Costing

Cost

The word 'cost' is used very often in our day-to-day affairs. The Committee on Terminology, American Institute of Certified. Public Accountants defined cost as:

"Cost is the amount, measured in money, of cash expanded or other property transferred, capital stock issued, services performed, or liability incurred, in consideration of goods or services received or to be received."

Cost represents the resources that have been or must be sacrificed to attain a particular objective. "Cost may be defined as a total of all expenses incurred, whether paid or outstanding, in the manufacture and sale of a product. We say that the cost of a sofa set is Rs.800, which means we have spent an amount or Rs.800 in making the sofa set. In other words, we can say that we spent Rs.800 towards the cost of materials, labour and other expenses. Thus, cost means an amount of expenditure on a given thing, here the sofa set costs Rs.800.

Costing

Costing is different from cost accounting. It is referred to "as classifying, recording and appropriate allocation of expenditure for the determination of the costs of products or services." Costing is the technique and process of ascertaining cost. The technique means and consists of principles and rules, which govern the procedure of ascertaining costs of a product or service. The technique is not static, and it changes with the ascertaining costs, whatever the costs ascertained may be and whatever be the means by which the costs are determined." Cost accountancy provides the basis and information for the ascertainment of costs; costing can be carried out arithmetically.

Staubus observes, "costing is the process of determining the cost of doing something, i.e., the cost of manufacturing an article, rendering a service of performing a function.

Wheldon has defined costing as "the classifying, recording and appropriate allocation of expenditure for the determination of the costs of products and services; the relation of these costs to sales value; and the ascertainment of profitability."

Harley observes, "costing is a study of the expenses incurred in manufacturing a product and conducting a business in such a manner that the expenses are analyased and classified so as to enable the actual cost of any particular process or unit of production to be determined with a minimum of error."

Cost Accounting

The Institute of Cost and Works Accountants, U.K. defines "Cost Accounting as the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and ascertainment of profitability. It includes the presentation of information derived therefrom for the purpose of managerial decision-making." The Institute of Cost and Works Accountants, India defines "Cost Accounting is the technique and process of ascertainment of costs. Cost accounting is the process of accounting for costs, which begins with recording of expenses or the bases on which they are calculated and ends with preparation of statistical data." Cost Accounting is defined as the body of concepts, methods and procedures used to measure, analyse or estimate the costs, profitability and performance of individual products, departments and other segments of a company's operations, for either internal and external use or both, and to report on these questions to the interested parties.

Thus, there are three main divisions of cost accounting – cost ascertainment, cost presentation and cost control.

The Institute of Cost and Works Accountants (ICWA) (UK) defines cost accounting as "the process of accounting for cost from the point at which expenditure is incurred or committed to the establishment of its ultimate relationship with cost centers and cost units. In its widest usage it embraces the preparation of statistical data, the application of cost control methods and the ascertainment of the profitability of activities carried out or planned."

Objectives of Cost Accounting

Cost accounting was born to fulfill the needs of management of manufacturing companies for a detailed information about the cost. Cost accounting is a mechanism of accounting by means of which costs of services or products are ascertained and controlled in a manufacturing firm for different purposes. The managerial skill and abilities can be improved. The objective of cost accounting is to ascertain the true cost of every operation, through a close watch – cost analysis and allocation. The main objectives or purposes are as follows:

1. **Ascertainment of Cost.** It enables the management to ascertain the cost of product, job, contract, service or unit of production so as to develop cost standard. Costs may be ascertained, under different circumstances, using one or more types of costing principles – standard costing, marginal costing, uniform costing etc.
2. **Fixation of Selling Price.** Cost data are useful in the determination of selling price or quotations. Apart from cost ascertainment, the cost accountant analyses the total cost into fixed and variable costs. This will help the management to fix the selling price; sometimes, below the total cost but above the variable cost. This will increase the volume of sales-more sales than previously, thus leading to maximum profit. The scientific way of reducing the prices is possible in an industry only where a sound costing system exists. In other words, cost reduction, in the absence of a costing system, may cause to shut down the industries.
3. **Cost of Control.** The object is to minimize the cost of manufacturing Comparison of actual cost with standards reveals the discrepancies – variances. If the variances are adverse the management enters into investigation so as to adopt corrective action immediately.
4. **Matching Cost with Revenue.** The determination of profitability of each product, process, department etc. is the important object of costing.
5. **Special Cost Studies and Investigations.** It undertakes special cost studies and investigations and these are the basis for the management in decision-making or policies. This will also include pricing of new products, contraction or expansion programmes, closing down or continuing a department, product mix, price reduction in depression etc.
6. **Preparation of Financial Statements, Profit and Loss Account, Balance Sheet.** To prepare these statements, the value of stock, work-in-progress, finished goods etc., are essential; in the absence of the costing department, when we have to close the accounts it rather takes too much time. But a good system of costing facilitates the preparation of the statements, as the figures are easily available; they can be prepared monthly or even weekly.

Previous examination theory question

Q.No 1 (CA PCC May. 2008) :- Define Cost Accounting and state its objectives ?

Ans.: Costing is a systematic procedure of determining -

(a) the cost of products manufactured e.g. television, scooter, cloth, bricks, etc., and

(b) the cost of providing a service, e.g. electricity, transport, etc.

Cost Accounting means formal system of recording costs in the books of account.

Objectives of Cost Accounting :

1. *Ascertainment of cost* - this is the primary objective of cost accounting. For cost ascertainment, different techniques and systems of costing are used in different industries.]
2. *Control of cost* - Cost control aims at improving efficiency by controlling and reducing cost.
3. *Guide to business policy* - Cost accounting aims at serving the needs of management in conducting the business with utmost efficiency. Cost data provide guidelines for various managerial decisions like make or buy, selling below cost, etc.
4. *Determination of selling price* - Cost accounting provides cost information on the basis of which selling prices of products or services may be fixed.

Q.No 2 (CA PCC Nov. 2008) :-. Distinguish between Financial Accounting and cost Accounting.

Ans.: Comparison of Cost Accounting and Financial Accounting :

Basis	*Financial Accounting*	*Cost Accounting*
1. Purpose	To prepare P & L A/c and Balance sheet for presentation to shareholders and other external users	To provide detailed cost information to management i.e. internal user.
2. Statutory requirements	This is mandatory under Companies Act, Income Tax Act, etc.	It is voluntary except in specified industries.
3. Cost and profit analysis	It reveals overall profit/loss and cost	It reveals cost and profit or loss for each product, department, etc.
4. Control aspect	It lays emphasis on recording of transactions	It lays emphasis on cost control.
5. Periodicity of reporting	P & L Account and Balance Sheet are generally prepared annually	Cost statements are regularly and frequently prepared at short intervals and presented to management.
6. Past and future costs	It is concerned with past records	It is concerned with past and future costs.

Q.No 3 (CA PE-II May 2003) Expalin 'Sunk Costs '
Ans :- There are historical costs which are incurred in the past . These cost were incurred for a decision made in the past and cannot be changed by any decision that will be made in future .in other words ,these costs play no role in decision making in the current period .While considering the replacement of a plant ,the depreciated book value of the old plant is irrelevant as the amount is a sunk cost which is to be written off at the time of replacement .

