repair charges of faulty work	3,000	Consumable stores	2,000
Selling expenses	5,500	Heating	5,500
Office expenses	33,500	Net selling price	31.60

From 1st Jan 2012. It was agreed that the sales price should be reduced by 60 paisa and was confirmed to Rs.31. Due to increase in efficiency, the output will increase by 50% and there will be increase in cost of material and wages by 10%. Prepare statement of cost for 2012 and estimated statement cost for 2013.

- (12) M/s VE Engineering Company Ltd. has manufactured 2000 sewing machines. The particulars of expense are as follows:-

Material consumed	1,60,000	Selling expenses	60,000
Wages	2,40,000	General expenses	40,000
Factory on cost	1,00,000	Salaries	1,20,000
Rent, Rates & insurance	20,000	Sales	8,00,000

Company plans for 2013 to manufacture 3000 sewing machines showing a profit at 10% on sales. 1) Increase in the cost of material by 20%. 2) Increase in the cost of wages by 10%. 3) Factory on cost will increase in joint proportion of material and wages. 4) Per unit selling expense will remain same. 5) Other expenses will remain unaffected by the rise in output.

- (13) M/s ABC company Ltd. has provided you the financial position for the year 31st March 2012. You are required to prepare a statement of cost and also prepared proposed statement of cost for 2013.

Trading & P & L A/c for the year ended 31st March 2012.

Particulars	Amount	Particulars	Amount
Cost of material	80,000	Sales	4,00,000
Direct wages	1,20,000		
Factory expenses	50,000		
Gross profit	1,50,000		
	4,00,000		4,00,000
Office salaries	60,000	Gross profit	1,50,000

Rent, Rates & insurance	10,000		
Selling expenses	30,000		
General expenses	20,000		
Net profit	30,000'		
	1,50,000		1,50,000

For the next year, it is estimated that, output will go up by 200 Fridge, out of the last year's 1000 fridge. Increase in cost of material by 20%; increase in cost of wages by 5%. Factory on cost will increase in joint proportion of material & wages. Per unit selling expenses remain same and other expenses will remain unaffected, by the rise in output.

- 14) The Raj Narayan Co. has furnished you the summarized Trading P & L A/c for the year ending on 31st March 12 in which 800 Typewriter were sold by the Co. Trading & profit & loss a/c for the year ended 31st March 2013.

Particulars	Amount	Particulars	Amount
Material	32,000	Sales	1,60,000
Direct wages	48,000		
Factory expenses	20,000		
Gross profit	60,000		
	1,60,000		1,60,000
Office salaries	24,000	Gross profit	60,000
Rent, Rates & insurance	4,000		
Selling expenses	8,000		
General expenses	12,000		
Net profit	12,000		
	60,000		60,000

Following is the estimates were made by costing department of company for the year ending 31st March 2013.

(a) The output & sales of typewriter will be 1000 units. (b) The price of material will rise by 25% on the previous year's level. (c) Wages during the year will rise by 12.5%. (d) Manufacturing expense will rise in proportion to the combined cost of material and wages. (e) Selling cost per unit will remain unchanged. (f) Other expense will be remaining unaffected by the rise in output.

From the above information prepare a cost statement showing the price at which a typewriter would be marked so as to show a profit of 10% on the selling price.

- 15) The cost structure of an article the selling price of which is Rs. 45,000 is as follows.

Direct material	50% of Total cost
Direct labour	20% of Total cost

Overhead's 30% of Total cost

An increase of 15% in the cost of material and 25% in the cost in labour is anticipated. These increased costs in relation to the present price would cause a 25% decrease in the amount of present profit per article. You are required to prepare :- a statement of profit per article as at present.

- 16) The metal product company produces a sewing machine that sells for Rs.300. An increase of 15% in cost of material and 10% in cost of labour is anticipated. If the only figures available are those given below. What must be the selling price to give the same percentage of profit as before?

A) Material cost has been 45% of cost of sales. B) Labour cost has been 40% of cost of sales. C) Overheads costs have been 15% of cost of sales. D) The anticipation increased cost in relation to the present sales price would cause 35% decrease in the present gross profit.

- 17) The cost structure of an article, the selling price of which is Rs.500, is as follows. Direct material 50% of total cost; direct labour 30% of total cost; overhead balance.

Due to anticipated increase in existing material price by 20% and in the existing labour rate by 10% the existing profit would come down by 30% if the selling price remains unchanged.

Prepare comparative statement showing the cost, profit & selling price under the present conditions and with the increase expected for the future assuming the same percentage of profit on cost as under the present conditions had to be earned. (Calculations may be made to the nearest rupee)

- 18) Indian plastic makes an average profit of rs.1.25 per plastic bucket on a selling price of Rs.16 per piece by producing 60,000 buckets or 60% of the potential capacity. Its cost of sales per piece is:

Particular	Rs.
Direct Material	5.00
Direct Wages	1.65
Work overheads	5.00(50%fixed)
Admin overhead	2.70(fixed)
Sales overhead	0.40(25%variable)

During the current year it intends producing the same number but anticipate that fixed charges will go up by 10%, while the rate of direct labour and direct material will increase 3.33% and 6% respectively. There is no scope for increasing the selling price due to keen competition. Under this situation, it obtains an offer from Indian Railway for further 20% of its capacity. What minimum price per piece should be quoted to the railway to insure that it earns an overall profit of Rs.1,00,000.

Prepare a statement for a submission to your client.

19) The cost manufacturing 5000 units of a commodity comprises:

	Amount
a) Material	20,000
b) Wages	25,000
c) Chargeable expenses	400
d) Fixed overheads	16,000
e) Variable overheads	4,000

for manufacturing every 1000 extra units of a commodity the cost of production increases as follows:

- a) Material: proportionately
- b) Wages: 10% less proportionately
- c) Chargeable expenses: no extra cost
- d) Fixed overheads Rs.200 extra
- e) Variable overheads: 25% less than proportionately.

Calculate the estimated cost of producing 8000 units of a commodity and show how much it will defer if a flat rate of factory overheads based on wages were charged.

* * * * *

Unit II

Marginal Costing & Decision Making

Marginal Cost is defined as, 'the change in aggregate costs due to change in the volume of production by one unit'.

The Institute of Cost and Management Accountants, London, has defined Marginal Costing as "**the ascertainment of marginal costs and of the effect on profit of changes in volume or type of output by differentiating between fixed costs and variable costs**".

In this technique of costing only variable costs are charged to operations, processes or products, leaving all indirect costs to be written off against profits in the period in which they arise.

Thus, in this context, marginal costing is not a system of costing such as process costing, job costing, operating costing, etc. but a technique which is concerned with the changes in costs and profits resulting from changes in the volume of output. Marginal costing is also known as 'variable costing'.

Basic Characteristics of Marginal Costing:

The main characteristics of marginal costing are as follows:

- a.** It is a technique of analysis and presentation of costs which help management in taking many managerial decisions and is not an independent system of costing such as process costing or job costing.
- b.** All elements of cost—production, administration and selling and distribution are classified into variable and fixed components. Even semi-variable costs are analysed into fixed and variable.
- c.** The variable costs (marginal costs) are regarded as the costs of the products.
- d.** Fixed costs are treated as period costs and are charged to profit and loss account for the period for which they are incurred.

- b. Removes the complexities of under-absorption of overheads.**: It does e. The stocks of finished goods and work-in-process are valued at marginal costs only.
- f. Prices are determined on the basis of marginal cost by adding ‘contribution’ which is the excess of sales or selling price over marginal cost of sales.**

Assumptions of Marginal Costing:

The technique of marginal costing is based upon the following assumptions:

- a. All elements of cost— production, administration and selling and distribution— can be segregated into fixed and variable components.**
- b. Variable cost remains constant per unit of output irrespective of the level of output and thus fluctuates directly in proportion to changes in the volume of output.**
- c. The selling price per unit remains unchanged or constant at all levels of activity.**
- d. Fixed costs remain unchanged or constant for the entire volume of production.**
- e. The volume of production or output is the only factor which influences the costs.**

4. Advantages of Marginal Costing:

The following are the important advantages of marginal costing:

- a. Simple to Operate And Easy To Understand.** The technique of marginal costing is very simple to operate and easy to understand. Since, fixed costs are kept outside the unit cost; the cost statements prepared on the basis of marginal cost are much less complicated.
away with the need for allocation, apportionment and absorption of fixed overheads and hence removes the complexities of under-absorption of overheads.
- c. Helps In Production Planning:** Marginal cost remains the same per unit of output irrespective of the level of activity. It is constant in nature and helps the management in production planning.
- d. No Possibility of Factitious Profits:** It prevents the carry forward of current year's fixed overheads through valuation of closing stocks. Since fixed costs are not considered in valuation of closing stocks, there is no possibility of factitious profits by over-valuing stocks.
- e. facilitates the calculation of various important factors, viz. BEP:-** It facilitates the calculation of various important factors, viz., break-even point, expectations of profits at different levels of production, sales necessary to earn a predetermined

target of profit, effect on profit due to changes of raw materials prices, increased wages, change in sales mixture, etc.

f. Aid to management for decision-making:- It is a valuable aid to management for decision-making and fixation of selling prices, selection of a profitable product/sales mix, make or buy decision, problem of key or limiting factor, determination of the optimum level of activity, close or shut down decisions, evaluation of performance and capital investment decisions, etc.

g. facilitates the study of relative profitability:- It facilitates the study of relative profitability of different product lines, departments, production facilities, sales divisions, etc.

h. Complimentary to standard costing and budgetary control: It is complimentary to standard costing and budgetary control and can be used along with them to yield better results.

i. Help in cost control: Since fixed costs are not controllable and it is only variable or marginal cost that is controllable, marginal costing, by dividing costs into controllable and non-controllable, help in cost control.

j. Helps the management in profit planning: It helps the management in profit planning by making a study of relationship between cost, volume and profits. Further, break-even charts and profit graphs make the whole problem easily understandable even to a layman.

k. Useful in management reporting: It is very useful in management reporting, marginal costing facilitates 'management by exception' by focussing attention of the management towards more important areas than to waste time on problems which do not require urgent attention of the higher managements.

Limitations of Marginal Costing:

In spite of so many advantages, the technique of marginal costing suffers from the following limitations:

a. Based on assumptions:-The technique of marginal costing is based upon a number of assumptions which may not hold good under all circumstances.

b. Classifications of cost is difficult: All costs are not divisible into fixed and variable. There are certain costs which are semi-variable in nature; it is very difficult

and arbitrary to classify these costs into fixed and variable elements.

- c. **Variable cost do not remain constant:** Variable costs do not always remain constant and do not always vary in direct proportion to volume of output because of the laws of diminishing and increasing returns.
- d. **Selling prices do not remain constant** forever and for all levels of output due to competition, discounts for bulk orders, changes in the general price level, etc.
- e. **Fixed costs do not remain constant** after a certain level of activity. Further, marginal costing ignores the fact that fixed costs are also controllable.
- f. **Exclusion of fixed costs:** The exclusion of fixed costs from the stocks of finished goods and work-in-progress is illogical since fixed costs are also incurred on the manufacture of products. Stocks valued on marginal costing are undervalued and the profit and loss account cannot reveal true profits. Similarly, as the stock is undervalued, the balance sheet does not give a true picture.
- g. Although the technique of marginal costing overcomes the problem of under or over-absorption of fixed overheads, the problem still exists in regard to under or over-absorption of variable overheads.
- h. **Ignores the 'time factor':-** Marginal costing completely ignores the 'time factor'. Thus, if two jobs give equal contribution but one takes longer time to complete, the one which takes longer time should be regarded as costlier than the other. But this fact is ignored altogether under marginal costing.
- i. The technique of marginal costing **cannot be applied in contract or ship-building industry** because in such cases, normally the value of work-in-progress is very high and the exclusion of fixed overheads may result into losses every year and huge profit in the year of completion of the job.
- j. Cost control can be better be achieved with the help of other techniques, viz., standard costing and budgetary control than by marginal costing technique.
- k. Fixation of selling prices in the long run cannot be done without considering fixed costs. Thus, pricing decisions cannot be based on marginal cost alone.

1. In the present days of automation, the proportion of fixed costs in relation to variable costs is very high and hence managerial decisions based upon only the marginal cost ignoring equally important element of fixed cost may not be correct.

Application of Marginal costing:-

1. Fixation of Selling Price: Fixation of selling price of a product is, no doubt, one of the most significant factors in modern management. It becomes necessary for various purposes, like, under normal circumstances of the interest; at trade depression, accepting additional order etc.

Under normal conditions, according to Financial Accounting technique, the selling price of the product must cover the total cost plus a certain margin of profit. But, under Marginal Costing technique, the price must equal the marginal cost plus a certain amount which depends on the nature, variety, demand and supply, policy pricing and other related factors.

Needless to mention that, if the selling price of the product is fixed at Marginal Cost, the amount of loss will be the amount of fixed overheads and the amount of loss will be same or lower if the production is suspended or closed down.

That is why selling in all the periods/loss must be higher than Marginal Cost. In this regard we should remember that it would be easier for us if profitability of a product is known while fixation of selling price.

2. Diversification of Products: In order to capture a new market or to utilise idle facilities etc., it may so happen that a new product may be introduced in the market together with the existing one. Naturally, the question arises before us whether the same will be a profitable product one.

In this regard it may be mentioned that the new product may be introduced only when the same is capable of contributing something against fixed cost and profit. Fixed cost will not be considered here on the assumption that the same will not increase, i.e., the new product will be produced out of existing resources.

3. Selection of Most Profitable Product-Mix: If any firm produces more than one product it may have to decide in what ratio should the products be produced or sold in order to earn maximum profit. However, the marginal costing techniques help us to a great extent while determining the most profitable product or sales mix.

Contribution under various mix will be determined first. Then the product which gives the highest contribution must be given the highest priority, and vice versa. Similarly, any product which gives negative contribution should be discontinued.

4. Make-or-Buy Decisions: Sometimes a firm may have to face a problem as to whether a part should be produced or the same should be purchased from the outside open market.

In this case, the following two points should carefully be considered:

- (a) The Marginal Cost of the product; and
- (b) Whether surplus capacity is available.

Needless to mention here that the decision in such a case is taken after comparing the price which has to be paid and the savings which can also be effected in terms of Marginal

In other words, if the marginal costs are lower than the purchase price it may be suggested to produce that article in the factory itself.

Moreover, if the surplus capacity is not available and, at the same time, making the parts in the factory involves putting aside other work, the loss on contribution so made must also be considered together with marginal cost. In short, if the purchase price—which are quoted by the outside sellers—is higher than the marginal cost plus a portion of fixed cost plus loss of contribution, the same may be produced by the factory.

5. Alternative Method of Production: It is interesting to note that the techniques of marginal costing are frequently applied while comparing the alternative methods of production, viz., whether one machine is to be employed instead of another, machine-work or hand-work etc. It should be remembered that the basis of selection would, however, be the relative contribution available from various methods when fixed costs are constant. That is, the method of production which will give the greatest contribution should be selected. Time factor or limiting factor, if any, should carefully be considered.

6. Effect of Change in Selling Price: Effect of change in selling prices is another significant factor which creates problem, particularly when a firm needs expansion. For its wider market the selling price of the product may be reduced. Needless to

mention that the effect of such a change in selling price should carefully be considered.

7. Shut-Down or Continue Decisions: Due to trade recession, unprofitable operation etc. it often becomes necessary for the management to suspend or close-down temporarily or permanently a part of activity which should be taken after careful relevant consideration. In the circumstances, absorption costing techniques will distort the position due to fixed cost while marginal costing technique helps us to take proper decision in this case.