Q.No 4 (CA PE-II May 2003) :- Write short notes on 'Conversion cost '
Ans :- Conversion cost :- it is the cost incurred to convert raw materials into finished goods .it is the sum of direct wages ,direct expenses and manufacturing overheads .

Q.No 5 (CA PE-II May 2003) :- Write short notes on ' Opportunity Cost '
Ans:- Opportunity cost :- It refers to the value of sacrifice made of benefit of opportunity foregone in accepting an alternative course of action for Example ,a firm financing its expansion play by withdrawing money form its bank deposits .in such a case the loss of interest on the bank deposit is the opportunity cost for carrying out the expansion plan .

Q.No 6 (CA PE-II May 2005) :- Distinguish between Explicit costs & Implicit costs ?
Ans :- These costs are also known as out of pocket costs .They refer to those costs which involves immediate payment of cash .Salaries ,wages postage and telegram .interest on loan etc .are some examples of explicit costs because they involve immediate cash payment .These payments are recorded in the books of account and can be easily measured . ,
Main points off difference: the following are the main points of difference between explicit and implicit costs
(i) Implicit costs do not involve any immediate cash payment .As such they are also known as imputed costs or economic costs .
(ii) Implicit cost are not recorded in the books of account but yet .they are important for certain types of managerial decisions such as equipment replacement and relative profitability of two alternative course of action .

Q.No 7 (CA PE-II May 2006) Distinguish between profit centers and investment centers

Ans :- it is defined as an activity centers of a business organization .Chief of such a centre is fully responsible for all costs ,revenues and profitability of its operation .the main objective of profit centre is to maximize the center's profit .Certain of profit centers facilities management control and implementation of the objectives , of responsibility accounting .A profit centre may have a number of cost centers .
Profit centre :- a profit centre is a centre where the manager has the responsibility of generating and maximizing profits .in such centers , the manager is responsible for revenue and cost .
Investment centers : investment centers are concerned with earnings an adequate ROI.in such centers ,the manager is responsible for investment ,revenue and cost .

Q.No 8 (CA PE-II May 2006) Distinguish between controllable costs and Uncontrollable cost
Ans :- Costs which can be influenced by the action of a specified person in an organization are known as controllable costs .Costs which remains unaffected by the action of such a person are termed as uncontrollable .in a business organization ,heads of each responsibility centre are responsible to control costs .Costs which they are able to control are known as controllable

and includes material ,labour and direct expenses .costs which they fail to control includes fixed cost and all allocated costs .

Uncontrollable costs are the costs which cannot be influenced by the action of a specified member of an undertaking.

The distinction between controllable and uncontrollable costs is not very sharp and is sometimes left to individual judgment .infect no cost is controllable .it is only in relation to a particular individual that we may specify a particular cost to be either controllable or uncontrollable .

It may be noted that controllable and uncountable cost concepts are related to the authority of a person In the organization .An expenditure which may be uncontrollable by one person may be controllable by another .Moreover in the long run all cost may be controllable .

Q.No 9 (CA PE-II Nov 2007) Distinguish between cost control and cost reduction

Ans :- Cost Control and Cost reduction : cost control is defined as the " guidance and regulation by executive of the costs of operating an undertaking " Cost control is achieved by setting targets of performance collecting actual cost for each area of responsibility ,comparing actual costs with targets and submitting prompt reports to top management showing deviations from targets .

Cost reduction may be defined " as the achievement of real and permanent reduction in the unit cost of goods manufactured or services rendered without impairing their suitability for the use intended or diminution in the quality of the product .

The distinctions between them are summarized below :

Cost control	Cost reduction
1. Cost control represents efforts made towards achieving a target or goal .	Cost reduction represents achievement in reduction of cost
2. The process of Cost control Is to set up a target ,investigate the variances /variations and taking remedial measures to correct them .	Cost reduction is not contended merely with maintenance of performance according to the standards.
3. Cost control assumes existence of standards or norms which are not chal lenged .	It assumes the existence of concealed potential savings in the standards or norms which are therefore subject to constant challenge of improvement.
4. cost control is a preventive function .costs are optimized before they are incurred .	Cost reduction is a corrective function .it operates even when efficient cost control system exists .There is a room for reduction in the achieved costs
5. cost control sometime lacks dynamic appoarch .	It is continuous process of analysis by various methods of all the factors affecting costs efforts and functions in an organization .The main aim is to have continuous economy in costs.

Q.No 10 (CA PCC June 2009) Distinguish between product cost and period cost

Ans :- Definition of product costs :-Product costs are inventoriable costs .These are the costs .which are assigned to the product .under marginal costing variable manufacturing costs and under absorption costing total manufacturing costs constitute product costs .

Purposes for computing product costs :- The three different purposes for computing product costs are as follows :

Preparation of financial statements : Here focus is on inventor able costs .

(i) Product pricing: it is an import purpose for which product costs are used .For this purpose , the cost of the areas along with the value chain should be included to make the product available to the customer .
(ii) Contracting with government agencies: For this purpose government agencies may not allow the contractors to re3cover research and development and marketing costs under costs plus contracts .

Q.No 11 (CA PEII May 2004, PEII 2005,May 2008 & June 2009) ,(CA IPCC Nov. 2010 IPCC :- Discuss the essentials of a good counting system ? or short notes Essential factors for installing a Cost Accounting system .

Ans :- Essential factors for installing a Cost Accounting system :- Before setting up a system of cost accounting following factors should be studied .

(i) Objective :- The objective of costing system ,for example whether it is being introduced for fixing prices or for insisting a system of cost control

(ii) Types of business :- The areas of operation of business where in the managements action will be most beneficial for instance ,in a concern which is anxious to expend its operations ,increase in production would require maximum attention .on the other hand for a concern which is not able ,to l the whole of its production the selling effort would require greater attention .The system of costing in each case should be designed to highlight .in significant areas .Factors considered important for improving the efficiency of operations that area .

(iii) General origination: The business, with a view of finding out the manner in which the system of cost control could be introduced without altering or exist ending the organization appreciably .

(iv) The technical Details: - Technical aspects on the concern and the attitude and behavior that will be successful in wining sympathetic assistemance or support of the supervisory staff and workmen .

(v) Change in operations: - The manager in which different variable expenses expansion or cessation of different operation would be affected with.

(vi) Method of maintenance of cost records : - The manner in which cost and Financial accounts could be interlocked in to a single integral accounting system and in which result of separate sets of accounts ,cost and financial ,could be reconciled by means of control accounts .

(vii) Information : The maximum amount of information that would be sufficient and how the same should be secured without too much clerical labour especially the possibility of collection of data on a separate printed from designed for each process ; also the possibility of instructions as regards filling up of the forms in writing to endure that these would be faithfully carried out .

(viii) Accuracy : - How the accuracy of the data collected can be verified ? who should be made responsible for making such verification in regard to each operation and the form of certificate that he should give to indicate the verification that he has carried out ?

(ix) Informative and simple : - The manner in which the benefits of introducing cost Accounting could be explained to various person in the concern .especially those in charge of production department and awareness created for the necessity of promptitude frequency and regularity in collection of costing data .

(x) Support : Support of top management and employees are essential for installing a cost Accounting system in any Organization .

Q.No 12 (CA PEII Nov. 2007) :- Discus the various reports provided by cost Accounting Department .