That is, if the products make a contribution towards fixed costs, it is advisable to continue the same because losses are minimised. Similarly, if the operation is suspended, certain fixed costs may be avoided but certain fixed costs may yet have to be incurred (i.e., maintenance of plant).

Thus, the decision depends on whether the contribution so made is more than the difference between the fixed costs in the normal courses of operation and the fixed costs incurred in the plant is shut-down.

Key Factor Analysis: The management has to prepare a plan after taking into consideration the constraints, if any, on the various resources. These constraints are also known as limiting factors or principal budget factors as discussed in the topic of 'Budgets and Budgetary Control'. These key factors may be availability of raw material, availability of skilled labour, machine hours availability, or the market demand of the product. Marginal costing helps the management to decide the best production plan by using the scarce resources in the most beneficial manner and thus optimize the profits.

Break-Even Analysis

Break-even analysis is a technique widely used by production management and management accountants. It is based on categorising production costs between those which are "variable" (costs that change when the production output changes) and those that are "fixed" (costs not directly related to the volume of production).

Total variable and fixed costs are compared with sales revenue in order to determine the **level of sales volume, sales value or production at which the business makes neither a profit nor a loss (the "break-even point")**.

The point at which total of fixed and variable costs of a business becomes equal to its total revenue is known as **break-even point (BEP)**. At this point, a business neither earns any profit nor suffers any loss. Break-even point is therefore also known as no-profit, no-loss point or zero profit point. Calculation of break-even point is important for every business because it tells business owners and managers how much sales are needed to cover all fixed as well as variable expenses of the business or the sales volume after which the business will start generating profit. The computation of sales volume required to break-even is known as break-even analysis. The concept explained above can also be presented as follows:

When there is profit:

Revenues > Variable cost + Fixed Cost

At Break Even Point:

Revenues = Variable cost + Fixed Cost

When there is loss:

Revenues < Variable cost + Fixed Cost

Assumptions of Break Even Point: The concept of break even point is based on the following assumptions.

1. Production and sales are the same, which means that as much as is produced is sold out in the market. Thus there is no inventory remaining at the end.
2. Fixed cost remains same irrespective of the production volume.
3. Variable cost varies with the production. It changes in the same proportion that of the production. Hence it has a linear relationship with the production. In other words, variable cost per unit remains the same.
4. Selling price per unit remains same irrespective of the quantity sold.

Objectives of Break Even Analysis

The following are the important objectives of cost volume profit analysis:

- (1) Cost volume is a powerful tool for decision making.
- (2) It makes use of the principles of Marginal Costing.
- (3) It enables the management to establish what will happen to the financial results if a specified level of activity or volume fluctuates.
- (4) It helps in the determination of break-even point and the level of output required

to earn a desired profit.

(5) The PV ratio serves as a measure of efficiency of each product, factory, sales area etc. and thus helps the management to choose a most profitable line of business.

(6) It helps us to forecast the level of sales required to maintain a given amount of profit at different levels of prices

Benefits:

The following are the benefits out of break-even analysis:

1. Make or buy decision: The C-V-P analysis assists in making a choice between two courses of action to make versus to buy. If the variable cost is less than the price that has to be paid to an outside supplier, it may be better to manufacture than to buy.

2. Production planning: The C-V-P analysis helps in planning the production of items giving maximum contribution towards profit and fixed costs.

3. Cost control: As a cost control device, the C-V-P analysis can be used to detect insidious upward creep of costs that might otherwise go unnoticed.

4. Financial structure: Break-even analysis provides an understanding of the behaviour of profits in relation to output. This understanding is significant in planning the financial structure of a company.

Limitations of Break even Point: The following limitations of break-even analysis have to be kept in mind while making use of this tool:

1. Many costs and their components do not fall into neatly compartmentalized fixed or variable cost categories as they possess the characteristics of both types.

2. If company sells several products, the financial manager has to prepare and evaluate a number of profit-graphs covering integrated segments of independent activities.

3. A break-even chart represents a short-run static relationship of costs and output and become obsolete very quickly.

4. The relations indicated in the break-even chart do not help for all levels of operations. Costs tend to be higher than shown on the static break-even chart when the plant's operation approaches 100 percent of its capacity.

5. The frequent changes happening in the selling price of the product affect the reliability of the break even analysis.

6. The cost of securing funds to expand is disregarded in break-even chart.

In spite of the above mentioned limitations, the breakeven analysis has high place in financial management.

Marginal Cost Equation The Following are the main important equations of Marginal Cost :

$$\text{Sales} = \text{Variable Cost} + \text{Fixed Expenses} \pm \text{Profit} / \text{Loss}$$

(OR)

$$\text{Sales} - \text{Variable Cost} = \text{Fixed Cost} \pm \text{Profit or Loss}$$

(OR)

$$\text{Sales} - \text{Variable Cost} = \text{Contribution}$$

(OR)

$$\text{Contribution} = \text{Fixed Cost} + \text{Profit}$$

The above equation brings the fact that in order to earn profit the contribution must be more than fixed expenses. To avoid any loss, the contribution must be equal to fixed cost.

The break-even point can be calculated by the following formula :

Break-Even Point in Units

(1) Break-Even Point in Units	$= \frac{\text{Total Fixed Cost}}{\text{Contribution per unit}}$
(or) B E P (in units)	$= \frac{F}{C}$
(2) Break-Even Point in Units	$= \frac{\text{Total Fixed Cost}}{\text{Selling Price} - \frac{\text{Variable Cost}}{\text{Per unit}}}$

Break-Even Point in Sales Volume

(1) Break-Even Sales	$= \frac{\text{Fixed Cost} \times \text{Sales}}{\text{Sales} - \text{Variable Cost}}$ <p style="text-align: center;">(or)</p> $= \frac{F \times S}{S - V}$
(2) Break-Even Sales	$= \frac{\text{Fixed Cost}}{\frac{\text{Variable Cost}}{\text{Sales}}}$ <p style="text-align: center;">(or)</p> $= \frac{F}{1 - \frac{V}{S}}$
(3) Break-Even Sales	$= \frac{\text{Fixed Cost}}{\text{P / V Ratio}}$
Profit Volume Ratio (P/V ratio)	$= \frac{\text{Contribution}}{\text{Sales}} \times 100$

Contribution The term Contribution refers to the difference between Sales and Marginal Cost of Sales. It also termed as "Gross Margin." Contribution enables to meet fixed costs and profit. Thus, contribution will first covered fixed cost and then the balance amount is added to Net profit. Contribution can be represented as:

$$\text{Contribution} = \text{Sales} - \text{Marginal Cost}$$

$$\text{Contribution} = \text{Sales} - \text{Variable Cost}$$

$$\text{Contribution} = \text{Fixed Expenses} + \text{Profit}$$

$$\text{Contribution} - \text{Fixed Expenses} = \text{Profit}$$

$$\text{Sales} - \text{Variable Cost} = \text{Fixed Cost} + \text{Profit}$$

Profit Volume Ratio (P/V Ratio) Profit Volume Ratio is also called as Contribution Sales Ratio (or) Marginal Income Ratio (or) Variable Profit Ratio. It is used to measure the relationship of contribution, the relative profitability of different products, processes or departments.

The following formula for calculating the P / V ratio is given below:

The following formula for calculating the P / V ratio is given below :

$$(1) \text{ P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \quad (\text{or}) \quad \frac{C}{S} \times 100$$

$$(2) \text{ P/V Ratio} = \frac{\text{Sales} - \text{Variable Cost}}{\text{Sales}} \times 100 \quad (\text{or}) \quad \frac{S - V}{S} \times 100$$

$$(3) \text{ P/V Ratio} = \frac{\text{Fixed Cost} + \text{Profit}}{\text{Sales}} \times 100 \quad (\text{or}) \quad \frac{F + P}{S} \times 100$$

When we find out the P / V Ratio, Break-Even Point can be calculated by the following formula :

$$(a) \text{ B E P (Sales volume)} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}}$$

(b) Fixed Cost = B E P x P / V Ratio

(c) Sales required in units to maintain a desired profit :

$$= \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P/V Ratio}}$$

$$(\text{or}) = \frac{F + P}{\text{P/V Ratio}}$$

$$(\text{or}) = \frac{\text{Required Contribution}}{\text{New Contribution per unit}}$$

(d) Contribution = Sales x P / V Ratio

(e) Variable Cost = Sales (1 – P / V Ratio)

Margin of Safety: Margin of Safety is the difference between the actual sales and the break even sales. As we have discussed, at the break even point there is neither any profit nor loss. Hence any firm will always be interested in being as much above the break even level as possible. Margin of safety explains precisely this thing and the higher the safety margin the better it is. Margin of safety is computed as follows.

Margin of Safety (in Rs.) = Total Sales - Sales at BEP

Margin of Safety can be calculated by the following formula :

$$(1) \text{ Margin of Safety} = \text{Total Sales} - \text{Break-Even Sales}$$

$$(2) \text{ Margin of Safety} = \frac{\text{Profit}}{\text{P / V Ratio}}$$

$$(3) \text{ Margin of Safety} = \frac{\text{Profit}}{\text{Contribution}} \times \text{Sales}$$

$$(4) \text{ Profit} = \text{Margin of Safety} \times \text{P / V ratio}$$

Marginal Costing

- 1) From the following find out Break Even point Sales 1,00,000; fixed cost 20,000;
Variable cost Rs.50,000
- 2) Given Fixed Cost-1,00,000 variable cost per unit -10; Selling price per unit-15;
units sold 10,000 units;- Find out 1) BEP 2)P/V Ratio 3) Margin of safety.
- 3) Information are given as under:-
 1) Variable cost per unit Rs.3 2) Selling price per unit Rs.5 3) Fixed cost Rs.
20,000 4) units sold 30,000. Find out 1) BEP 2)P/V Ratio 3)Break even point in
units 4) Margin of safety 5) Sales at desired profit Rs.40,000 6) Profit on a sale
of Rs.2,00,000.
- 4) Selling price per unit Rs.20; variable cost per unit Rs.15. Fixed cost Rs.20,000
units sold 4000 Find out :-1) Break Even Point in Rs/units 2) Profit volume
ratio 3) Margin of safety 4) Sale on desired profit of Rs.50,000 5) Profit on
desired sale of Rs.6,00,000 6) Break Even Point if selling price reduced by 10%.
- 5) A Company submitted the following information variable cost per units Rs.8;
selling price per unit Rs.10; units sold 50,000; fixed cost 20,000 Find out:-
1)Break even point in Rs and units 2) Profit volume ratio 3) Margin of safety 4)
Break Even Point if selling price increase by 10% 5) Break even point if selling
price decrease by 10%.
- 6) Following information is given from the books of Ramesh company Ltd. P/V
ratio 25%; Fixed cost Rs.30,000 Calculate a) Net profit for the sales of

Rs.6,00,000 b) Required sales to earn Net profit of Rs.1,40,000. c) BEP (Rs.)

- 7) From the following information, ascertain by how the value of sales must be increased by the company to reach the level of break even point. Sales Rs.3,00,000; Fixed cost Rs.1,50,000; Variable cost Rs.2,00,000.
- 8) Consider the following information. Fixed cost Rs.20,000 selling price per unit Rs.10 and variable cost per unit Rs.6 Show the impact on Break Even Point if fixed cost increase by 20,000.
- 9) By the following information find out Break Even Point 1) Material per unit Rs.10 2) Wages per unit Rs.5 3) Other variable overhead per unit Rs.2 4) Selling price per unit Rs.20 5) Units sold out 10,000 6) Fixed cost 20,000.
- 10) Find out by the help of following information. 1) Break Even Point in Rs. 2) Margin of safety a) Prime cost Rs.5 per unit b) variable cost Rs.1 per unit c) Fixed cost Rs.20,000 d) Selling price Rs.10 per unit e) unit sold out 10,000
- 11) From the following particulars find out the Break-even point of sale :

Variable cost per unit	Rs. 30
Selling price per unit	Rs. 50
Fixed expenses	Rs. 1,00,000

- (a) What should be the selling price per unit, if the Break-even point is brought down to 4000 units?
- (b) If the present volume of sales is Rs. 4,00,000, what is the "margin of safety" on the basis of data given in (a) above ?

- 12) You are given the following particulars :

Selling price	Rs. 200 per unit
Variable cost	Rs. 100 per unit
Total fixed cost	Rs. 96,000

Calculate : (i) Break-even units and value ii) Sales to earn a profit of Rs. 20 per unit

- 13) The cost data relating to the manufacture of a product are as follows :

	Per unit (R.s.)
Selling price	10
Trade discount	5% of selling price

Material cost	3
Labour	2
Overheads:	
Fixed	Rs. 10,000 (Total)
Variable	100% of labour cost

You are required to calculate :

- a) Sales at BEP both in units and value
- b) Profit when sales are 10% above the Break-even value.

14) A retail dealer in garments is currently selling 24,000 shirts annually. He supplies the following details for the year ended 31st December, 2012

Selling Price per shirt Rs.	40
Variable Cost per shirt	25
Fixed Cost: Staff Salaries for the year	1,20,000
General Office Costs for the year	80,000
Advertising Costs for the year	40,000

As a cost accountant of the firm you are required to answer the following each part independently:

(i) Calculate the break-even point and margin of safety in sales revenue and number of shirts sold. (ii) Assume that 20,000 shirts were sold in a year, find out the net profit of the firm.(iii) If it is decided to introduce selling commission of Rs. 3 per shirt, how many shirts would you require to be sold in a year to earn a net income of Rs. 15,000 (iv) Assuming that for the year 2012 an additional Staff salary of Rs. 33,000 is anticipated, and price of a shirt is likely to be increased by 15% what should be the break even point in number of shirts and sales revenue ?

15) A Bank conducts competitive examination every year for selection of candidates for the post of Probationary Officers. Each candidate is charged an entrance fee of Rs. 75 for admission to the examination. Data gathered for the last two years as under :

Particulars	Year	
	2011	2012
Fees Collected	3,00,000	3,75,000
Cost:-		
Valuation of Answer books	1,20,000	1,50,000
Question Paper	80,000	1,00,000
Hire of Hall	12,000	12,000
Honorarium of examination superintendent	10,000	10,000
Invigilators @ of 1 invigilators for every 50 students @ Rs.100 per day for 2 days	16,000	20,000
General expenses	12,000	12,000
Total	2,50,000	3,04,000
Net Income	50,000	71,000

In 2013, it is expected that 6,000 candidates will appear for the entrance examination. The hall rent and general expenses are expected to increase by Rs. 3,000 and Rs. 8,000 respectively.

You are required to calculate the following for 2013 :

- (i) Budgeted Income (ii) Break-even Number of Candidates
 - (iii) Number of Students required to appear for the examination to earn a net revenue of Rs. 1,00,000.
- 16) A company had incurred fixed expenses of Rs. 2,25,000 with sales of Rs. 7,50,000 and earned a profit of Rs. 1,50,000 during the first half year. In the second half year, it suffered a loss of Rs. 75,000. Calculate (i) The profit-volume ratio, break-even point and margin of safety for the first half year. (ii) Expected sales-volume for the second half year assuming that selling price and fixed expenses remained unchanged during the second half year.
- 17) a) Given the following, find the margin of safety sales :
- | | |
|-----------------------------|------------|
| (i) Profit earned | Rs. 24,000 |
| (ii) Selling price per unit | Rs. 10 |
| (ii) Marginal cost per unit | Rs. 7 |
- 18) Profit volume ratio is 60% and marginal cost of a product is Rs.20 what will be the selling price?
- 19) Selling price Rs.40 per unit; variable cost Rs.30 per unit Fixed costs.80,000. Calculate selling price. If the break-even units be reduced to 5,000units
- 20) Vidarbha steel company submitted the following information.

Sales	2,00,000
(-) Variable cost	<u>1,50,000</u>
Gross profit	50,000
(-) Fixed cost	<u>25,000</u>
Net profit	<u>25,000</u>

Find out :-1) Break Even Point 2) Profit volume ratio 3) Margin of safety 4) Margin of safety on sale of a sales of Rs.3,00,000 5) Profit on a sales of Rs.3,00,000 6) What will be the additional sales required if the salary of sales manager increase by Rs.3,000 p.a. 7) Sales on a profit of Rs.50,000.

- 21) A person plans to sell a toy rocket at Maharashtra Industrial Fair. He may purchase these Rocket at Rs. 5 each with privilege of returning all unsold Rockets. The rent of the stall at the fair is Rs. 2,000 payable in advance. The Rocket will be sold at Rs. 9 each. Find out :-1) Break Even Point 2) Profit volume ratio
- 22)

Year	Sales	Total cost
1990	Rs. 20,000	Rs. 16,000
1991	Rs. 30,000	Rs. 22,000

You are required to calculate :-P/V ratio 2) fixed cost 3) sales to earn a profit of Rs. 6,000 4) Break even sales volume 5) profit when sales are Rs. 16,000.

- 23) Following information of Anand Limited :-

Year	Sale	Profit
1994	1,20,000	9,000
1995	1,40,000	13,000

You may assume cost construction and selling price is same both the years.

Find out 1) Profit volume ratio 2) Break even point 3) profit on a sale 1,00,000 4) Sale on a profit of 20,000. 5) Margin of safety for both the year.

- 24) Alpha Company submitted following information.

Year	Sale	Profit
1 st	20,00,000	2,00,000
2 nd	25,00,000	3,00,000

Find out :- 1) Profit volume ratio 2) Break Even Point 3) Margin of safety for

both 4) sale on a desired profit Rs.4,00,000.

- 25) Cost construction for 2007 and 2008. The information is available from the book of Manohar company as under :-

Year	Sale	Profit
2007	2,40,000	(-) 20,000
2008	4,40,000	(+) 20,000

Find out :- 1) Profit volume ratio 2) Break Even Point 3) sale on a desired profit Rs.30,000 4) profit on sales of Rs.4,00,000. 5) Margin of safety for the year 2008.

- 26) The Sales Director of Phinex Ltd., requires you to compute the sales volume necessary :- a) BEP b) Make of profit of Rs.4 per unit c) Make a profit of 30% of sales d) Make a profit of Rs.30,000 per annum. e) Make of loss of 10% of sales.

Cost data as computed and collected by the cost accountant are as below:

Sale 10000 Units @ 10 per unit; Out of Pocket cost 10,000 units @ 5 per unit;
 Burden Rs.30,000 for 10,000 units; Profit Rs.20,000

- 27) Following information is received from the books of a company calculate BEP.

Year	Sale	Profit / Loss
2007	10,000	Loss 400
2008	20,000	Profit 1,600

- 29) A company sells its product at Rs. 15 per unit. In a period, if it produces and sells 8000 units, it incurs a loss of Rs. 5 per unit. If the volume is raised to 20,000 units, it earns a profit of Rs. 4 per unit. Calculate break-even point both in terms of rupees as well as units
- 30) A company has a P/v ratio of 40 percent. By what percentage must sales be increased to offset (i) 10% per cent reduction in selling price, and (ii) 20 per cent reduction in selling price
- 31) The ratio of variable cost to sales is 70%. The break-even point occurs at 60% of the capacity Find the sales capacity sales when fixed costs are Rs. 90,000. Also compute profit at 75% of the capacity sales.
- 32) Margin of safety is Rs. 2,40,000 (40% of sales) and P/v ratio is 30% of AB Ltd.,

calculate its (i) Break-even sales and (ii) Amount of profit on sales of Rs, 9,00,000.

33) A company manufactures and markets three products P, Q and R. All the three products are made from the same set of machines. Production is limited by machine capacity. From the data given below, indicate priorities for products P, Q and R with a view to maximizing profits.

Particulars	Products		
	P	Q	R
Raw Material Cost Per Unit	11.00	16.25	21.00
Direct labour Cost Per Unit	2.50	2.50	2.50
Other variable Cost Per Unit	1.50	2.25	3.50
Selling price per unit	25.00	30.00	35.00
Standard machine time required per unit in minutes	40.00	20	25

34) A company manufactures and markets products X, Y and Z. All the three products are made from the same set of machines. Production is limited by machine capacity. From the data given below, indicate priorities for products X, Y and Z with a view to maximizing profits :

Particulars	Products		
	X	Y	Z
Raw material cost per unit	11.25	16.25	21.25
Direct labour cost per unit	2.50	2.50	2.50
Other variable cost per unit	1.50	2.25	3.55
Selling price per unit	25.00	30.00	35.00
Standard machine time required per unit in minutes	39	20	28

35) The following particulars are taken from the records of a company engaged in manufacturing two products A and B from a certain material :

Particulars	Product A	Product B
	(per unit in Rs)	(per unit in Rs)
Sales	2,500	5,000
Material cost (Rs. 50 per kg.)	500	1,250
Direct labour (Rs. 30 per hour)	750	3,500
Variable overheads	250	500

Total fixed overheads : Rs. 10,00,000. Comment on the profitability of each product when : (i) Total sales in value is limited. (ii) Raw materials is in short

supply. (iii) Production capacity is the limiting factor. (iv) Total availability of raw materials is 20,000 kg. and maximum sales potential of each product is 1,000 units, find the product mix to yield maximum profits.

- 36) ABC Ltd., which produces three products, furnishes the following data for the year **2012** :

<i>Products</i>	<i>Alfa</i>	<i>Beta</i>	<i>Gama</i>
Selling price per unit (Rs.)	100	75	50
Profit/volume ratio	10%	20%	40%
Maximum sales potential (units)	40,000	25,000	10,000
Raw material as % of variable cost	50%	50%	50%

The company uses the same raw material for all the three products. Raw material is in short supply and the company has a quota for supply of raw material of the value of Rs. 18,00,000 for the year 2012 for manufacture of its products to meet its sales. Total lived cost is Rs. 6,80,000. You are required to (a) Determine a sales mix which will give the maximum overall profit keeping in view the short supply of raw material. (b) Compute that maximum profit.

- 37) A farmer asks your recommendation for optimal mix of production for the coming year. The current data are given below :

Item Produced

PARTICULARS	A	B	C	D
Area occupied (acres)	25	20	30	25
Yield per acre (tonnes)	10	8	9	12
Sale price per tonne (Rs.)	1,000	1,250	1,500	1,350
Variable cost per (acre) :				
Material (Rs.)	700	600	950	900
Labour (Rs.)	2,100	2,500	3,000	3,700
Variable overheads (Rs.)	2,000	2,000	2,000	2,000
Fixed Overheads				
Cultivation and growing	1,00,000			
Harvesting and transport	2,40,000			
Land revenue	90,000			
Administration	1,10,000			
	5,40,000			

The land which is being used for producing items A and B can be used for either items but not for items C and D. The land which is being used for producing items C

and D can be used for either items but not for items A and Ii.

In order to provide adequate market service, the farmer must produce each year at least 40 tonnes each of A and B and 36 tonnes each of C and I). You are required to calculate the following :

- (a)the profit for the current year; and
- (b)the profit for the production mix which you could recommend.

38) The Chief Cost Accountant of a company running an orchard with an adequate supply of labour, presents the following data and requests you to advise about the area to be allotted for the cultivation of various types of fruits, which result in maximization of profit. The company contemplates growing Apples, Lemons. Oranges and Peaches :

Particulars	Apples	Lemons	Oranges	Peaches
Selling price per box in Rs.	15	15	30	45
Seasons yield in boxes per acre	500	150	100	200
Cost:-	Rs.	Rs.	Rs.	Rs.
Material per acre	270	105	90	150
Labour :- Growing acre	300	225	150	195
Picking and packing per box	1.50	1.50	3	4.50
Transport per box	3	3	1.50	4.50

The total fixed costs in each season would be Rs. 2,10,000. The following limitations are also placed before you :

- (i) The area available is 450 acres, but out of this 300 acres are suitable for growing only oranges and lemons. The balance of 150 acres is suitable for growing any of the four fruits.
 - (ii) As the produce may be hypothecated to banks, area allotted for any fruit should be demarcated in complete acres and not in fractions of an acre.
 - (iii) The marketing strategy of the company requires the compulsory production of all the four types of fruits in a season and the minimum quantity of any one type to be 18,000 boxes. Calculate the total profit that would accrue if your advice is followed.
- 39) A multi product company gives the following data on cost and sales of the three

products manufactured by it.

Particulars	Products		
	X	Y	Z
Sales Mix (% of sales value)	40	30	30
Selling price per unit (Rs.)	400	250	200
Variable cost per unit (Rs.)	200	100	120
Fixed cost per unit Rs.	100	50	40
Total sales Rs.1,00,00,000			

The current level of production absorbs the entire fixed cost of the company. The management of the company wants to discontinue 'Z' and introduce 'W' to improve profitability. The revised data on production and sales are as follows:-

Particulars	Products		
	X	Y	W
Sales Mix (% of sales value)	50	30	20
Selling price per unit (Rs.)	400	250	320
Variable cost per unit (Rs.)	200	100	180
Total sales Rs.1,00,00,000			

You are required to determine: a) Fixed costs of the company per annum. b) profit currently earned and profit likely to be earned after introduction of 'W', c) Current break even sales and break even sales after introduction of 'W' d) if it is possible to increase sales of any of the product X Y & w BY 20% BY Keeping the total sales unchanged what alternate mix would you suggest for higher profit?

40) The cost per unit of the three product A, B and C of a concern are as

Particulars	A	B	C
Variable cost	20	20	18
Fixed cost	3	3	2
Total cost	23	23	20
Profit	9	7	6
Selling price	32	30	26
Number of units produced	10,000	5,000	8,000

Production arrangements are that if product of one product is given up the production of the other can be raised by 50%. The directors propose that C should be

given up because the contribution in that case is the lowest do you agree? What Other Non Cost Consideration should be kept in mind before taking decision in such situation

41) Himgiri Ltd. produces and sells three types of products P, Q and R. The management has proposed to discontinue the production of Q since there is no profit on it. From the following information, find the total profitability of the company before and after discontinuance of the product Q by preparing a marginal cost statement, and give your brief comments on the proposal of the management :

Particulars	Products		
	P	Q	R
Production (units)	3,000	2,000	5,000
	Rs.	Rs.	Rs.
Selling price	30.00	12.50	30.50
Material	6.00	3.00	7.00
Wages	4.50	5.00	4.00
Variable overheads	2.25	2.50	2.00
Fixed overheads	5.00	4.00	6.00
Total cost	17.75	14.50	19.00
Profit (Loss)	12.25	(2.00)	11.50

42) A producer is presently producing 20,000 units of a product at a total cost of Rs. 50, 00,000 and selling them in the home market at a price of Rs. 350 per unit. A new customer from Zambia offers to buy 6,000 units at a price of Rs. 200 per unit. Estimated total costs of producing 26,000 units are Rs. 60, 00,000. Would you accept the order from the Zambian customer, if: (i) there is no other better customer, and (ii) this new sale will have no impact on rest of the sale ? Show complete working.

Make or Buy Decision

- 1) A radio manufacturing co. finds that while it costs Rs.6.25 to make component R-100, the same is available in the market at Rs.5.75 each, with an assurance of contained supply. The break-down of the cost is:

	Rs. per unit
Material	2.75
Labour	1.75
Other variables	0.50
Depreciation and other fixed costs	1.25

(a) Should you make or Buy?

(b) What would be your decision, if the supplier offered the component at Rs.4.85 each?

- 2) The product X takes 20 hours to process on machine99. It has selling price of Rs.100 & marginal cost of Rs.60. The product Y (a component part used in production) could be made on machine99 in 3 hours for a marginal cost of Rs.5. The supplier's price is Rs.10. Should we make or buy Y? Discuss in both situations when machine99 is working at full capacity & when there is idle capacity? What are other non cost considerations to be kept in mind in such cases?
- 3) A firm is planning 15,000 units of an intermediate product X at an average cost of Rs.40 per unit including fixed cost of Rs.1,50,000. One third of fixed cost is avoidable. Instead of producing, the firm can buy product X from outside at Rs.32 per unit. Should the firm produce X or buy it from outside? Show complete workings.
- 4) ABC Co. Ltd produces a variety of product each having a number of component parts. Product B takes 5 hours to produce on particular machine which is working at full capacity. Product B has a selling price of Rs.100 & variable cost of Rs.60 per unit. A component part X-100 could be made on the same machine in two hours at variable cost of Rs.10 per unit. The supplier's price for the component is Rs.25 per unit. Required:- Advise whether the company should buy the component X-100.
- 5) Ridwell Cycles Ltd. purchases 20,000 bells per annum from an outside supplier at Rs.5 each. The management feels that these be manufactured and not purchased a Machine costing Rs.50,000 will be required to manufacture

the item within the factory. The machine has an annual capacity of 30,000 units and life of 5 years. The following additional information is available:

Material Cost per bell	Rs.20
Labour cost per bell	Re.01
Variable overheads	100% of labour cost

You are required to advise whether:-

- (i) The company should continue to purchase the bells from outside supplier or should make them in the factory; and

(ii) The company should accept an order to supply 5,000 bells to the market at a selling price of Rs.4.50 per unit?

6) Stoner Company uses three different components (material) in manufacturing its primary product. Stoner manufactures two of the components and purchases one (designated as component 1) from outside suppliers. The company is currently developing the annual profit plan. Sales are highly seasonal. Component 2 cannot be acquired from outsiders. However, component 3 can be purchased. The three components have critical specifications. The annual profit plan provided data for the following computations.

Component 3	(Unit cost at 12,000 units)
Material Direct	Rs.1.40
Labour Direct	Rs.2.20
Factory overheads (apportioned)	Rs.0.40
Annual Machine rental (special machine used only for component 3)	Rs.0.50
Variable factory overhead	Rs.1.00
Average storage cost per year (fixed)	<u>Rs.0.40</u>
Total	Rs.5.90

Average inventory level 500 units

The purchase manager investigated outside suppliers and found one that would sign a one year contract to deliver "12,000 top quality units as needed during the year at Rs.5.20 per unit". Serious consideration is being given to this alternative.

Should Stoner make or buy component 3? Explain the relevant factors influencing

your decision.

ADD OR DROP PRODUCT/PRODUCT-LINE DECISION

- 1) The records of Ram Ltd., which has three departments give the following figures:

	Division A	Division B	Division C	Total
Sales	12,000	18,000	20,000	50,000
Marginal Cost	13,000	6,000	15,000	34,000
Fixed Cost	1,000	4,000	10,000	15,000
Total Cost	14,000	10,000	25,000	49,000
Profit/loss	-2,000	+8,000	-5,000	+1,000

The management wants to discontinue product C immediately as it gives the maximum loss. How would you advise the management?

- 2) A Ltd. has three departments. The following data relates to the period ending 31st Dec, 2015:

	Departments		
	A	B	C
Sales (Rs.)	<u>80,000</u>	<u>40,000</u>	<u>60,000</u>
Marginal Cost:			
Direct Material	10,000	5,000	10,000
Direct Labour	4,000	5,000	16,000
Variable Overhead	10,000	5,000	20,000
Fixed Overhead	<u>20,000</u>	<u>10,000</u>	<u>20,000</u>
Total Cost	<u>44,000</u>	<u>25,000</u>	<u>66,000</u>

the manager in-charge of department is disappointed with the results because of higher marginal cost and there is no hope of being reduced further. You are required to present the information in the most suitable manner indicating whether or not Department C should be closed down.