Ans :- Various reports provided by cost Accounting Departments

(i) Cost sheet setting out the total cost ,analyzed into various elements

(ii) Consumption of material statement

(iii) Labour unitization statement .

(iv) Overheads incurred compared with the budget and overheads actual charged to production

(v) Sales effected compared with budgets

(vi) Reconciliation of actual profits earned with budgeted profits.

(vii)The total cost of abnormally spoiled work in factory and abnormal losses .

(viii) Labour turnover ,cost of recruitment and training new employees

(ix) Expenses incurred on R & D as compared with those budgeted .

Q.No 13 (CA PEII May. 2007) :- Explain briefly each of the following categories in Activity based Costing by giving at least two examples

(i) Units level activities

(ii) Batch level activities

(iii) Product level activities

(iv) Facility level activities

Ans :- Units level activities :- The cost of some activites (mainly primary activites) are strongly co-related to the number of units produced these activities are known as unit level activities ,Examples are :

(a) The use of indirect materials

(b) Inspection or testing of every produced or say every 100th item produced .

(c) Indirect consumables.

(ii) Batch level activities :- The cost of some activities (mainly manufacturing support activities) are driven by the number of batches of units produced .These activities are known as Batch level activities Examples are :

(a) Material ordering

(b) Machine set-up cost

(c) Inspection of products –like first item of every batch .

(iii) Product level activities :- The cost of some activities are driven by the certain of a new product level activities .Examples are :

(a) Designing the product

(b) Producing parts to a certain specified limit

(c) Advertising cost ,if advertisement is for individual products

(iv) Facilities level activities : The cost of some activities cannot be related to a particular product line .instead they are related to maintaining the building and facilities .these activities are known as Facility level activities ,Examples are :

(a) Maintenanance of buildings

(b) Plant security

(c) Production manager's salary

(d) Advertising campaigns promoting the company

Q.No 14 (CA PEII May. 2007) :- What items are generally included in good uniform costing manual "

Ans :- Uniform costing manual included essential information and instructions to implement accounting procedures
Introduction it includes objects and scope of the planning
Accounting procedure and planning includes rules and general principle to be followed .
Cost accounting planning includes methods of costing relation between cost and financial accounts and methods of integration

Q.No 15 (CA PEII May. 2008) :- Define Cost Audit.

Ans.: Cost Audit is a procedure which is carried out to establish the accuracy of cost accounts. Following are the two functions of cost audit :

1. To verify that the cost accounts have been correctly maintained and compiled according to the cost accounting system employed by the concern.
2. To see that the cost accounting plan laid down is carried out.

Q.No 16 (CA PEII May. 2008) :- What are the functions of cost audit ?

OR

What are the functions of cost auditors ?

Ans.: 1. To establish the accuracy of cost data.

2. To detect errors and to prevent fraud and misappropriations.

3. To ensure that the objectives of cost accounting as determined by management are achieved.

4. To check the general working of costing department and to make suggestions for its improvement.

Q.No 17 (CA PEII May. 2008) :- What are the advantages of cost audits ?

Ans.: (A) Advantages to the Management :

1. Cost Audit acts as an effective managerial tool for detection of errors, frauds, inconsistencies, etc.

2. Audited cost data is helpful in inter-firm comparison.

3. It helps the management to present reliable and accurate costing information to the parties concerned.

(B) Advantages to the Consumers :

Cost Audit helps in ascertaining the true cost of production which helps in ascertaining the market price of the product. Hence, the consumer gets the advantage of the fair prices.

(C) Advantages to the Shareholders :

1. Cost Audit enables shareholders to determine whether or not they are getting a fair return on their investment.

2. Cost Audit ensures a true picture of company's state of affairs. It tells whether the resources of the business are being properly utilised or not.

(D) Advantages to the Government :

1. Cost Audit provides correct data to the government for fixing up the prices of the commodities.

2. It's an effective tool to see that conditions of countries economy remain healthy.

3. Productivity is increased and national income goes up.

Q.No 18 (CA PEII Nov. 2008) :- Explain the following

State the method of costing that would be most suitable for

(a) Oil refinery (b) Bicycle manufacturing

(c) Interior decoration (d) Airlines company

Ans :-

Industry	Method of costing
(a) Oil Refinery	-- Process costing
(b) Bicycle manufacturing	-- Multiple costing
(c) Interior decoration	-- Job costing
(d) Airlines company	-- Operating costing

Q.No 19 (CA PEII May . 2009) :- State the areas of activity for which accounting records are to be maintained under cost Accounting records rules -

Ans:- Areas of activity for which cost accounting records rules are to be maintained under cost Accounting records rules are to be maintained are

(i) Raw materials components store etc
(ii) Salaries & wages
(iii) Service department expenses
(iv) Utilities
(v) Repair and maintenance
(vi) Depreciation
(vii) Royalty
(viii) Other overheads
(ix) Conversion cost
(x) R & D expenses
(xi) Interest
(xii) Expenses /incentive on exports
(xiii) By-products
(xiv) Joint products
(xv) Captive consumption
(xvi) Packing
(xvii) Expenses of capital nature
(xviii) WIP & FG stock
(xix) Cost statement
(xx) Production records
(xxi) Reconciliation of cost and financial A/c
(xxii) Adjustment of cost variances
(xxiii) Record of physical verification
(xxiv) Statistical statement & Records

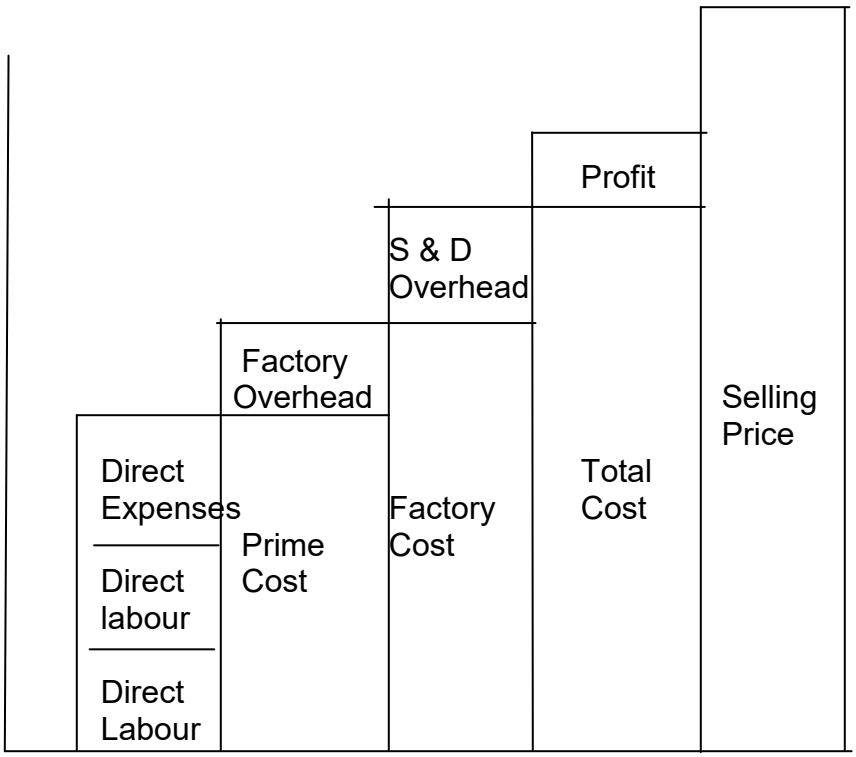
COST SHEET

Cost Sheet:

All expenses relating to product are extracted from financial accounts and analysed under expense heads in the form of statement. This tabulated statement is called cost sheet. Bigg defines, "The expenditure which has been incurred upon production for a period is extracted from the financial books and the stores records, and set out in a memorandum or a statement. If this statement is confined to the disclosure of the cost of the units produced during the period, it is termed a cost sheet." In other words, cost sheet is a document, which provides for the assembly of the detailed cost of a cost centre or cost unit. Cost sheet is a statement showing the details of the total cost of a job, operation or order. It brings out the composition of total cost in a logical order, under proper classifications and sub-divisions. The period covered by the cost sheet may be a week, a month, or so. It should present cost information in total as well as per unit. It would be better, for comparison, if the information for the previous year also is given.

Purposes of Cost Sheet

(1) It gives the break up figures of the total cost under different elements.
(2) It gives total cost as well as cost per unit.
(3) It facilitate comparisons
(4) It helps in the preparation of cost estimates (for tenders, quotations)
(5) It helps in fixing the selling price.
(6) It facilitates cost control by disclosing the inefficiencies, by comparing with the previous year's figures.



Prime Cost of any product comprises of all direct costs, viz., direct material, direct labour and direct expenses, specially attributable to a job. Prime cost is also known as flat cost or first cost or direct cost.

Work Cost represents the total of all items of expenses incurred in the manufacturing of an article, viz., direct material, direct labour, direct expenses and factory expenses. In short, it is described as prime cost plus works on cost. It is also known as factory cost or cost of manufacture.

Cost of Production means and represents the factory cost plus administrative expenses i.e. prime cost plus works cost plus administrative expenses = cost of production it is also known as office cost.

Selling Price is the price, which includes cost of sales plus a margin of profit or minus loss if any.

Specimen of Cost Sheet
Cost Sheet for the period ----------
Production ----------Units

	Total Cost Rs.	Cost per unit Rs.
Direct Material Compound:		
Opening Stock		
Add: Purchases		
Less: Closing Stock		
Direct Expenses		
Primary Packing materials		
PRIME COST	-------	--------
Add: Works/Factory overheads:		
Indirect materials		
Indirect wages		
Factory rent and rates		
Power and fuel		
Repairs and Maintenance		
Drawing Office expenses		
Research and Experiment cost		
Depreciation of Factory plant		
Works Stationery		
Insurance of factory		
Works Manager's salary		
WORKS COST/FACTORY COST		
MANUFACTURING COST	-------	--------
Add: Office and Administrative Overheads:		
Office salaries		
Office rent and Rates		
Lightning and Heating		
Cleaning		
Telephone and Postages		
Printing and Stationary		
Depreciation of Office Furniture		

Depreciation of office Equipment
Insurance
Legal Expenses
COST OF PRODUCTION ------- --------
Add: Selling and Distribution Overheads:
Advertising
Salesman Salaries
Samples and Free gifts
Sales and Free gifts
Sales Office Rent
Sales Promotion Expenses
Packing and Demonstration
Showroom Rent and Rates
Commission
Traveling Expenses
Warehouse Rent and Rates
Repair of Delivery vans
Carriage freight Outwards etc.
COST OF SALES ------- --------

Cost Sheet and Production Account

Cost is a statement. It is not an account. It does not form the part of double entry system. The items of expenses are presented in it on the basis of elements, functions and even behaviour i.e. fixed and variable. Sales proceeds are not included in it. It discloses the total cost and the cost per unit during the given period.

When entering the information of costs, sales and profit or loss in the form of a ledger account, it is known as production account or manufacturing account. This account is debited with opening stock and all items of costs and credited with sales and closing stock, the balancing figure shows profit or loss.

Production Statement for the Month Ending……..Units Produced:

Particulars	Previous Month		Current Month	
	Total Rs.	Per unit. Rs.	Total Rs.	Per unit. Rs.
Cost of raw material Direct wages Chargeable expenses	----	----	----	----
Prime cost Add: Factory overhead	----	----	----	----
Factory cost Add: Office and admn. Overheads	----	----	----	----
Cost of production Add: Opening stock of finished	----	----	----	----

Less: Closing stock of finished goods	----	----	----	----
Cost of goods sold Add: Selling and distribution overhead	----	----	----	----
Cost of sales Add: profit	----	----	----	----
Sales price	----	----	----	----

Cost Sheet (Cost Statement) Vs. Production Statement

The cost of production or the manufactured product can be ascertained in the form of a statement, known as cost sheet. The various costs and expenses can be derived from various financial books and set in the prescribed manner. Thus, the detailed cost of a cost centre or cost unit can be drawn in the statement (cost sheet).

Hence, cost sheet is confined to a record of expenses incurred during the period. When sales, stocks, and profits are included in the cost sheet, it is known as production statement. Bigg has defined as "The expenditure which has been incurred upon production for a period is extracted from the statement. If this statement is confined in the disclosure of the cost of the units produced during the period, it is termed as cost sheet; but where the statement records, both cost, sales and profit, it is usually known as production output statement or account."

Stock of Raw Materials, Work-in-progress and Finished goods

1. If stock (opening and closing) of raw materials and purchases has been given, raw materials consumed will be taken into account, which is calculated as follows:

Opening stock of raw materials	------
Add: Purchases of raw materials	------
Less: Closing stock of raw materials	------
Raw materials consumed	------

2. Incomplete work is known as work-in-progress and may be valued at prime cost or works cost. If it is at works cost, then,

Prime Cost	------
Add: Factory overhead	------
Add: Work-in-progress (beginning)	------
Less: work-in-progress (closing)	------

Works Cost	-----

3. Cost of goods sold can be found out, in case of opening and closing of finished goods, in the following manner:

Cost of production	------

Add: Opening stock of finished goods	------
Less: Closing stock of finished goods	------
Cost of Goods sold	------

4. Statement of Sales and Profit

Cost of production	------
Add: Opening stock of finished goods	------
Less: Closing stock of finished goods	------
Cost of Goods sold	------
Profit (Balancing figure)	------
Sales Price	------

Theoretical Question

Q.1. Define Unit Costing. In what type of industry it is applied ?

Ans. Unit costing is the costing technique adopted by those undertaking which produces only one product or a few grades of the same product on large scale.

This costing technique is used in the following industries :

1. Sugar Industry
2. Shoe manufacturing industry
3. Cement Industry
4. TV and Radio manufacturing, etc.

Q.2. What are the advantages of preparation of cost sheet ?

Ans.
1. It reveals total cost and cost per unit.
2. It discloses the total break up of total costs.
3. It helps in fixing up selling price more accurately.
4. It facilitates cost comparison.
5. It helps in the preparation of cost estimates for the submission of tenders.

Q.3. What are the characteristics of industries which uses unit costing ?

Ans.
1. Identical or homogeneous goods are manufactured.
2. Production is on large scale.
3. The goods are capable of being expressed in convenient unit of measurement.

Q.4. “Price Quotations requires preparation of estimated cost sheet”. Comment.