SELLING PRICE DECISION

- 3) The following details have been extracted from the annual budget of Classic Manufacturing Co. Ltd. for the year 2015:

Particulars	Per unit (Rs.)	Per Annum (Rs.)
Selling Price	300	
Direct Material	64	
Direct Labour	48	
Production Overheads:		
Variable	32	
Fixed		40,00,000
Administration overheads:		
Fixed		30,00,000
Selling & Distribution overheads		
Variable	36	
Fixed		<u>20,00,000</u>

Currently the company is operating on margin of safety of 25%. To improve its profitability further, the company is considering the following options:

- (i) Reduce selling price by 5%. Sales volume is expected to increase by 20%.
Also fixed production and distribution overheads by Rs.3 lakhs.
 - (ii) Increase selling price by 5%. This will cause a drop in sales volume by 10%. To arrest further fall in sales, an increase of Rs.2 lakhs will be required under fixed selling and distribution overheads.
 - (iii) Production can be increased by 15% by introducing an incentive scheme for labour. This will increase direct labour cost by 25%.
 - (iv) Required:
 - (a) current level of production/sales and profit earned.
 - (b) Assuming that (i), (ii) and (iii) are mutually exclusive and other items remain unaffected, evaluate each of these options.
 - (c) If the company is able to reduce raw material cost by Rs.5 per unit by making bulk purchases and reduce the fixed overhead cost by Rs.2 lakhs by suitable economy measures at what selling price per unit should it sell its current production to earn a 10% increase in current profit?
- 4) S Ltd, manufactures and markets a single product. The following information is available:

	Rs.	Per	unit
Material			8.00
Conversion Cost (variable)			6.00
Dealer's margin			2.00
Selling Price			20.00
Fixed Cost:			(Rs.2,50,000)

Present Sales: 80,000 units

Capacity utilisation: 60%

There is acute competition. Extra efforts are necessary to sell. Suggestions have been made for increasing sales: (i) by reducing sales price by 5% and (ii) by increasing dealer's margin by 25% over existing rate. Which of two suggestions would you recommend if the company desires to maintain the present profit? Give reasons.

Profit Planning

- 1) The Delhi Mixy Co. manufactured and sold 1,000 mixers last year at a price of Rs.800 each. The cost structure of a Mixer is as follows:

	Rs.
Material	200
Labour	100
Variable cost	<u>50</u>
Marginal Cost	350
Factory Overhead (Fixed)	<u>200</u>
Total Cost	550
Profit	<u>250</u>
Sales Price	<u>800</u>

Due to heavy competition, price has to be reduced to Rs.750 for the coming year. Assuming no change in costs, state the number of Mixers that would have to be sold at the new price to ensure the same amount of total profits as that of the last year.

- 2) Present the following information to show to the management : (a)the marginal product cost and the contribution per units (b) the total contribution

and profit resulting from each of the following sales mixtures.

Particulars	Products	Per Unit
Direct Material	A	10
Direct Material	B	9
Direct Wages	A	3
Direct Wages	B	2

Fixed expenses Rs 800/-

Variable expenses are allotted to products as 100% of Direct wages.

Sales Price A Rs 20 & B Rs 15

Sales Mixture:

1. 1,000 Units of Products A and 2,000 Units of B
 2. 1,500 Units of Products A and 1,500 units of B
 3. 2,000 Units of Products A and 1,000 Units of B
- 3) A factory engaged in manufacturing plastic buckets is working at 40% capacity and produces 10,000 buckets per annum.

The present cost break up for one bucket is as under :

Particulars	Rs
Material	10
Labour Cost	3
Overheads	5 (60% fixed)

The selling price is Rs 20 per bucket.

If it is decided to work the factory at 50% capacity, the selling price falls by 3%. At 90% capacity the selling price falls by 5% accomplished by a similar fall in the prices of material.

You are required to calculate the profit at 50% and 90% capacities and also the break-even points for the same capacity productions.

- 4) A toy manufacturer earn an average net profit of Rs 3 per piece is selling price of Rs 15 by producing and selling 60,000 pieces at 60% of the potential capacity. Composition of his cost of sale is :

Direct material - Rs 4/-

Direct Wages -Rs 1/-

Work Oveheads - Rs 6(50% fixed)

Sales Overheads - Rs 1 (25% varying)

During the current year, he intended to produce the same number but anticipated that:

- (i) his fixed charge will go up by 10%
- (ii) Rates of the direct labour will increase by 20%
- (iii) Rates of direct material will increase by 5%
- (v) Selling price cannot be increased.

Under these circumstances he obtained an order for a further 20% of his capacity.

What minimum price will you recommend for accepting the order to ensure the manufacturer an overall profit of Rs 1,80,500?

- 5) Following information has been made available from the cost records of a company, manufacturing spare parts:

Particulars	Per Units
Direct Material	
X	8/-
Y	6/-
Direct Wages :	
X	24 hours @25 paise per hours
Y	16 Hours @25 paise per hours
Variables Overheads	150% of wages
Fixed Overhead	Rs 25
Selling Price of X	Rs 25
Selling Price of Y	Rs 20

The directors want to be acquainted with the desirability of adopting any one of the following alternative sales mixes in the budget for the next period.

- (a) 250 units of X and 250 units of Y
- (b) 400 Units of Y Only
- (c) 400 Units of X and 100 Units of Y
- (d) 150 Units of X and 350 Units of Y

State which of the alternative sales mixes you would recommend to the management.

Unit III

MEANING AND DEFINITION OF STANDARD COSTING

Standard:

The word ‘Standard’ means criterion. Standard is a predetermined measurable quantity, under defined set conditions.

Standard Cost: Standard cost is a scientifically pre-determined cost, which is arrived at assuming a particular level of efficiency in utilization of material, labour and indirect services.

When the actual figure is compared against standard, one can measure the level of efficiency achieved by seeing how much actual differs from the standard.

When costing is used for the purpose of cost control, the technique is known as standard costing.

Through the standard costing system, management is able to control the variances in materials, labour and controllable expenses on quantity, efficiency and cost basis (in terms of money).

Standard costs are, widely, used as they serve as an effective management tool for control. Standard costing is a managerial device to determine efficiency and effectiveness of cost performance.

Definition:

The costing terminology of the institute of cost and management accounts, London defines Standard costing as “Standard costing is the preparation of standard costs and applying them to measure the variances from actual costs and analyzing the causes of variations, with a view to maintain maximum efficiency in production”.

Standard cost has also been referred to a cost plan for a single unit. This thinking is not merely an estimate or guess work. It is based on certain assumed conditions of efficiency, economic and other factors.

When we break the definition, the technique of Standard costing can be broken into the following:

- 1.Determination of standard costs under each element of cost-material, labour and overheads. In other words, preparation of standard cost sheet is the first step.
- 2.Finding out the actual costs.

3.Comparison of the actual costs with standard costs to ascertain and measure variances.

4.Analyse the variances.

5.Presentation of information to the appropriate levels of management for remedial action to control costs for achieving improved or better performance.

Industries where standard costing is applied:

Standard costing can be applied in industries producing standardised products, which are repetitive in character. Examples are fertilizers, bricks, sugar, cement etc.

In job industries, it is not worthwhile to develop and employ a full system of standard costing. In such industries, jobs undertaken are different from one another. Setting standards in such job industries may be expensive. Implementation partial standard costing in such industries is a better idea. Certain processes or operations may be repetitive and introduction of standard costing can be applied only to those areas.

Objectives of Standard Costing:

- 1.To institute a control mechanism on all the elements of costs that affect production and sales
2. To measure different operational efficiencies and check the wastages
3. To improve the delegation of authority and generate a sense of responsibility among the employees
4. To develop a cost consciousness in the employees
5. To presume the production costs, sales and profit
6. To avail the benefits of' Management by exception.'
7. to bring about a vivid progressive vision and sagacious decision making at each managerial level.

Advantages of Standard Costing:

1.Proper Planning: It helps to apply the principle of "Management by exception". That is, the management need not worry over those activities which proceed in tandem plans. It is only on the issues of exceptions that they have to concentrate.

2. Efficient Cost Control: Standard Costing is a tool for the management to gain

reduction in the cost and control over it. Under this technique, differences reanalyzed and responsibilities are determined.

3. Motivational Factor: Labour efficiency is promoted and they are destined to be cost conscious. Standards provide incentives and motivation to work with greater effort. This increases efficiency and productivity.

4. Comparison of Forecasting and Outcome: A target of efficiency is set for the employees and the cost consciousness is stimulated. Since the process of standard costing allow an appraisal to be made of personnel, machines and method of working, current inefficiencies come to the notice and get eliminated.

5. Inventory Control: Standard costing facilitates inventory control and simplifies inventory valuations. This ensures uniform pricing of stocks in the form of raw materials, work - in - progress and finished goods.

6. Economical System: Standard costing system is economical system from the viewpoint that it does not require detailed records. It also does not require a big staff. It results in the reduction in paper work in accounting and needs very few records. Thus, there is saving of time as well as money.

7. Helpful in Budgeting: Budgets are prepared on the basis of standard costing. Standards which are set up in respect of materials, labour and overheads, are helpful in preparing various budgets. For example, flexible budget, sales budget, etc.

8. Helps Formulate Policies: This technique is a valuable aid to the management in determining prices and formulating production policies. Standard costing equips cost estimates while planning the production of new products.

9. Helps Distinguish Activities: Standard costing helps in distinguishing between skilled and unskilled activities. So the skilled worker only gives pays attention to improving the activities of the unskilled workers.

10. Eliminates Wastage: Through fixing standard, certain waste such as material wastage, idle time, lost machine hours, etc. are reduced.

Limitations of Standard Costing:

1. Costly System: Because the Standard Costing requires highly skilful and competent personnel, it becomes a costly system too. For the same experts are paid

high remuneration.

2. Difficulties in Fixation of Standard: It is always difficult to determine precise standard costs in a given situation which will coincide with actual cost when operations are over. Standard cost are determined partly by the past experience and partly by the cost projections based on advanced statistical techniques. Thus, uncertainties revolve around standards.

3. Constraint for Service Industry: Standard costing is applied for planning and controlling manufacturing costs. Thus, it cannot be applied in a service industry.

4. Consistency of Standard: because the standards of marginal costing fluctuate and vary timeto time, it is difficult to always sustain and continue the same standards.

5. Unsuitable for Non - standardised Products: Standard costing is expensive and unsuitable for job manufacturing industries as they manufacture non standardized products such as catering, tailoring, printing, etc.

6. Relatively Fixed Standards: A business may not be able to keep standards up - to - date. In other words, a business may not revise standards to keep pace with the frequent changes in manufacturing conditions. Firms may avoid revising standards as it is costly affair.

7. Difficulties for Small Industries: Establishment of standards and their implementation involve initial high costs. Standards are to be revised and new standards be fixed involving larger costs. Thus, small firms find it expensive to operate standard costing system. This system is not fit for each type of industries.

8. Discouragement for Workers: Sometimes the employees and workers are discouraged when the standards are fixed at a high level. The unreal high standards may adverse by effect the morale of workers rather than working as an incentive for better efficiency.

9. Inaccurate Diverse Results: Inaccurate and unreliable standards cause misleading results and thus may not enjoy the confidence of the users of this system

Meaning of Analysis of Variance:

Variance means the deviation of the actual cost or actual sales from the standard cost or profit or sales. Calculation of variances is the main object of standard costing.

This calculation shows that whether costs are under controlled or not. A variance may be favourable or adverse. The process of computing the amount of variance and isolate the causes of variances between actual and standard. C.I.M.A. London

When actual cost is less than standard cost or profit is better than the standard profit, it is known as 'Favourable Variance'. On the other hand, where the actual cost is more than standard cost or profit is better than the standard profit, it is known as 'Unfavourable Variance' or 'Adverse'. A mere knowledge of the variances is not sufficient and useful to the management; the causes responsible for these variances should also be brought to the knowledge of the management of the business. The process of finding out the causes of the variances and evaluating their effect is regarded as 'Analysis of Variance'

A controllable variance is when a variance is treated as the responsibility of a person with the result that his or her degree of efficiency can be reflected in size. When a variance arises due to some unforeseen factors, it is known as uncontrollable variance. The management should look more carefully at controllable variance, for it is these variances that require examination and possible corrective measures. The uncontrollable variances may be ignored

Importance of Variance:

There is a lot importance of analysis of variance. There are many objects fulfilled with their analysis. Without analysis of variance, there is no use of standard costing.

The important points of variances are as under:

- 1) Check and control of wastage is possible.
- 2) It improves the efficiency of the organization by the use of standard costing.
- 3) It exercises control over all cost centers including department, individuals and so on.
- 4) Responsibility of a particular person or department can be fixed.
- 5) In the prediction of production cost, sales and profit, variance analysis is very useful.
- 6) on the basis of variance analysis, delegation of authority could be made effective.

- 7) Variance analysis is easy to introduce, apply and orient result.
- 8) Various operational efficiencies can be measured

Features of Variance:

- 1) **In terms of money:** For post office, all the variance are calculated and expressed in terms of money. They are always monetary values in as much as the physical variations are the concern of industrial engineers.
- 2) **Standard item:** The minuend should always be the standard item and the subtrahend the actual figure. The remainder between the minuend and the subtrahend is multiplied by the standard index. In fact, minuend is the figure from which something is subtracted and subtrahend is that something which is subtracted from the minuend. In other words if the performance has, on the whole, been costlier, it is unfavourable variance and when it is cheaper than it was envisaged, it is favourable.
- 3) **Budgeted figure – the Minuend:** Where the prefix 'budget' is used before the variance, the minuend is the budgeted figure based on the normal production. The fixed overhead budget variance is the difference between the budgeted fixed overhead and the actual overhead.

Types of Variances:

Initially, standards for all elements of costs should be set and then the actual cost should be compared with the standard costs to obtain the variances. Some deviations are found when actual performances are recorded and compared with the standard set. These deviations are known as variances. " A variance is the difference between a standard cost and the comparable actual cost incurred during a period" -

C.I.M.A. London

Variances are classified on the basis of:

- 1) On the basis of control
 - 2) On the basis of profitability
 - 3) On the basis of elements of cost
- (1) On the basis of control: On the basis of control, variance may be classified as controllable variance and uncontrollable variance.
- (2) On the basis of profitability: With regard to the profitability or effect, variance

may be classified into two:

- (i) favourable variance and
- (ii) unfavourable variance.

These are also known as credit and debit variance or negative and positive variances.

(3) On the basis of elements of cost: Though different types of variances can be calculated, their use may not be much useful. Variance calculated on the basis of different elements of cost. They are as follows:

Total Cost Variance is a difference between the standard cost value of the output achieved in a period and the total cost incurred.

Material Variances: In the material variances, the main objective is to find out the difference between the standard cost of material used for actual production and actual cost of material used. Thus the main variance in this category is the cost variance, which is thereafter broken down into other variances. These variances are given below.

MATERIAL COST VARIANCE

Material cost variance is the difference between the standard cost of direct materials specified for the output achieved and the actual cost of direct materials used. It is important that entire calculation is to be made for the actual production, but not planned production. It is calculated as:

$$\text{Material Cost Variance} = \text{Standard Cost} - \text{Actual cost}$$

$$\text{MCV} = \text{SC} - \text{AC}$$

OR

$$\text{Material Cost Variance} = (\text{Standard Quantity} \times \text{Standard Price}) - (\text{Actual Quantity} \times \text{Actual Price})$$

OR

$$\text{MCV} = (\text{SQ} \times \text{SP}) - (\text{AQ} \times \text{AP})$$

It should be noted that the standard quantity must relate to the actual production. Material cost variance is the sum of Material quantity (usage) variance and Material price variance.

Material Usage Variances (MUV): Material usage variance is a part of Direct Material Cost Variance. MUV is determined by difference found between the standard quantity and the use of actual quantity. Later, the difference found is multiplied by the standard price.

$$\text{Material Usage Variance} = (\text{Standard Quantity} - \text{Actual Quantity}) \times \text{Standard Price}$$

OR

$$\text{MUV} = (\text{SQ} - \text{AQ}) \times \text{SP}$$

Thus, this is the difference between standard and actual quantity multiplied by the standard price.

Reasons for material usage variance

Some or all of the following reasons may cause the material usage variance:

1. Use of defective or sub-standard materials, causing spoilage.
2. Carelessness in the use of materials, resulting excessive consumption.
3. Pilferage of materials.
4. Faulty workmanship.
5. Defect in plant and machinery, causing excessive consumption of materials.
6. Change in the design or specification of the product.
7. Change in the quality of materials.
8. Use of material mixture, other than standard mix.
9. Use of substitute or non-standard materials.
10. Yield from materials in excess of or less than standard yield.
11. Faulty material processing.

Responsibility: Normally, foreman of that machine is responsible for not exercising effective supervision over the concerned worker. But, the department head, production manager is responsible for the department, as a whole.

Material Price Variance

This is “that portion of the material cost variance which is due to the difference between the standard price specified and the actual price paid”. It is calculated by the following formula:

$$\text{Material price variance} = (\text{Standard price} - \text{Actual price}) \times \text{Actual quantity.}$$

$$\text{MPV} = (\text{SP} - \text{AP}) \times \text{AQ}$$

Thus, this is the difference between standard and actual price multiplied by actual quantity.

Reasons for material price variance

This variance usually arises due to the following reasons:

1. Change in the basic prices of materials.
2. Failure to purchase the standard quality, thereby resulting in a different price being paid.
3. Uneconomical size of purchase orders, leading to lower/ higher quantity discount.
4. Not availing cash discounts, when standards set are based on such discounts.
5. Bad purchasing.
6. Change in transportation costs.
7. Rush purchases from uneconomical markets.
8. Purchase of a substitute material on account of non-availability of the material specified.
9. Change in the rates of excise duty, purchase tax, etc.
10. Off-season purchasing, especially, for certain seasonal products like jute, cotton, etc.

Responsibility: Normally, the purchase manager is responsible for material price variance. However, he cannot be held responsible for variance due to change in market prices, because a general change in prices is, obviously, outside his control. Similarly, purchase of smaller quantity may be due to shortage of finances, which is a financial matter, beyond his control.

The algebraic sum of material price variance and material usage variance should be equal to material cost variance.

Thus: $\text{MCV} = \text{MPV} + \text{MUV}$

Material Mix Variances (MMV): It is that portion of direct material usage variance which is the difference between the actual quantities of elements used in a mixture at a standard price and the total quantity of elements used at the weighted average price per unit of element as shown by the standard cost sheet.

Material Mix Variances= (Standard Mix - Actual Mix) x Standard Price

$$MMV = (SM - AM) \times SP$$

$$SM = \frac{\text{Total weight of actual quantity}}{\text{Total weight of Standard quantity}} \times \text{standard quantity}$$

Note: When the actual weight of quantity and the standard weight of quantity differ from each other, this formula is used to find new quantity

Material Yield Variances (MYV): This is "that portion of the direct materials usage variances which is due to the difference between standard yield specified and the actual yield obtained.

Material Yield Variances= (Standard Yield - Actual Yield) x Standard Yield Price

$$MYV = (SY - AY) \times SYP$$

$$\begin{aligned} \text{Standard Yield Price} &= \frac{\text{Total Standard Output}}{\text{Net Standard Output}} \\ & \end{aligned}$$

Note:-When the actual weight of quantity and the standard weight of quantity differ from each other, this formula is used to find new quantity.

Labour Variances (LV): Labour variances occur because of the difference in actual rates and standard rates of labour and the variation in actual time taken by labours and the standard time allotted to them for doing a job. These variances include Labour Cost Variances, Labour Rate Variances, Labour Time or Efficiency Variances, Labour Idle Time Variances, Labour Mix Variances.

1. Labour Cost Variances (LCV): This is the difference between the standard direct labour cost and the actual direct labour cost incurred for the production achieved.

Labour Cost Variances= Standard Time x Standard Rate) - (Actual Time x Actual Rate)

$$LCV = (ST \times SR) - (AT \times AR)$$

2. Labour Rate Variances (LRV): This is that portion of the labour cost variance which is due to the difference between the standard rate specified and the actual rate paid.

Labour Rate Variances (Standard Rate - Actual Rate) x Actual Time

$$\text{LRV} = (\text{SR} - \text{AR}) \times \text{AT}$$

Note: Actual Time = Actual Hours, Standard Rate = Standard Wage Rate

Reasons for labour rate variance

Usual Reasons are:

1. Change in the basic wage rates.
2. Use of a different method of wage payment.
3. Employing workers of different grades from the standard grades specified.
4. Unscheduled overtime.
5. New workers not being paid at full rates.

Responsibility: Often, labour rate variance will be an uncontrollable variance as labour rates are usually determined by demand and supply conditions in the labour market, backed by a negotiable strength of the trade union. Where this variance is due to the use of a grade of labour other than that specified, there may well be such acceptable explanations as non-availability of the labour grade specified. But when a foreman, carelessly, employs a wrong grade of labour on a job, he may be held responsible.

- 3. Labour Time (Efficiency) Variances: (LTV/LEV):** It is defined as the difference between the standard hours (Time) for the actual production achieved and the hours actually worked, valued at the standard labour rate.

$$\text{Labour Time (Efficiency) Variances} = (\text{Standard Time} - \text{Actual Time}) \times \text{Standard Rate}$$

$$\text{LTV} = (\text{ST} - \text{AT}) \times \text{SR}$$

Reasons for labour efficiency variance

One or more of the following reasons usually causes this variance:

1. Poor working conditions e.g. inadequate lighting and ventilation, excessive heating, etc.
2. Defective tools and plant and machinery.
3. Inefficient workers.
4. Incompetent supervision.
5. Use of defective or non-standard materials, which requires more or less time than the standard time for processing.

6. Time wasted by factors like waiting for materials, tools etc. or machine breakdown.
7. Insufficient training of workers.
8. Change in the method of operation.
9. Non-standard grade workers.

Idle Time Variance (ITV): ITV comes up because of idle time of workers on account of abnormal causes. The wages paid for the time during which the workers remained idle due to causes like strikes, breakdown on plant, etc. are treated as idle time variances.

$$\text{Idle Time Variance (ITV)} = \text{Idle Time} \times \text{Standard Rate}$$

$$\text{ITV} = \text{IT} \times \text{SR}$$

Labour Mix Variance / Gang Composition Variance (LMV): It occurs only when more than one grade of workers is employed and the composition of actual grade of workers differs from those specified.

$$\text{Labour Mix Variance/Gang Composition Variance (LMV)} = (\text{Revised Std. Time} - \text{Actual Time}) \times \text{Std. Time}$$

$$\text{LMV} = (\text{RST} - \text{AT}) \times \text{ST}$$

Overhead Variances: The overhead variances show the difference between the standard overhead cost and the actual overhead cost. In case of direct material and direct labour variances, there is no question of dividing them into fixed and variable as the direct material and direct labour costs are variable. However, in case of overheads, it is necessary to divide them into fixed and variable for computation of variances. We will take up the fixed overhead variances first and then the variable overhead variances. The fixed overhead variances are discussed in the following paragraphs.

I] **Fixed Overhead Variances:** The following variances are computed in case of fixed overheads.

A. **Fixed Overhead Cost Variance:** This variance indicates the difference between the standard fixed overheads for actual production and the actual fixed overheads

incurred. Actually this variance indicates the under/over absorbed fixed overheads. If the actual overheads incurred are more than the standard fixed overheads, it indicates the under absorption of fixed overheads and the variance is favourable. On the other hand, if the actual overheads incurred are more than the standard fixed overheads, it indicates the over absorption of fixed overheads and the variance is adverse. The following formula is used for computation of this variance.

Fixed Overhead Cost Variance: Standard Fixed Overheads for Actual Production – Actual Fixed Overheads.

B. Fixed Overhead Expenditure/Budget Variance: This variance indicates the difference between the budgeted fixed overheads and the actual fixed overhead expenses. If the actual fixed overheads are more than the budgeted fixed overheads, it is an adverse variance as it means overspending as compared to the budgeted amount. On the other hand, if the actual fixed overheads are less than the budgeted fixed overheads, it is a favourable variance. This variance is computed with the help of the following formula.

Fixed Overhead Expenditure Variance: Budgeted Fixed Overheads – Actual Fixed Overheads

C] Fixed Overheads Volume Variance: This variance indicates the under/over absorption of fixed overheads due to the difference in the budgeted quantity of production and actual quantity of production. If the actual quantity produced is more than the budgeted one, this variance will be favourable but it will indicate over absorption of fixed overheads. On the other hand, if the actual quantity produced is less than the budgeted one, it indicates adverse variance and there will be under absorption of overheads. The formula for computation of this variance is as shown below:

Fixed Overhead Volume Variance: Standard Rate [Budgeted Quantity – Actual Quantity]

Reconciliation I = Fixed Overhead Cost Variance = Expenditure Variance + Volume Variance

D] Fixed Overhead Efficiency Variance: It is that portion of volume variance which arises due to the difference between the output actually achieved and the output which should have been achieved in the actual hours worked. This variance will be favourable if the actual production is more than the standard production in actual

hours. The formula for computation of this variance is as follows:

Fixed Overhead Efficiency Variance: Standard Rate [Standard Production – Actual Production]

E] Fixed Overhead Capacity Variance: This variance is also that portion of volume variance, which arises due to the difference between the capacity utilization, i.e. the capacity actually utilized and the budgeted capacity. If the capacity utilization is more than the budgeted capacity, the variance is

favourable, otherwise it will be adverse. The formula is as follows:

Fixed Overheads Capacity Variance: Standard Rate [Standard Quantity – Budgeted Quantity]

Reconciliation II = Volume Variance = Efficiency Variance + Capacity Variance

F] Fixed Overhead Revised Capacity Variance: This variance indicates the difference in capacity utilization due to working for more or less number of days than the budgeted one. The computation of this variance is done by using the following formula.

Fixed Overhead Revised Capacity Variance = Standard Rate [Standard Quantity – Revised Budgeted Quantity]

G] Fixed Overheads Calendar Variance: This variance indicates the difference between the budgeted quantity of production and actual quantity of production achieved arising due to the difference in the number of days worked and budgeted. The formula for computation of this variance is as follows.

Fixed Overheads Calendar Variance = Standard Rate [Budgeted Quantity – Revised Budgeted Quantity]

II] Variable Overhead Variances: The following variances are computed in case of variable overheads.

A] Variable Overhead Cost Variance: This variance indicates the difference between the standard variable overheads for actual overheads and the actual overheads. The difference between the two arises due to the variation between the budgeted and actual quantity. The formula for the computation of this variance is as follows:

Variable Overhead Cost Variance = Standard Variable Overheads for Actual Production – Actual Variable Overheads.

B] Variable Overheads Expenditure Variance: This variance indicates the difference between the standard variable overheads to be charged to the standard production and the actual variable overheads. If the actual overheads are less than the standard variable overheads, the variance is favourable, otherwise it is adverse. The formula for the computation is as follows:

Variable Overhead Expenditure Variance = Standard Variable Overheads for

Standard Production – Actual Variable Overheads.

C] **Variable Overheads Efficiency Variance:** It indicates the efficiency by comparing between the output actually achieved and the output that should have been achieved in the actual hours worked. [Standard Production] This variance will be favourable if the actual output achieved is more than the standard output. The formula for computation is given below:

Variable Overheads Efficiency Variance: Standard Rate [Standard Quantity – Actual Quantity]

Important note: All the formulae mentioned above are with reference to the quantity. All overhead variances can also be computed with relation to number of hours.

Material Variance

Material Variance with ONE Material

- 1) A company produces a product X and operates a system of standard costing. Details of information for the month of July, 2016 are as under:

Standard output from each ton of material :	50 units
Standard Price per ton	:Rs.150
Actual usage	:100 tons
Actual price per ton	:Rs.200
Actual output	: 6000 units

Calculate material variance
- 2) A furniture manufacturer uses summica tops for table. From the following information, find out price variance, usage variance and joint variance:

Standard quantity of summica per table	: 4 sq. Ft.
Standard price per sq. Ft. of summica	Rs.500
Actual production of tables	1,000
Summica actually used	4300 sq. Ft.
Actual purchase price of summica per sq.Ft.	: Rs.5.50
- 3) The standard cost of material for manufacturing a unit of a particular product is estimated as follows:

16 kgs of raw material @ Re.1 per kg. on completion of the unit, it was found that

20 kgs of raw material costing Rs.1.50 per kg had been consumed. Calculate material variance.

- 4) Given that the cost standard for material consumption are 40 kg @Rs.10 per kg, compute the variance when actual are:
- a) 48 kgs @Rs.10 per kg
 - b) 40 kgs @Rs.12 per kg
 - c) 48 kgs @Rs.12 per kg
 - d) 36 kgs for a total cost of Rs.360
- 5) From the following particulars, compute a) Material Cost variance, b) Material Price variance and c) Material Usage variance:
- | | |
|--|--------------|
| Quantity of material purchased | 3,000 units |
| Value of materials purchased | Rs.9,000 |
| Standard quantity of material required per tonne of output | 30 units |
| Standard rate of material | Rs.2.50 p.u. |
| Opening stock of material | Nil |
| Closing stock of material | 500 units |
| Output during the period | 80 tons |
- 6) In a factory, a product 'R' is manufactured. From every ton of raw material consumed, it is estimated that 200 articles will be produced. Standard price per ton of the raw material is Rs.120. in the month of June, 2016, 50 tons of raw material were issued to production. The actual price of ram material was Rs.118.5 per ton. Production during the month was10,100 articles. Compute:
a) price variance, b) usage variance and c) cost variance.

Material Variance with TWO Materials

- 7) The standard cost of a certain chemical mixture is:

35% Material A at Rs.25 per kg

65% Material B at Rs.36 per kg

A standard loss of 5% is expected in production.

During a period thre is used:

125 kgs of material A at Rs.27 per kg and

275 kgs of Material B at Rs.34 per kg

The actual output was 365 kgs

Calculate:

a) material cost variance, b) material price variance, c)Material mix variance and d) material yield variance.

- 8) Determine material mix and yield variance:

Units produced of Z: 8000 kgs

	X	Y
Standard usage per kg of Z	0.75 kg	0.50 kg
Actual usage	6,100 kgs	4,400 kgs
Standard price	Rs.4	Rs.10

- 9) The standard Engg. Co. Ltd. manufactures a product 'X'. Details of the direct material cost of this product are as follows:

Material C: 60% @Rs.20 per ton

Material D: 40% @Rs.15 per ton

Normal loss in production is 10%. Owing to a shortage of material D, it was not possible to use the standard mix in February 2016. However, normal loss is expected to be the same as formerly. Actual results for the month were:

Material C: 280 tons @Rs.19 per ton

Material D: 120 tons @Rs.18 per ton

400 tons

Loss: 36 tons

Output: 364 tons

You are requested by the Co. to show in respect of product 'X' the following variances:

- a) Price Variance, b) Mix variance, c) yield variance and d) cost Variance.