Ans. It is often seen that the management has to quote prices in advance in relation to goods to be supplied in future. For this purpose, an estimated cost sheet is prepared to show the estimated cost of products to be manufactured. While preparing the estimated cost sheet, the cost of direct materials, direct wages and overheads are estimated on the basis of past cost structure after taking into account the present conditions and also the anticipated changes in future price level.

Q.5. Distinguish between Production Account and Cost Sheet.

Ans.
1. Production Account is based on double entry system, whereas cost sheet is not based on double entry system.
2. Production Account shows the cost in aggregate and thus, facilitates comparison with other financial accounts. Cost sheet shows the cost in detail and analytical manner, which facilitates the comparison of cost for control.
3. Production Account is not useful for preparing tenders or quotations. Estimated cost sheets, which are prepared on the basis of actual cost sheets, are useful for preparing tenders or quotations.

Practical Question

Question 1: Calculate Prime Cost, Factory Cost, Cost of Production, Cost of sales and Profit from the following details:

Direct Materials	Rs.10,000
Direct Labour	Rs. 4,000
Direct Expenses	Rs. 500
Factory Expenses	Rs. 1,500
Administrative Expenses	Rs. 1,000
Selling expenses	Rs. 300
Sales	Rs.20,000

Question 2: From the following details, you are required to prepare a Production Account for the three months ending 31st March, assuming stock of finished goods at the end of the period to be valued at cost, showing:

(a) Value of materials consumed;
(b) Works cost;
(c) Cost of Production;
(d) Cost of goods sold;
(e) Gross Profit and
(f) Net Profit

	1st Jan	31st March
	Rs.	Rs.
Raw Materials	20,000	24,700
Finished goods	14,300	8,400
Work-in-progress	6,200	6,900
Purchases of Raw Materials	17,600	
Direct wages	14,000	
Indirect wages	500	
Work Expenses	7,400	
Office Expenses	2,600	
Selling Expenses	3,000	
Sales	56,800	

Question 3: Draw a statement of cost from the following particulars:

			Rs.
Opening Stock:	(1)	Materials	2,00,000
	(2)	Work-in-progress	60,000
	(3)	Finished goods	5,000
Closing Stock:	(1)	Materials	1,80,000
	(2)	Work-in-progress	50,000
	(3)	Finished goods	15,000
Materials purchased			5,00,000
Direct wages			1,50,000
Manufacturing expenses			1,00,000
Sales			8,00,000
Selling and distribution expenses			20,000

RECONCILIATION

The 'Integral' or 'integrated' accounting means, the merger of both cost and financial accounts; i.e. there are no separate cost accounts and financial accounts, consequently the problem of reconciliation does not occur. But in non-integrated system the cost accounts are kept independently of financial accounts; i.e. separate books have been maintained. In the case of non-integral system, the two profits disclosed by the two sets of books differ, and as such the accounts are to be reconciled and this is essential. Reconciliation of these cost and financial accounts means tallying the profits revealed by the two sets of books. Reconciliation is aimed to find out the reasons for disagreement of the two profits. The process involved in reconciliation of the profits, is the same as that of Bank Reconciliation Statement.

Reasons for Variation. The various reasons for the disagreement in profits or loss shown by the two sets of books can be grouped under the following categories:

(a) Items included in one set of Accounts but not included in the other set. There are certain types of items which are recorded in financial accounts but not in cost accounts and vice versa.

(b) Matters of Financial Nature. There are a number of items which are of financial nature, not included in cost accounts; they are entered in financial accounts. This will lead to a difference in profit or loss. Examples for these are:

1. The following items appear in financial books: but not in cost books:

(A) PURELY FINANCIAL INCOMES:

(a) Interest received on bank balance.
(b) Profit on sale of fixed assets.
(c) Interest on loan.
(d) Share transfer fees.
(e) Rent on sublet.
(f) Dividend on investments.
(g) Discount or commission received.
(h) Brokerage received etc.

(B) PURELY FINANCIAL CHARGES:

(a) Loss on sale of fixed assets
(b) Interest and dividend paid
(c) Expenses of capital nature
(d) Donations
(e) Discount
(f) Stamp duties
(g) Fines, penalties
(h) Damage payable
(i) Loss due to machinery scrap.
(j) Cash discount etc.

(C) APPROPRIATION OF PROFITS

(a) Appropriation to Sinking Funds.
(b) Dividends paid on shares.
(c) Interest paid on debentures.
(d) Taxes on incomes and profits
(e) Transfer to specific reserves.

(f) Amount written off, for example, goodwill, preliminary expenses, discount on debentures, expenses of capital issue.

(g) Excess provision against depreciation etc.

(c) Matters shown in Cost Account. There are certain items which appear only in cost accounts and not in financial accounts:

(1) Nominal Rent

(2) Depreciation on assets even when the value of them becomes negligible in the books.

(3) Interest on capital employed in production but upon which no interest is paid.

(d) **Under or Over Absorption of Overheads.** In cost account, the overhead rates are recovered at predetermined rates. In financial accounting the actual expenses, paid or due, are shown. In costing books overheads are charged at predetermined rate or estimated rate, which may not be equal to the amount actually incurred. The difference falls under the head under or over absorbed overhead. Thus the two profits shown by the two books will differ.

(e) Abnormal Losses and Gains. Abnormal gains or losses may be completely excluded from cost accounts but not from the financial accounts. In this case, costing profit or loss will differ from financial profit or loss. This leads to reconcile between the two. For examples, abnormal gain or loss, abnormal wastage, loss by fire or theft, cost of abnormal idle time, exceptional bad debts etc.

(f) Valuation of Stock (Opening and Closing). Materials, work-in-progress, finished goods may be in stocks. For the purpose of financial accounts, the stocks are valued at cost price or market price, whichever is less. In cost accounts, they are valued at factory cost or prime cost bases. Since the adoption of different methods of valuation of stocks in the two sets of books, there arises a difference in the profits.

(g) Other Items. It may be remembered that financial books represent actual state of affairs, whereas cost books represent only estimates, except prime cost. This estimation may be revised from time to time. For example, the amount of depreciation charged may be different in the two sets of books is shown in the Balance Sheet. The reconciliation is useful because of the following reasons:

1. The process helps in checking the reliability of the sets of books.
2. Reasons for the variations of profit or loss can be known and they help to exercise internal control.
3. Coordination of cost office and accounts office is possible.
4. It facilitates in formulating policies – overheads, depreciation, stock valuation etc.

Procedure of Reconciliation. The procedure is similar to Bank Reconciliation Statement. It may be prepared in the form of a statement or in the form of a memorandum reconciliation account. If the profit or loss shown by the cost books does not tally with the figures of financial books, the reconciliation may be made with profits (or loss) shown by the books or financial

books. The statement is prepared by making additions or deductions of the items included in one set of accounts and not in the other set. For example, items like loss of sale asset, obsolescence loss etc., are of financial nature; by debiting these items, the financial books show less profit and these items are to be added to the profits (financial books) to arrive at costing profits. Additions or deductions, to and from the profits shall be explained briefly in the statement. If the given profit is less, then the find-out profit will be more, so add the difference to it. In the same way, if the given profit is more, then the find – out profit will be less, so deduct the difference from it.

Types of Problems

1. If profit (or loss) on the basis of cost books and financial books is given in the question, then the profit is to be reconciled.
2. If profit as per one set of books is given, then the reconciliation is made with the profit, which is to be calculated first.
3. Preparation of reconciliation statement shall be done.