Material Variance with THREE Materials

- 10) A company manufacturing 'distempers', the standard material requirement is:

Material	Quantity (Kgs)	Rate (Rs.)
X	3	10
Y	4	05

Z	5	06
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During January 2016, 1000 kgs of 'Distempers' were produced. The actual consumption of material is as under:

Material	Quantity (Kgs)	Rate (Rs.)
X	350	09
Y	420	06
Z	530	07

Calculate:

- a) material cost variance, b) material price variance, c) Material usage variance.

11) XYZ Ltd. has established the following standard mix for producing 9 gallons of product A:

Particulars	Rs.
5 gallons- Material X at Rs.7 / gallon	35
3 gallons- Material Y at Rs.5 / gallon	15
2 gallons- Material Z at Rs.2 / gallon	04

A standard loss of 10% of input is expected to occur. Actual input was:

Particulars

53,000 gallons- Material X at Rs.7 / gallon
28,000 gallons- Material Y at Rs.5.30 / gallon
19,000 gallons- Material Z at Rs.2.20 / gallon

Actual output for the period was 92,700 gallons. Calculate material mix and yield variance.

DIRECT LABOUR VARIANCE

1) With the help of the following data, calculate:

- i) Labour cost variance
- ii) Labour rate variance
- iii) Labour Efficiency Variance
- iv) Standard hours: 40 @ Rs.3 per hour
- v) Actual hour : 50 @ Rs.4 per hour

2) From the data given below, calculate labour variance for the two departments:

Dept. A	Dept. B
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Actual gross wages (direct)	Rs.2,000	Rs.1,800
Standard hours produced	8,000	6,000
Standard rate per hour	30 paise	35 paise
actual hours worked	8,200	5,800

- 3) Standard hours for manufacturing two products M and N are 15 hours per unit and 20 hour per unit respectively. Both products required identical kind of labour and standard wage rate per hour is Rs.5. In the year 2016, 10,000 units of M and 15,000 units of N were manufactured. The total of labour hours actually worked were 4,50,500 and the actual wage bill came to Rs.23,00,000. This included 12,000 hours paid for @Rs.7 per hour and 9,400 hours paid for @Rs.7.50 per hour, the balance having been paid at Rs.5 per hour. You are required to compute the labour variance.

- 4) Calculate labour variance from the following data:

Gross Direct wages	Rs.30,000
Standard hours	1,600
Standard rate per hour	Rs.15
Actual hours paid	1,500

Actual hours paid include hours not worked (abnormal idle time) : 50

- 5) Coates of India Ltd. manufactures a particular product, the standard cost of which is Rs.120 per unit and which is composed of as follows:

Grade of workers	Hours	Rate	Amount
A	30	2	60
B	<u>20</u>	3	<u>60</u>
	<u>50</u>		<u>120</u>

During a period, 100 units of the product were produced, the actual cost of which was as follows:

Grade of workers	Hours	Rate	Amount
A	3,200	1.5	4,800
B	<u>1,900</u>	4.0	<u>7,600</u>
	<u>5,100</u>		<u>12,400</u>

Calculate Mix variance.

- 6) From the following data, you are required to calculate labour mix variance or gang composition variance:

Standard Labour:

100 skilled workers @Rs.300 per month per worker

200 semi-skilled workers @Rs.200 per month per worker

Actual Labour:

110 skilled worker @Rs.300 per month per worker

340 semi-skilled workers @Rs.225 per month per worker

Due to shortage of skilled workers, it was decided to reduce the number of skilled workers by 10% and increase that of semi-skilled workers by 5%

- 7) The standard labour complement and the actual labour complement engaged during the month are given below:

	Skilled	Semi-Skilled	Unskilled
Std number of workers in group	30	10	10
Std. Wage rate (Rs./hour)	05	03	02
Actual workers in group	24	15	12
Actual Wage rate (Rs./hour)	06	2.5	02

During the month of 200 working hours, the group produced 9,600 standard hours of work.

Required: Calculation showing rate variance, Labour efficiency variance, Labour Mix variance and Total Labour cost variance.

- 8) The details regarding composition and the weekly wage rate of labour force engaged on a job scheduled to be completed in 30 weeks are as follows:

	Standard		Actual	
	No. of works	Rate	No. of works	Rate
Skilled	75	60	70	70
Semi Skilled	45	40	30	50
Unskilled	60	30	80	20

The Work is actually completed in 32 weeks. Calculate the various labour variance.

- 9) The following details are available from the records of ABC Ltd. engaged in manufacturing Article A for the week ended 28th February. The standard

labour hours & rates of payment per article A were as follows:

Grade of workers	Hours	Rate	Amount
Skilled	20	3.00	30
Semi-skilled	08	1.50	12
Unskilled	16	1.00	16

During a period, 1000 units of the product were produced, the actual cost of which was as follows:

Grade of workers	Hours	Rate	Amount
Skilled	9000	4.00	36,000
Semi-skilled	8400	1.50	12,600
Unskilled	20000	0.90	18,000

Calculate the various labour variance.

Unit IV:

Contract Costing: Contract Costing is a method used in construction industry to find out the cost and profit of a particular construction assignment. The principles of job costing are also applicable in contract costing. In fact Contract Costing can be termed as an extension of Job Costing as each contract is nothing but a job completed. Contract Costing is used by concerns like construction firms, civil engineering contractors, and engineering firms. One of the important features of contract costing is that most of the expenses can be traced to a particular contract. Those expenses that cannot be traced to a particular contract are apportioned to the contract on some suitable basis.

Contract costing have the following distinct features

1. The major part of the work in connection with each contract is ordinarily carried out at the site of the contract.
2. The bulk of the expenses incurred by the contractor are considered as direct.
3. The indirect expenses, mostly consist of office expenses of the yards, stores and works
4. A separate account is usually maintained for each contract.
5. The number of contracts undertaken by a contractor at a time is not usually very large.
6. The cost unit in contract costing is the contract itself.

Recording of contract costs :

Material Cost : All materials supplied from the stores or purchased directly for the contract are debited to the concerned contract account. In the case of transfer of excess material from one contract to other contract, their costs would be adjusted on the basis of material transfer note, signed both by the transferee and the transferor foreman. In case the return of surplus material appears uneconomical on account of high cost of transportation, the same is sold and the concerned contract account is credited with the sale price. Any loss or profit arising there-from is transferred to the Profit and Loss Account. Any theft, or destruction of material by fire represent a loss

and as such, the same is transferred to the Profit and Loss Account. If any stores items are used for manufacturing tools, the cost of such stores items are charged to the work expenses account. If the contractee has supplied some materials without affecting the contract price, no accounting entries will be made in the contract account, only a note may be given about it.

Labour Cost : Labour actually employed on the site of the contract is regarded as direct (irrespective of the nature of the task performed) and the wages paid to them are charged to the concerned contract directly or on the basis of a wage analysis sheet (if concurrently a number of contracts are carried on and labourers are required to devote their time on two or more contracts).

Direct Expenses : Direct expenses (if any) are directly charged to the concerned contract.

Indirect Expenses : Indirect expenses (such as expenses of engineers, surveyors, supervisors etc.) may be distributed over several contracts as a percentage of cost of materials, or wages paid or of the prime cost. If however, the contracts are big, the labour hour method may be used for the distribution of expenses.

Plant and Machinery : The value of the plant in a contract may be either debited to contract account and the written down value thereof at the end of the year entered on the credit side for closing the contract account, or only a charge (depreciation) for use of the plant may be debited to the contract account. Depreciation on the plant and machinery used for the contract is to be charged to the contract account.

If a plant is used for a contract for a short period, there is no need of debiting the cost of the plant to the contract account. The amount of depreciation is worked out on the basis of per hour and charged to the contract on that basis. The hourly rate is calculated by dividing the depreciation and other operating expenses of the plant by the total estimated working hours of the plant.

Sometimes plants may be taken on hire for a particular contract. In such cases the amount of rent paid should be debited to the contract account.

Sub-Contract : Sometimes due to certain situations, a sub contractor is appointed to

carry out certain special work for the main contract. This special work done by the sub contractor becomes a direct charge to the main contract and accordingly debited to the contract account. The payments made to the sub contractor are charged to the main contract as direct expenses

Extra work : Sometimes additional work may be necessary in addition to the work originally contracted for. This forms a separate charge and if the amount involved is large, a subsidiary contract is generally entered into with the contract. The extra work amount payable by the contractee should be added to the contract price. If extra work is substantial, it is better to treat it as a separate contract. If it is not substantial, expenses incurred should be debited to the contract account as "Cost of Extra work".

Cost of work certified : Certified Work: In contracts which are expected to continue for a long period of time, it is a normal practice that the contractor obtains certain sums from the contractee from time to time. This is done on the value of contract completed and certified by the architect/surveyor appointed by the contractee. The amount received by the contractor is not 100% of the value of the work certified but is less than the same, as the balance amount is kept as retention money. For recording this

transaction, any of the following two methods may be used.

Mathematically :

Cost of work certified = Cost of work to date - (Cost of work uncertified + Material in hand + Plant at site)

The amount retained is called retention money. The full value of the work certified should be credited to the Contract Account and debited to the account of the contract. Since the cash received from him will be less, the balance in his account will be shown as an asset in the balance sheet.

Work uncertified : It 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 uncertified work may be ascertained as follows :

Rs. Total cost to date	xxxx
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Less: Cost of work certified :

Material in hand	xxx
Plant at site	<u>xxx</u>
Cost of work uncertified	<u>xxx</u>

Retention money : A contractor does not receive full payment of the work certified by the surveyor. Contractee retains some amount (say 10% to 20%) to be paid, after sometime, when it is ensured that there is no fault in the work carried out by contractor. If any deficiency or defect is noticed in the work, it is to be rectified by the contractor before the release of the retention money. Retention money provides a safeguard against the risk of loss due to faulty workmanship.

Cash received : It is ascertained by deducting the retention money from the value of work certified i.e.,

Cash received = Value of work certified – Retention money.

Work-in-progress: In Contract Accounts, the value of the work-in-progress consists of (i) the cost of work completed, both certified and uncertified; (ii) the cost of work not yet completed; and (iii) the amount of profit taken as credit. In the Balance Sheet, the work-in-progress is usually shown under two heads, viz., certified and uncertified. The cost of work completed and certified and the profit credited will appear under the head ‘certified’ work-in-progress, while the completed work not yet certified and the cost of labour, material and expenses of work which has not yet reached the stage of completion are shown under the head “uncertified” work-in-progress.

Notional profit : It represents the difference between the value of work certified and cost of work certified. It is determined :

Notional profit = Value of work certified – (Cost of work to date – Cost of work not yet certified)

Estimated profit : It is the excess of the contract price over the estimated total cost of the contract.

6.3.4 Profit/loss on incomplete contracts : To determine the profit to be taken to Profit and Loss Account, in the case of incomplete contracts, the following four situations may arise:

- (i) **Completion of contract is less than 25 per cent:** In this case no profit should be taken to profit and loss account.
- (ii) **Completion of contract is upto 25 per cent or more than 25 per cent but less than 50 per cent:** In this case one-third of the notional profit, reduced in the ratio of cash received to work certified, should be transferred to the Profit and Loss Account. Mathematically:

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

- (iii) **Completion of contract is upto 50 per cent or more than 50 per cent but less than 90 per cent:** In this case, two-third of the notional profit, reduced by proportion of cash received to work certified, is transferred to the Profit and Loss Account. Mathematically :

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

(iv) **Completion of contract is upto 90 per cent or more than 90 per cent i.e. it is nearing completion:** In this case the profit to be taken to Profit and Loss Account is determined by determining the estimated Profit and using any one 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

$$\text{Estimated Profit} \times \frac{\text{Cash Received}}{\text{Contract Price}}$$

(c) Estimated Profit $\times \frac{\text{Cost of Work to Date}}{\text{Estimated Total Cost}}$

$$(d) \text{Estimated Profit} \times \frac{\text{Cost of Work to Date}}{\text{Estimated Total Cost}} \times \frac{\text{Cash Received}}{\text{Work Certified}}$$

$$(e) \text{Notional Profit} \times \frac{\text{Work certified}}{\text{Contract price}}$$

(This formula may be preferably used in the absence of estimated profit figure).

Cost plus Contract : This type of contract is generally adopted when the probable cost of contract cannot be ascertained in advance with reasonable accuracy. In this type of contract, the contractor receives his total cost plus a profit, which may be a percentage of cost. These types of contracts give protection to the contractor against fluctuations in profits as he is guaranteed about his profit irrespective of the actual costs. However in order to avoid any dispute in future, it is always advisable to specify the admissible costs in advance. Similarly the customer may also reserve the right of demanding 'cost audit' in order to check the reliability of the claim of the contractor regarding increase in the costs.

Cost plus contracts have the following advantages and disadvantages :

Advantages :

- (i) The Contractor is assured of a fixed percentage of profit. There is no risk of incurring any loss on the contract.
- (ii) It is useful specially when the work to be done is not definitely fixed at the time of making the estimate.
- (iii) Contractee can ensure himself about 'the cost of the contract', as he is empowered to examine the books and documents of the contractor to ascertain the veracity of the cost of the contract.

Disadvantages - The contractor may not have any inducement to avoid wastages and effect economy in production to reduce cost.

Target- price contracts: In such cases, the contractor receives an agreed sum of profit over his predetermined costs. In addition, a figure is agreed as the target figure and if actual costs are below this target, the contractor is eligible for bonus for the savings

Escalation Clause: In order to protect the contractor from the rise in the price, an escalation clause may be inserted in the contract. Inclusion of such a clause in a contract deed is called an “Escalation Clause”

The condition that may be laid down is that the contractor will have to produce a proof regarding the rise in the price.