Question 1: From the following particulars, prepare (a) a statement of cost of manufacture, (b) a statement of profit as per Cost Accounts, (c) Profit and Loss Account in the financial books and (d) Reconciliation statement reconciling profit as per Cost and Financial books.

	Rs.
Opening stock of raw materials	60,000
Opening stock of finished goods	1,20,000
Purchase of raw materials	3,60,000
Stock of raw materials at the end	90,000
Stock of finished goods at the end	30,000
Wages	1,50,000

Calculate factory overhead at 25% on prime cost and office overhead at 75% on factory overhead.

Actual works expenses amounted to Rs.1,16,250 and actual office expenses amounted to Rs.91,500. The selling price was fixed at a profit of 20% of the selling price.

Question 2: The profit as per cost accounts is Rs.1,65,300. The following details are ascertained on comparison of the cost and financial accounts:

		Cost Accounts Rs.	Financial accounts Rs.
(a)	Opening stocks:		
	Materials	32,600	33,000
	Work-in-progress	20,000	21,000
(b)	Closing stocks:		
	Materials	16,000	14,400
	Work-in-progress	16,000	15,200
	Finished goods	8,000	9,000

(c) Director' fees paid Rs.1,000, interest paid Rs.800; reserve for bad debt Rs.500; transfer fees collected Rs.300 and dividends received Rs.200 are exclusively taken in financial accounts but ignored in cost accounts.

(d) Rent charged in costing, but not in financial accounts Rs.6,000.

(e) Preliminary expenses written off Rs.13,000 but not charged in costing.

(f) Overheads charged in financial books Rs.1,21,200; but recovered in costing Rs.1,26,200.

Find out profits as per financial accounts and draw up a Reconciliation Statement.

Question 3: The net profit shown by financial accounts of a company amounted to Rs.2,85,500 while the profits as per cost accounts for that period were Rs.3,88,600. On reconciliation, the following differences were noticed.

(a) The following items were included in the financial books:

Directors fees (Dr.)	Rs.6,500
Bank Interest (Cr.)	Rs. 300
Income Tax (Dr.)	Rs.83,000

(b) Bad and doubtful debts for Rs.5,700 were written off in financial books.

(c) Overheads in cost accounts absorbed were Rs.85,000 while the actuals were Rs.83,200.

(d) A net loss of Rs.10,000 on sale of old machinery was dealt within the financial books.

Reconcile the profit between the cost and financial accounts.

Question 4: The financial books of a company show a net profit of Rs.2,57,510 for the year ending 31st December. The cost accounts show a net profit of Rs.3,44,800 for the same corresponding period. The following facts are brought to light.

Prepare a reconciliation statement.

		Rs.
Under recovery of factory overheads in cost A/cs		6,240
Over – recovery of overheads in cost A/cs		3,400
Depreciation in financial accounts	22,400	
Depreciation in cost accounts		25,000
Interest on investments not included in cost		16,000
Loss of obsolescence charged in financial A/cs		11,400
Income tax debited in financial accounts	80,600	
Bank interest and dividend credited to financial A/cs		2,450
Loss in stock and not charged in cost accounts	13,500	

Question 5: Two types of articles are manufactured in a factory. From the following particulars, prepare a statement showing cost per article sold. There is no opening or closing stock.

	Article A	Article B
	Rs.	Rs.
Materials	1,200	1,616
Labour	2,280	2,828

Works oncost is charged at 100% on labour; and office oncost is taken at 25% on works cost. The number of article A sold during the period was 120 at Rs.75 each, whereas the price per article B sold was Rs.55 and the number sold was 202. Ascertain the total profit as per cost books from the above particulars.

Also prepare a profit and loss account for the period in the financial books, the actual works expenses being Rs.4,960 and the office expenses being Rs.3,380. How would you account for the difference between the two figures of profit ?

Memorandum Reconciliation Account

The Memorandum Reconciliation Account can be prepared on the same pattern as a reconciliation statement, the only difference is that in the former Dr. Denotes "minus" and Cr.denotes "plus". The profit as shown by the cost is shown on the right hand side. The under-recovered amount of expenses in cost accounts and the amount of expenses debited in financial accounts but excluded from cost accounts are shown on the left hand side of this account. The over-recovered amount of expenses in cost accounts and incomes or gains credited in financial accounts but excluded from cost accounts are shown on the right hand side of this account. The memorandum reconciliation account is prepared on memorandum basis and not on the basis of the double entry system of book-keeping.

Question 6: From the following Profit and Loss Account draw up a Memorandum Reconciliation Account, showing the profit as per cost accounts.

Profit and Loss Account (31-12-1986)

	Rs.		Rs.
To office Salaries	11,282	By Gross profit	54,648
To office expenses	6,514	By dividend	400
To salesman's salaries	4,922	By interest on deposit	150
To sales expenses	9,304		
To distribution expenses	2,990		
To loss on sale of machinery	1,950		
To fines	200		
To discount on debentures	100		
To Net profit	17,936		
	55,198		55,198
To Income tax	8,000	By net profit	17,936
To Reserve	1,000		
To dividend	4,000		
To Balance c/d	4,936		
	17,936		17,936

The cost accountant of the company has ascertained a profit of Rs.19,636 as per his books.

Question 7: Pioneer Engineering Company manufactures two sizes of machine components, size A and B. The following date refer to the year ending 31st December 1994.

	Size A	Size B
Production	125 units	400 units
Sales	120 units	360 units
Wages cost per unit	Rs.40	Rs.30
Material cost per unit	Rs.15	Rs.12
Sale price per unit	Rs.125	Rs.90

All expenses other than wages and materials are analysed under 'works overheads' which during the year amounted to Rs.9,000 and office overheads which amounted to Rs.10,000. In fixing selling price, it was estimated that works overhead expenses, at 331/3% on works cost.

You are required to compute:

(a) The total cost of each unit on the basis of the above overhead percentages.

(b) The net profit for the year shown by the financial accounts, valuing unsold stocks at actual materials and wages cost plus works overheads at 50% on wages.

(c) The reconciliation of net profit on (b) above with estimated total net profit based on cost figures.

Question 8: The following is the profit and loss account of a manufacturing company for the year 1994.

		Rs.		Rs.
To	Materials	48,000	By Sales	96,000
	Wages	36,000	By closing stock of	
	Works expenses	24,000	Finished goods	18,000
	Gross profit	12,000	Work-in-progress	
			Materials	3,000
			Labour	1,800
			Works expenses	1,200
		1,20,000		1,20,000
To	Administration		By gross profit	12,000
	Expenses	6,000		
	Net profit	6,000		
		12,000		12,000

During the year 6,000 units were manufactured and 4,800 units were sold. The costing records show that works expenses have been worked out at Rs.3 per article and administrative expenses at Rs.1.50 per article. The costing books show a profit of Rs.1.50 per article. The costing books show a profit of Rs.11,040. Prepare the necessary accounts and show the reconciliation.

Question 9: The following figures are taken from the books of Jaynath & Sons for the year ended 31st December 1994.

	Financial Accounting	Cost Accounting
	Rs.	Rs.
Opening Stock:		
Raw Materials	6,000	5,000
Finished Stock	5,000	4,800

Closing Stock:		
Raw Materials	4,000	4,300
Finished Stock	6,000	8,000
Purchase of materials	40,000	
Direct labour	20,000	
Factory Expenses	18,000	21,000 absorbed
Indirect Labour	3,000	
Sales	1,20,000	
Administrative expenses	6,000	4,000 absorbed
Interest received on investments	5,000	
Goodwill written off	1,000	

Question 10: The following figures are extracted from the financial accounts of a manufacturing firm for the first year of its operation.

	Rs.
Direct material consumption	50,00,000
Direct wages	30,00,000
Factory overheads	16,00,000
Administration overheads	7,00,000
Selling and distribution overheads	9,60,000
Bad debts	80,000
Preliminary expenses written off	40,000
Legal charges	10,000
Dividends received	1,00,000
Interest on deposit received	20,000
Sales – 1,20,000 units	1,20,00,000
Closing stock:	
Finished stock 4,000 units	3,20,000
Work-in-progress	2,40,000

The cost accounts for the same period reveal that the direct material consumption was Rs.56,00,000;

Factory overheads is recovered at 20% on Prime Cost;

Administration overheads is recovered @ Rs.6 per unit of production;

Selling and distribution overheads are recovered @ Rs.8 per unit sold.

You are required to prepare Costing and Financial Profit and Loss Accounts and reconcile the difference in the profits as arrived at in the two set of accounts.

Question 11: SV Ltd. has furnished you the following information from the financial books for the year ended 30th June:

Profit and Loss Account (ended 30th June)

	Rs.	Rs.
Opening Stock:		

500 units at Rs.35 each	17,500	Sales (10,250units)	7,17,500
Materials used	2,60,000	250 units at Rs. 50 each	12,500
gross profit	3,02,500		
	7,30,000		7,30,000
Factory overheads	94,750	Gross profit	3,02,500
Adm. Overheads	1,06,000	Interest	250
Selling expenses	55,000	Rent received	10,000
Bad debts	4,000		
Preliminary expenses	5,000		
Net profit	48,000		
	3,12,750		3,12,750

The cost sheet shows the cost of materials at Rs.26 per unit and the labour cost as Rs.15 per unit. The factory overheads are absorbed at 60% of labour cost and administration overheads at 20% of factory cost. Selling expenses are charged at Rs.6 per unit. The opening stock of finished goods is valued at Rs.45 per unit.

You are required to prepare:

1. A statement showing profit as per cost accounts for the year ended 30th June;
2. Statement showing the reconciliation of profit shown in the financial accounts.

Question 12: The following particulars relate to a manufacturing company for the year ending 1994.

Stock on 1st January 1994:	
Raw Materials	10,000
Finished Stock	20,000
Stock on 31st December 1994:	
Raw Materials	20,000
Finished Stock	10,000
Materials Purchase	50,000
Wages	20,000
Works expenses	1,37,500
Office Expenses	24,500

Prepare a statement showing:

(a) the cost of manufacture and percentage of each item of costs to total cost, calculating works on cost at 25% on prime cost and office on cost 331/3 on works cost,

(b) Profit and also prepare profit and loss account in the financial books and the reconciliation statement reconciling the profit shown by the cost accounts with that shown by the profit and loss account. The selling price is fixed at cost plus 25%.

Question 13: The following figures are extracted from the Financial Accounts of L.G. Ltd. for the year ending 31.12.03:

	Rs.
Sales (20,000 units)	50,00,000
Materials	20,00,000
Wages	10,00,000

Factory overheads		9,00,000
Administrative Overheads		5,20,000
Selling and Distribution		3,60,000
Finished goods (1,230 units)		3,00,000
Work-in-process		
Material	60,000	
Labour	40,000	
Factory overhead	40,000	1,40,000
Goodwill written off		4,00,000
Interest paid on capital		40,000

In the costing records, factory overhead is charge at 100% of Wages Administration Overhead 10% of factory cost & Selling & Distribution Overhead at the rate of Rs.20 per unit sold.

Prepare a statement reconciling the profit as per Cost Records with the profit as per Financial Records.

Question 14: From the following figures prepare a statement reconciling the profit as per Cost accounts and the profits as per the Financial Accounts.

	Rs.
Net profit as per the financial accounts	1,28,755
Net profit as per the cost accounts	1,72,400
Works overheads under – recovered	3,120
Administrative overheads over–recovered	1,700
Depreciation charged in the financial accounts	11,200
Depreciation charged in the cost accounts	12,500
Interest received but not included in the cost account s	8,000
Loss due to obsolescence charged in the financial accounts	5,700
Income – tax provided in the financial accounts	40,300
Store adjustment credited in the financial accounts	475
Depreciation of stock charged in the financial accounts	6,750
Bank interest credited in the financial accounts	750

Question 15: From the financial accounts of Batliboi & Co. Ltd., manufacturing, trading and profit and loss accounts are reproduced below:

		Rs.		Rs.
To	Raw Materials		By work-in-progress	
	Opening stock	29,500	Materials	4,000
	Purchases	1,86,000	Wages	5,500
To	Wages	2,98,000	Work expenses	3,300
To	work expenses	1,90,750	By cost of goods	
			manufactured	6,59,950
		7,04,750	By closing stock of	
			Raw materials	32,000
				7,04,750

To Cost of goods manufactured	6,59,950	By sales (7,600 units)	9,12,000
To Administrative expenses	1,22,500		
To selling & distribution exp.	1,64,000	By finished stock (1,400 units)	1,17,600
To bad debts written off	17,500		
To net profit transferred to Appropriation A/c	72,450	By interest on Investment	6,800
	10,36,400		10,36,400

The following information is also available:

1. Accrued wages of Rs.17,000 included in wages.
2. Work expenses are allocated to production at 60% of direct labour cost.
3. Administrative expenses are allocated at Rs.12 per unit of production.
4. Selling and Distribution expenses are allocated so as to work out 20% of selling price.

Prepare costing profit and loss account and statement of reconciliation between the two accounts (cost and financial).

Question 16: The following figures are extracted from the Financial Accounts of a Manufacturing Firm for the first year of its operation:

	Rs.
Direct Material Consumption	50,00,000
Direct Wages	30,00,000
Factory overheads	16,00,000
Administrative Overheads	7,00,000
Selling and Distribution overheads	9,60,000
Bad debts	80,000
Preliminary expenses written off	40,000
Legal charges	10,000
Dividends Received	1,00,000
Interest received on deposits	20,000
Sales (1,20,000 units)	1,20,00,000
Closing stocks:	
Finished goods (4,000 units)	3,20,000
Work-in-process	2,40,000

The cost accounts for the same period reveal that the direct material consumption was Rs.56,00,000. Factory overhead is recovered 20% on prime cost. Administration overhead is recovered at Rs.6 per unit production. Selling and distribution overheads are recovered at Rs.8 per unit sold.

Prepare the profit and loss account both as per financial and as per cost records. Reconcile the profits as per the two records.

Question 17: A Company's Trading and Profit and Loss Account was as follows:

	Rs.		Rs.
Purchases	2,52,100	Sales: 50,000	
Less: closing stock	40,800	units @ Rs.15 each	7,50,000
		Discount received	2,600
	2,11,300	Profit on sale of land	23,400
Direct wages	1,05,000		
Work expenses	1,21,300		
Selling expenses	71,000		
Administrative expenses	53,400		
Depreciation	11,000		
Net profit	2,03,000		
	7,76,000		7,76,000

Profit as per cost accounts was Rs.1,97,700.