Contract Costing

Particulars	rs.	Particulars	RS.
To opening stock of materials	xxx	By certified work	xxx
To materials purchased	xxx	By uncertified work	xxx
To materials transf. From other contract	xxx	By balance stores	xxx
To materials issued from godown	xxx	By bal. Materials on site at end	xxx
To machine purchased	xxx	By balance tools & equipment	xxx
To machine transf. From other contracts.	xxx	By balance tractor	xxx
To store sent on contract	xxx	By bal. Machinery at the end:	
To wages	xxx	Machine xxx	
To unpaid wages	xxx	(-) depreciation xx	xxx
To office & admin.exp.	xxx	By mat. Returned to warehouse	
To direct expenses	xxx	By machine returned to godown	
To any outstanding exp.	xxx	Cost of machine returned xxx	
To incidental exp.	xxx	(-) depreciation xx	xxx
To architects fees	xxx	By materials transf. To other site	xxx
To engineers fees	xxx	By machine transf. To other cont	xxx
To machine repairing exp	xxx	By materials transf. To other cont	xxx
To depreciation	xxx	By profit and loss account	
To any other expenses on contract	xxx	i) materials stolen by thieves	
To tractor sent on contract	xxx	ii) loss by accident or fire	
To profit on sale of machine	xxx	Iii)machinery stolen by thieves	xxx
To tools and equipments	xxx	By sale of machinery (selling price)	xxx
To profit on sale of machine	xxx	By sale of scrap	xxx
To notional profit	xxx		
	xxx		xxx
To W.I.P a/c	xxx	By notional profit	xxx
To P & L a/c	xxx		
	xxx		xxx

WORK - IN - PROGRESS ACCOUNT

Particulars	Rs.	Particulars	Rs.
Certified Work	xxx	Balance transferred From Contract A/C	xxx
Uncertified Work	xxx	Bal. Transf. To Balance Sheet (On Assets Side)	xxx
Bal. Materials At The End	xxx		
Balance Machine At The End	xxx		
	xxx		xxx

BALANCE SHEET AS ON

Liabilities	Rs.	Assets	Rs.
Share Capital	Xxx	Bal. Of Work-In Progress a/c	xxx
Creditors	Xxx	(-) Cash Rec. From Contractee	<u>xx</u>
Any Unpaid Expenses	Xxx	Machine transfer in Godown	xxx
Profit And Loss Account :-		Materials transfer in Godown	xxx
Last Year Profit Balance	xxx		
(+) Profit Of Current Year (From Contract Account)	xxx		
(+)Profit On Sale Of Asset	<u>xxx</u>		
	xxx		
(-)Loss On Contract	xxx		
(-) Loss On Sale Of Assets	<u>xxx</u>	Xxx	
	Xxx		
			xxx

Important points :-

- 1) In incomplete contract, the balance of profit should be transferred to profit and loss account by the following formula :-

$$= \text{Balance of contract a/c.} \times \frac{1}{3} \times \text{cash received}$$

$$= \text{certified work}$$

OR

$$= \text{Balance of contract a/c.} \times \frac{2}{3} \times \% \text{ of cash received to certified work}$$

Note:-

- 1) If the contract work is completed, then the entire profit balance will be transferred to profit and loss a/c. only.
- 2) If there is loss, it will be transferred to profit and loss account only.
- 3) Cash received and contract price should not be shown in the contract a/c.
- 4) If the certified work is not given clearly in the problem then it should be calculated on the basis of cash received by the following equation.

$$\frac{\text{Cash received amt.} \times \text{Certified work \%}}{\text{Cash received \%}}$$

- 10) If no details are given, then depreciation on machine should be considered for the whole year, but when the date of machine sent on site is given then the depreciation on machine should be calculated for the actual period of use on site.
- 11) If the certified work is less than 1/3 of the contract price then the whole balance of profit will be transferred to work-in-progress account only (means the profit will not be transferred to P&L a/c) (loss

on contract will be transferred to P&L account only)

Contract Costing

- 1) Mr. X undertook a work contract for the construction of building on 1.1.2011, the contract price being is 5,00,000. Following details are available for the year 2011.

Material purchased	80,000
Material supplied from stores	10,000
Labour engaged on site	30,000
Plant installed on site	40,000
Direct expenses	20,000
Proportion of establishment expenses	5,000
Cash received from contractor (80% of work certified)	2,00,000
Work uncertified	50,000
Material returned to stores	5,000
Material in hand on 31 st Dec 2011	2,000
Plant in hand on 31 st Dec 2011	30,000
Wages accrued	6,000
Direct expenses accrued	8,000

Prepare necessary accounts & show relevant items in the Balance Sheet.

- 2) The following information is available in respect of a contract undertaken by a building contractor in 2012. The contract was for Rs.4,00,000.

Material issued	75,000	Work certified	2,60,000
Wages paid	1,10,000	Work uncertified	6,000
General expenses	4,000	Cash received	1,50,000
Plant installed (1.7.12)	20,000	Material transfer to other contract	4,000
Material in hand (1.12.12)	4,000	Material received from other contract	1,000
Wages outstanding	4,000		
Depreciation on plant @	10%		

Financial year ends on 31st Dec every year. Prepare contract a/c and show what part of the profit on contract should be taken credit of 2012.

- 3) Mr. Deshpande took a contract of Building on 1.1.2011. Prepare contract a/c. The following information is obtained on 31st Dec. 2011

The value of contract	7,50,000	Office expenses	10,000
Material issued from stores	15,000	Cash received	36,050
Material purchased	1,20,000	Uncertified work	35,550
Labour transferred to site	45,000	Material returned to godown	4,000
Machinery established	60,000	Balance machinery	5,600
Direct expenses	30,000	Outstanding expenses	50,000
Outstanding wages	12,000		

- 4) A contractor under took a contract for construction of a building. The contract price was Rs. 4,50,000 and contract commenced on 1st Jan 2011. During the year

the following expenses were made. Material issued Rs. 76,500; wages paid Rs. 1,21,500; Plant issued Rs. 22,500; General expenses Rs. 7,500; Cash received on account of 31st Dec. 2011 amounted to Rs. 1,92,000 being 80 % of work certified of the plant and material charged to contract. Plant which has a cost of Rs. 4,500 and material costing Rs. 3,750 were lost. On 31st Dec. 2011 Plant Costing Rs. 3,000 was returned to stores. The cost of work done but not certified was Rs. 1,500 and material costing Rs. 3,450 were in hand charge 15 % depreciation on plant. Prepare contract a/c.

- 5) Following information is related to contract No. 16 is available from the contract ledger of a contractor for financial year ended on 31st March 2012.

Material supplied for contract work Rs. 42,000, Wages Rs. 18,900 Direct expenses 15,200; Machinery sent to contract Rs. 34,200 sale of scrap Rs. 1,800. Following additional information is available.

- 1) On 31st March 2012 direct expenses Rs. 1000 were outstanding.
- 2) Work uncertified on 31st March 2012 Rs. 5100
- 3) Machinery valued Rs. 2000 & Material costing Rs.3000 were lost due to fire.
- 4) Machinery costing Rs. 4000 was sold for Rs. 3000 and material costing Rs. 5000 was sold for Rs. 6000.
- 5) Depreciation on machinery up to 31st March 2012 was Rs. 10,000
- 6) Stock of material at site on 31st March 2012 was Rs. 5000
- 7) Cash received from contractor was Rs. 60,000, which is 80 % of the work certified & value of contract is Rs. 1,20,000.

Prepare contract a/c No. 16. W.I.P. account & show all related items in the balance sheet.

- 6) Three contracts A, B and C, commenced on 1st January; 1st July and 1st October 2012, respectively were undertaken by the Bharat contractors Ltd and their accounts on 31st December 2012 showed the following position.

Particulars	Contract -A	Contract- B	Contract -C
Contract Price	8,00,000	5,40,000	6,00,000
Expenditure :-			
Raw material	1,44,000	1,16,000	40,000
Wages paid	2,20,000	2,24,800	28,000
General charges	8,000	5,600	2,000
Plant installed	40,000	32,000	24,000
Material in hand	8,000	8,000	4,000
Wages accrued	8,000	8,000	3,600
Work certified	4,00,000	3,20,000	72,000
Work finished but not certified	12,000	16,000	4,200
Cash received in respect of			
Work certified	3,00,000	2,40,000	54,000

The plant was installed on the date of commencement of each contract depreciation is taken & 10 % p.a. on original cost. Prepare contract account & show how they would appear in the Balance sheet as on 31st Dec. 2012.

- 7) Work out in a suitable cost Account from the financial result of contract for construction of temporary building undertaken by a firm your answer should be based on following figures extracted from the financial books of the firm. The terms of the contract is Rs. 10 per square feet of the covered floor area accepted and certified to be correct by the engineers of the contractor a) Materials :- Building Material in stock at the commencement of work Rs. 10,000 during the period of the contract material purchased : i) Cement 900 bags @ Rs. 5 per bag. ii) Bricks 1,00,000 @ Rs. 50 per thousand iii) Sand 10,000 cubic feet @ Rs. 10 per 100 cubic feet iv) wood work 900 cubic feet @ Rs. 10 per cubic feet. Value of Balance of various material in hand after completion of work is Rs. 10,000. b) Labour ;- (i) 100 masons @ Rs. 2.50 per day for 40 days ii) 500 labourers @ Rs. 1 per day for 40 days c) Tools & Plants :- Two new concrete mixtures were purchased at Rs. 10,000 each at the commencement of the contract. Residual value as assessed after completion of the contract at Rs 3,500 each concrete mixtures. d) Supervision :- i) 50 % of 4 engineers pay Rs. 500 per month for each engineer for 2 months ii) 50 % of 10 overseer pay at Rs. 200 per month for each overseer for 4 months. e) Administration overheads :- 20% of Head office expenses for the period of contract. The total office expenses amounted to Rs. 5,000. f) Quantity of work Done :- quantity of work certified and accepted by the engineering authority of project 12,000 square feet of covered floor area
- 8) A contractor started a work on a contract on 15-7-2011 to construct a building of 5000 square feet @ Rs. 250 per square feet. As per the terms of the contract the contractor was to retain Rs. 30 per square feet. While paying the remuneration for the complete and certified work 4000 square feet of work was completed on 31st March 2012 and of this work of 3600 sq. ft. was certified. Uncertified work was valued as Rs. 82,000. He incurred the following expenses on the contract during the period upto 31st March 2012.

Material :- a) Cement	1,18,000	Labourer:- a) Masons	2,20,000
b) Bricks	60,000	b) Coolies	1,35,000
c) Sand	10,000;	c) Carpenters	40,000
d) Wood	80,000	Supervision charges	15,000
e) Steel	1,10,000		

Following extra information is supplied :- (a) Total administrative expenses Rs. 35,000 of which 1/5 to be apportioned to this contract (b) Concrete mixture purchased for contract of Rs. 80,000 (c) Material at site on 31st March 2012 was valued at Rs. 26,000 (d) Broken Bricks were sold for Rs 10,000 (e) Empty cement bags were sold for Rs. 5000 (f) Steel at hand was valued at 31st March 2012 Rs. 11,000 (g) The mixtures were valued at Rs. 55,000 on 31st march 2012. Prepare contract account and show the amount to be transferred to P & L A/c.

- 9) M/s Bhujang Ltd. began to trade on 1st January 2012 During the 2012 the company under took only one contract of which the contract price of was Rs. 5,00,000. Of the plant and material charged to contract. Plant which had a cost of Rs. 5,000 and material which had a cost of Rs. 4,000 were lost in an accident. On 31st December 2012 Plant which had a cost of Rs. 5000 were returned to store, the work done but uncertified was Rs. 2000 and material costing Rs. 4000 were hand on site. Charge 10 % Depreciation on plant, carry forward by way of reserves 1/3 of profit received and prepare contract account and Balance sheet from the following Trial Balance as on 31st December 2012.

Particulars	Amount	Amount
Share capital		1,20,000
Creditor's		10,000
Cash received (80% of w. c.)		2,00,000
Land & Building	43,000	
Bank Balances	25,000	
Charged to contract:- Material	90,000	
Plant	25,000	
Wages	1,40,000	
Expenses	7,000	
	3,30,000	3,30,000

- 10) The following is the Trial Balance of M/s VP construction Company engaged on the execution of contract No. 303 for the year ended on 31st Dec 2012

Particulars	Amount	Amount
Contract account amount received		3,00,000
Building	1,60,000	
Creditors		72,000
Bank Balance	35,000	
Capital Account		5,00,000
Material	2,00,000	
Wages	1,80,000	
Expenses	47,000	
Plant	2,50,000	
	8,72,000	8,72,000

The work on contract No. 303 was commenced as 1st Jan 2012. Material costing Rs. 1,70,000 were sent to the site of the contract but those of Rs. 6,000 were destroyed in an accident. Wages of Rs. 1,80,000 were paid during the year. Plant costing Rs. 50,000 was used on the contact all through the year. Plant with a cost of Rs. 2 lakhs was used from 1st Jan to 30th Sept. and was then returned to stores. Material of the cost of Rs. 4,000 were at site on 31st Dec. 2012.

The contract was for Rs. 6,00,000 and the contractor pay 75% of the work certified. Work certified was 80% of the total contract work at the end of 2012. Uncertified work was estimated at Rs. 15,000 on 31st Dec. 2012. Expenses charged to the contract at 25% of wages. Plant is to be depreciated at 10% for the entire year. Prepare contract No. 303 account for the year 2012 and make out the Balance sheet as on 31st Dec. 2012 in the books of M/s AV construction company.

- 11) A company of builders having an authorised capital of Rs. 1,00,000 divided in 1000 equity shares of Rs. 100 each. Commence operations on 1st January 2012 and during the year was engaged in a contract, the contract price of which was Rs. 4,00,000. The Trial Balance extracted from their books on 31st Dec 2012 as follows.

Particulars	Amount	Amount
Share capital Rs. 80 paid up		80,000
Sundry creditors		8,000
Land & Building at cost	34,000	
Cash at bank	9,000	
Material	80,000	
Plant	15,000	
Wages	1,05,000	
Expenses	5,000	
Cash received (being 80% of w.c.)		1,60,000
	2,48,000	2,48,000

Of the plant & materials charged to the contract, plant costing Rs. 2,000 and material costing Rs. 2,000 were destroyed by an accident. On 31.12 2012, plant which cost Rs. 4,000 was returned to the store, value of materials on hand Rs. 4,000. Cost of work done but not certified was Rs. 2,000. Charge depreciation @ 10% on plant & carry forward to profit & loss A/c 2/3 of the profit. Prepare the contract account for the year.

- 12) A contractor who prepares his accounts on 31st December each year commenced a contract on 1st April 2012. The costing records concerning the said contract reveal the following information on 31st December 2012. Material charged to site Rs. 2,58,100; labour engaged Rs. 5,60,500, Foremen's salary Rs. 79,300; Plant costing Rs. 2,60,000 had been on site for 146 days. Their working life is estimated at 7 years and their final scrap value at Rs. 15,000. A supervisor, who is paid Rs. 4000 p.m. has devoted approximately % of his time to this contract. The administrative and other expenses amount to Rs. 1,40,000. Material in hand at site on 31st Dec. 2012 cost Rs. 25,400 some of the material costing Rs. 4,500 was found unsuitable and was sold for Rs. 4000 and part of the plant costing Rs. 5,500 on 31-12-90 unsuited to the contract was sold at a profit of Rs. 1000. The contract price was Rs. 22,00,000 but it was accepted by the contractor for Rs. 20,00,000. On 31st Dec. 2012, 2/3 of the contract was completed. Architects certificate had been issued covering 50 % of the contract price and Rs. 7,50,000 had so far been paid on account. Prepare contract account.

Unit IV OPERATING COSTING

Cost accounting has been increasingly applied in service industries like banks, insurance companies, transportation organizations, electricity generating companies, hospitals, passenger transport and railways, hotels, road maintenance, educational institutions, road lighting, canteens, port trusts and several other service organizations. The costing method applied in these industries is known as 'Operating Costing'. According to the Institute of Cost and Management Accountants [UK] operating costing is, 'that form of operating costing which applies where standardized services are provided either by an undertaking or by a service cost center within an undertaking'.

This costing method is usually made use of by transport companies, gas and water works departments, electricity supply companies, canteens, hospitals, theatres, schools etc.

Nature of Operating Costing The main objective of operating costing is to compute the cost of the services offered by the organization. For doing this, it is necessary to decide the unit of cost in such cases. The cost units vary from industry to industry. For example, in goods transport industry, cost per ton kilometer is to be ascertained while in case of passenger transport, cost per passenger kilometer is to be computed. The next step is to collect and identify various costs under different headings. The headings used are,

- ❖ Fixed or standing charges
- ❖ Semi-fixed or maintenance charges
- ❖ Variable or running charges.

One of the important features of operating costing is that mostly such costs are fixed in nature. For example, in case of passenger transport organization, most of the costs are fixed while few costs like diesel and oil are variable and dependent on the kilometers run.

The cost units usually used in the following service undertakings are as below :

- ❖ Transport service – Passenger km., quintal km., or tonne km.
- ❖ Supply service – Kw hr., Cubic metre, per kg., per litre.
- ❖ Hospital – Patient per day, room per day or per bed, per operation etc.
- ❖ Canteen – Per item, per meal etc.
- ❖ Cinema – Per ticket.
- ❖ Composite units i.e. tonnes kms., quintal kms. etc. may be computed in two ways.

Transport Organization

Transport undertakings include goods transport organizations as well as passenger transport organizations. The cost unit is either ton kilometer or passenger kilometer. The meaning is cost of carrying one ton over a distance of one kilometer or cost of carrying one passenger for a distance of one kilometer. The costs are shown under the following heads.

- ❖ **Standing Charges or Fixed Costs:** These are the fixed costs, which remain constant irrespective of the distance travelled. These costs include the following costs.
 - 1) License fees and insurance
 - 2) Salaries of drivers, cleaners and conductors
 - 3) Garage costs which include garage rent and other relevant expenses
 - 4) Depreciation of the vehicle and other assets
 - 5) Taxes applicable
 - 6) Any other fixed charge like administrative expenses etc.
- ❖ **Variable Costs or Running Costs:** These costs include,
 - 1) Petrol and diesel
 - 2) Oil
 - 3) Grease
 - 4) Any other variable costs
- ❖ **Maintenance Charges:** These charges include expenses like repairs and maintenance, tyre, and other charges connected with maintenance like servicing of the vehicles etc.

Electricity Generation

Power houses engaged in electricity generation or steam generation use 'Power House Costing.' Operating cost statement can be prepared by identifying the costs associated with the power generation or steam generation. Cost unit is different for electricity generation and steam generation. For electricity generation, cost unit is cost per kilowatt-hour while for steam it is lb. A pro forma for these organizations is given below:

Hotels and Canteens

Operating costing can be used effectively in hotels and canteens. While hotels are run purely on commercial principles, canteen facilities are provided by several organizations by providing subsidies. However it is necessary to compute the cost in both the cases to find out the profit or loss at the end of a particular period. In this case, the costs associated with different products offered should be identified and cost per unit should be worked out. The cost unit may be number of meals served or any other dish offered to the customers. A typical format of the cost sheet is given below. It should be noted that this format is not a standardized one and can be modified to suit the requirements of an organization.

Unit IV

Operating Costing

Base Period -

Kilometer Run -

	Particulars	Rs.
A	Fixed Expenses :-	
	Road License	XXX
	Garage Rent	XXX
	Insurance	XXX
	Supervision & salaries	XXX
	Taxes	XXX
	Depreciation	XXX
	Interest on Capital	XXX
Total Fixed Expenses (A)		XXX
B	Variable Expenses :-	
	Maintenance Charges	XXX
	Repairs & maintenance	XXX
	Painting expenses	XXX
	Stores & spares	XXX
	Overhauling	XXX
	Tyres & Tubes	XXX
Total Variable Expenses (B)		XXX
C	Total Maintenance/ Running Expenses:-	
	Depreciation	XXX
	Fuel	XXX
	Wages	XXX
	Lubricants	XXX
	Misc. Expenses	XXX
Total Maintenance /Running Expenses (C)		XXX
	Total Operating Expenses (A+B+C)	XXX
(-)	Sale of Old Tyres & Tubes	XX
	Total Net Operating Expenses	XXX

Cost per Km. = Total Net Operating Expenses / Total No. of Kms.

1. A transport service company is running 4 buses between two towns 50 miles apart. Seating capacity of each bus is 40 passengers. The following particulars were obtained from their books:

Wages of Driver, conductors and cleaners	2,400
Salary of supervisory and office staff	1,000
Diesel oil etc.	4,000
repairs and maintenance	800
Taxation and insurance	1,600
Depreciation	2,600
Interest and other charges	2,000

The actual passenger carried were 75% of the capacity. All the buses ran on all the days. Find out the cost per passenger mile

2. From the following data calculate the cost per mile of a vehicle
Vehicle cost

Road License for the year	15,000
Insurance charges per year	500
Garage rent for the year	100
Driver's wages per month	600
Cost of petrol per litre	200
Miles per litre	8
Proportional charges for tyre & maintenance per mile	8
Estimated life	1,50,000 miles
Estimated Annual mileage	6,000 miles

3. Mr. Ahuja runs a tempo service in the town and has two vehicles. He furnishes you the following data and wants you to compute the cost per running mile.

Particulars	Vehicle A	Vehicle-B
Cost of vehicle	25,000	15,000
Road license per year	750	750
Supervision and salary (yearly)	1,800	1,200
Driver's wages per hour	4	4
Cost of fuel per litre	1.50	1.50
Repairs and maintenance per mile	1.50	2.00
Tyre cost per mile	1.00	0.80
Garage rent per year	1,600	550
Insurance premium p.a.	850	500
Miles run per litre	6	5
Mileage run during the year	15,000	6,000
Estimated life of the vehicle	1,00,000 miles	75,000 miles

Charge interest @ 10% p.a. on the cost vehicle. The vehicle run 20 miles per hour on an average.

4. Mr. Soham Singh has started transport business with a fleet of 10 taxies. The various expenses incurred by him are given below:

(a) Cost of each taxi	Rs.75,000
(b) Salary of Office staff	Rs.1,500 p.m.
(c) Salary of garage staff	Rs.2,000 p.m.
(d) Rent of garage	Rs.1,000 p.m.
(e) Driver's Salary (per taxi)	Rs.400 p.m.
(f) Road tax and repairs per taxi	Rs.2,160 p.a.
(g) Insurance premium	@ 4% of cost p.a.

The life of the taxi is 3,00,000 km. and at the end of which it is estimated to be sold at Rs.15,000. A taxi runs on an average 4,000 km. per month of which 20% it runs empty. Petrol consumption is 9 km. per liter and costing Rs.6.30 per liter. Oil and other sundry expenses amount to Rs.10 per 100 km. Calculate the effective cost of running taxi per kilometer. If the hire charge is Rs.1.80 per km. find out the profit Mr. Soham singh may expect to make in the first year of operation.

5. Union transport limited supplied the following details in respect of a truck of 5 tonnes capacity:

Cost of Truck Rs.90,000	Scrap value Rs.4,500
Estimated life - 10 years	Diesel, oil Rs.15 per litre, each way
Repairs and maintenance Rs. 500 p.m.	Cleaner's wages Rs.250 p.m.
Driver's wages Rs.500 p.m.	Insurance Rs.4,800 p.a.
Tax Rs.2,400 p.a.	Supervision charges Rs.4,800 p.a.

The truck carries goods to and from the city covering a distance of 50 miles each way. On outward trip freight is available to the extent of full capacity and on return 20% of capacity.

Assume that truck runs on an average 25 days a month, work out:

- (a) Operating cost per tonne mile
- (b) Rate per tonne trip that the company should charge if a profit of 50% on freight is to be earned

6. A practicing charted accountant now spends Rs.0.90 per km on taxi fares for his client's work. He is considering two other alternatives, the purchase of a new small car or an old bigger car.

Items	New Small Car	Old Bigger Car
Purchase price	Rs. 35,000	Rs. 20,000
Sales price after 5 years	Rs. 19,000	Rs. 12,000
Repairs and supervision p.a.	Rs. 1,000	Rs. 1,200
Taxes & Insurance p.a.	Rs. 1,700	Rs. 700
Petrol consumption per liter	10 km	7 km.
Petrol price per liter	Rs. 3.50	Rs. 3.50

He estimate that he does 10,000 km. annually. Which of the three alternative will be cheaper? If his practice expand and he has to do 19,000 km. p.a. what

should be his decision. At how many km. per annum, will the cost of the two cars break-even and why?

7. A person owns a 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 trip from Delhi and Chandigarh and will back on the same day. The bus goes 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 33.33% of his taking. The other information is :

Cost of Bus	Rs.2,40,000
Salary of conductor	Rs.800 p.m.
Depreciation	20% p.a.
Salary of accountant	Rs.320 p.m.
Salary of Driver	Rs.1,000 p.m.
Insurance	Rs.1,680 p.a.
Token tax	Rs.600 p.a.
Repairs and maintenance	Rs.500 p.m.
Permit fee	Rs.284 p.m.
Lubricants	Rs.10 per 100 miles.
Normal Capacity	50 persons.

Diesel consumption 4 miles per liter costing Rs. 4 per liter.

The bus is generally 90% occupied of the capacity when it goes to Chandigarh, 80% when it goes to Agra. It is always full when runs within the city. Passenger tax is 20% of his net taking.

8. Rajan has been promised a contract to run a tourist car on a 20 km long route for the chief executive of a multinational firm. He buys a car costing Rs.1,50,000. The annual costs of insurance and taxes are Rs.4,500 and Rs.900 respectively. He has to pay Rs.500 p.m. for a garage rent where he keeps the car when it is not in use. The annual repairs costs are estimated at Rs.4,000. The car is estimated to have a life of 10 years at the end of which the scrap value is likely to be Rs.50,000. He hires a driver who is to be paid Rs.300 p.m. plus 10% of the taking as commission other incidental expenses are estimated at Rs.200 p.m.

Petrol and Oil will cost Rs.100 per 100 km. the cost will make 4 round each trip per day. Assuming that a profit of 15% on taking is desired at the car will be on the road for 25 days on an average per month. What should be charge per round trip?

9. A company is considering three alternatives proposals for conveyance facilities for its sales personnel who have to do considerable travelling, approximately 20,000 km every year. The proposal are as follows:
- a) Purchase & maintain its own fleet of cars. The average cost of car is Rs.1,00,000.

- b) Allow the executive to use own car and reimburse expenses @ Rs.1.60 per km and also bear insurance costs.
- c) Hire cars from an agency at Rs.20,000 per year per car. The company will have to bear costs of petrol taxes and tyres. The following further details are available petrol Rs.0.60 per km; repairs and maintenance Rs.0.20 km. tyre Rs.0.12 per km; insurance Rs.1,200 p.a. per car; taxes Rs.800 p.a per car. Life of car is 5 years with annual mileage of 20,000 km. resale value Rs.20,000 at the end of the fifth year. Work out the three proposals and rank them.
10. Mr. Harry is travelling inspector for the Environmental Protection Agency. He uses his own car and the agency reimburse him at Rs.1.80 per km. Mr. Harry claims he needs rs.2.20 per km just to break even. A security of his expenses by the agency travel the following.
- Oil changes every 4800 km. - Rs.1.20 Maintenance (other than oil) every 9,600 km - Rs.1,800; yearly insurance (comprehensive with accident benefits) Rs.4,000; cost of car (with an average residual value of Rs.60,000 and with useful life of 3 years) Rs.1,08,000.
- Petrol is Rs.5 / litre and harry gets 8 km per litre in his car. When Harry is on the road, he averages 192 km a day. He works 5 days a week and has 10 days vacation in a year beside 6 holidays and spend 15 working days a month in the office. You are required to determine an equitable rate of reimbursement on the basis of the schedule he presently follows.
11. In the view of increasing cost of operating own fleet of cars, your company is presently considering two proposals viz:
- To hire cars with drivers from an agency @Rs.800 per car per month. The company will bear the cost of petrol, oil and tyres.
 - The executive will be given Rs.25,000 interest free loan repayable in 5 years to buy his own car. The company will, however, provide him free petrol and Rs.500 per month for maintenance and drivers wages. if the present cost of car is Rs.50,000 and monthly average running is 2,000 km. find out the most economic way with the help of the following data.

Particular	Cost Per Km
Petrol	Rs.0.65
Oil	Rs.0.08
Tyre	Rs.0.07
Repair	Rs.0.10

taxes and insurance Rs.560 p.a. Drivers wages and bonus Rs.720 per month; life of car is 5 years. Resale value at the end of 5th year Rs.10,000. Assume interest @18% p.a.

Course: - MBCII-5 Cost Accounting

Winter 2019 (January to December 2019)

Assignment

Assignment-I

Q.1 Define Cost Accounting. What are the main objectives of cost accounting? Discuss the advantages and limitations of cost accounting

Q.2. PL Agro Ltd. engaged in agricultural activities has 500 hectares of virgin land, which can be used for growing jointly or individually tea, Coffee, and cardamom. The yield per hectare of the different crops and their selling prices per kg. tire as under

Particulars	Yield	Selling price
	Kgs.	Rs. Per Kgs
Tea	2,500	25
Coffee	625	50
Cardamom	125	300

The relevant cost data are given below:-

Particulars	Tea	Coffee	Cardamom
	Rs.	Rs.	Rs.
Labor charges	10.00	12.50	150.00
Packing material	2.50	2.50	12.50
Others costs	5.00	1.25	25.00
	17.50	16.25	187.50

The fixed cost per annum

Fixed cost per annum	
Cultivation charges	16,00,000
Administrative cost	4,50,000
Land revenue	2,75,000
Repairs and maintenance	5,00,000
Other costs	6,75,000
	35,00,000

The policy of the company is to produce and sell all the three kinds of products and the maximum & minimum area to be cultivated per product is as follow:-

Particulars	Maximum Area	Minimum area
	Hectares	Hectares
Tea	320	240
Coffee	100	60
Cardamom	60	20

Calculate the priority of production the most profitable product mix and the maximum profit which can be achieved.

Assignment-II

Q.1 SMC is a public school having five buses each plying in different directions for the transport of school students. In view of a large number of students availing of the bus service, the buses work two shifts daily in the morning and in the afternoon. The buses are garaged in the school. The work-load of the students has been so arranged that in the morning the first trip picks up the senior students and the second trip plying an hour later picks up the junior students. Similarly in the afternoon the first trip drops the junior students and an hour later the second trip takes the senior students home. The distance travelled by each bus one way is 8 kms. The school works 25 days in a month and remains closed for vacation in May, June and December. Bus fee, however, is payable by students for all the 12 months of the year.

The details of expenses for a year are as under:

Drivers Salary	Rs.450 pm per driver
Cleaner's salary	Rs.350 per month
(Salary payable for 12 months)	
(One cleaner employed for all the five buses)	
License fee, taxes etc.	Rs. 860 per bus p.a.
Insurance	Rs.1,000 per bus p.a
Repairs and maintenance	Rs.3500 per bus p.a.
Purchase price of bus (Life 12 years)	Rs.1,50,000each
Scrap value	Rs.30,000
Diesel cost'	Rs.2.00per litre

Each bus gives an average mileage of 4 kms per liter of diesel. Seating capacity of each bus is 50 students. The seating capacity is fully occupied during the whole year.

Students picked up and dropped within a range upto 4 kms of distance from the school are charged half fare 50% of the students travelling in each trip are in this category. Ignore interest. Since the charges are to be based on average cost you are required to:

- (i) Prepare a statement showing the expenses of operating a single bus and the fleet of five buses for a year.
- (ii) Work out the average cost per student per month in respect of:
 - (a) Students coming from a distance of upto 4 kms from the school, and
 - (b) Students coming from a distance beyond 4 kms from the school.

Q.2 Modern tiles Ltd. makes plastic tiles of standard size of 6" X 6" X 1/8". From the following information, you are required to calculate direct material:

- a) The cost variance in total
- b) The cost variance sub divided into i) price and ii) usage
- c) The usage variance analysed as i) mix and ii) yield

A standard mix of the compound required to produce an output of 20,000 square feet of tiles 1/8" thick as follows:

Direct Material	Quantity (Kgs)	Price per kg (Rs.)
A	600	0.90
B	400	0.65
C	500	0.40

During December, 2016 8 mixes were produced and actual materials consumed were:

Direct Material	Quantity (Kgs)	Price per kg (Rs.)
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A	5,000	0.85
B	2,900	0.60
C	4,400	0.45

Actual production for December was 6,20,000 tiles