Reconcile the financial and cost profits, using the following information:

(a) Cost accounts value of closing stock Rs.42,800.

(b) The work expenses in the cost accounts were taken as 100% of direct wages.

(c) Selling and administration expenses were charged in the cost accounts at 10% of sales and Re.1 per unit respectively.

(d) Depreciation in the cost accounts was Rs.8,000.

Question 18: MRF Ltd. has furnished you the following information from the financial books for the year ended 30th June 2003.

Opening stock:		Sales: 10,250	
500 units at Rs.35 each	17,500	Units	7,17,500
Material consumed	2,60,000	Closing Stock:	
Wages	1,50,000	Rs.50 each at Rs.50 each	12,500
Gross profit	3,02,000		
	7,30,000		7,30,000
Factory overheads	94,750	Gross profit	3,02,000
Administrative overheads	1,06,000	Interest	250
Selling expenses	55,000	Rent received	10,000
Bad debts	4,000		
Preliminary expenses	5,000		
Net profit	48,000		
	3,12,750		3,12,750

The cost sheet shows the cost of materials as Rs.26 per unit and the labour cost as Rs.15 per unit. The factory overheads are absorbed at 60% of labour cost administration overheads at 20% of factory cost. Selling expenses are charged at Rs.6 per unit. The opening stock of finished goods is valued at Rs.45 per unit.

You are required to:

i. A statement showing profit as per cost accounts for the year ended 30th June 2003.
ii. Statement showing the reconciliation of profit disclosed in cost accounts with the profit shown in the financial accounts.

Question 19: The information is available from the financial books of R Ltd. having a normal production capacity of 60,000 units for the year ended 31st March, 2004:

(i) Sales Rs.10,00,000 (50,000 units).
(ii) There was no opening and closing stock of finished stocks.
(iii) Direct material and direct wages cost were Rs.5,00,000 and Rs.2,50,000 respectively.
(iv) Actual factory expenses were Rs.1,50,000 of which 60% are fixed.
(v) Actual administrative expenses were Rs.45,000 which are completely fixed.
(vi) Actual selling and distribution expenses were Rs.30,000 of which 40% are fixed.
(vii) Interest and dividends received Rs.15,000.

You are required to:

(a) Find out profit as per financial books for the year ended 31st March, 2004;
(b) Prepare the cost sheet and ascertain the profit as per cost accounts for the year ended 31st March, 2004 assuming that the indirect expenses are absorbed on the basis of normal production capacity; and
(c) Prepare a statement reconciling profits shown by financial and cost books.

Question 20: The financial books of a company reveal that the following data for the year ended 31st March, 2002.

		Rs.
Opening stock	Finished goods (875 units)	74,375
	Work-in-process	32,000
1.4.01 to 31.3.03	Raw Materials Consumption	7,80,000
	Direct labour	4,50,000
	Factory overheads	3,00,000
	Goodwill	1,00,000
	Administrative Overheads	2,95,000
	Dividends paid	85,000
	Selling and Distribution overheads	61,000
	Bad debts	12,000
	Interest received	45,000
	Rent received	18,000
	Sales (14,500 units)	20,80,000
Closing stocks:		
	Finished goods (375 units)	41,250
	Work-in-process	38,667

The cost records provide as under:

(a) Factory overheads are absorbed at 60% of direct wages,
(b) Administration overheads are recovered at 20% of factory cost,
(c) Selling and Distribution overheads are charged at Rs.4 per unit sold,
(d) Opening stock of finished goods is valued at Rs.104 per unit,

(e) The company values work-in-progress at factory cost for both Financial and Cost Profit Reporting.

Required:

(i) Prepare statements for the year ended 31st March, 2002 to show.
   (a) the profit as per financial records and
   (b) the profit as per costing records.

(ii) Present a statement reconciling the profit as per costing records with the profit as per financial records.

Question 21: A manufacturing company disclosed a net loss of Rs.3,47,00 as per their cost accounts for the year ended March, 2003. The financial account however disclosed a net loss of Rs.5,10,000 for the same period. The following information was revealed as a result of scrutiny of the figure of both the sets of accounts:

		Rs.
(i)	Factory overheads under–absorbed	40,000
(ii)	Administrative overheads over–absorbed	60,000
(iii)	Depreciation charged in the financial accounts	3,25,000
(iv)	Depreciation charged in the cost accounts	2,75,000
(v)	Interest on investments not included in cost accounts	96,000
(vi)	Income tax paid	54,000
(vii)	Interest on loan funds in Financial Accounts	2,45,000
(viii)	Transfer fees (credit in financial books)	24,000
(ix)	Stores adjustment (credit in financial books)	14,000
(x)	Dividend received	32,000

Prepare a Memorandum Reconciliation Account.

OPERATING COSTING

Q.1. Define Operating Costing ?

Ans.: There are various undertakings which provides or renders services to their customers e.g. Airways, Railways, Hospitals, Transport, electricity, etc. All these industries are interested in ascertaining the cost of providing a service, so that they can decide upon the amount to be charged for providing the service. Operating costing is the technique adopted to calculate the cost of providing a service.

Q.2. Distinguish between Operating Costing & Operation Costing.

Ans.: Operating costing is a method of costing which is used in those industries which do not produce tangible goods but which provide services. For example, transport companies which include road transport, railways, shipping companies etc. provide transport services. Similarly, other companies which provide services are electricity companies, hotels, canteens, cinemas etc. Here cost of providing a service is computed.

As against operating costing, the operation costing is a variant of process costing under which costs are accumulated for each operation. The cost per unit is calculated at each stage of production. It is used in those industries where the manufacturing process is made up of a number of various distinct processes and the cost of each operation is to be ascertained.

Q.3. What are the characteristics of industries using the technique of operating costing ?

Ans. (1) Services provided by industries to consumers are of unique type.

(2) A large proportion of total capital is invested in fixed assets and comparatively less working capital is required.

(3) The destinction between fixed and variable cost is very important because the economies of scale of operations considerably affect the cost per unit of service rendered.

Q.4. In relation of transport industry, it is said, “More kilometres you travel, more cheaper it becomes”. Comment.

Ans. The statement is perfectly true and the reason is the amount of fixed cost per km which decreases as much as you travel. In fact, the economies of scale of operations considerably affect the cost per unit of service rendered.

Q.5. Explain Absolute and Commercial Tonne – kms.

Ans. (a) *Absolute tonne – km :*

Applying the concept of weighted average, it means the sum total of tonne-kms., arrived at by multiplying various distances by respective load quantities carried.

(b) *Commercial tonne-kms :*

Applying the concept of simple average, it is derived by multiplying the total kms. travelled by the average tonnes loaded.

Q.6. “Different service-providing enterprises uses different cost units to compute their cost or service” Comment and illustrate.

Ans. There are large varieties of services and therefore, there are different cost units for different services. For some services, cost units are simple involving only one characteristic, whereas, in other cases, it may be composite reflecting two or more characteristics.

Examples of Simple Cost Unit

Nature of service	Cost unit
(1) Taxi	Per – km.
(2) Hiring of a complete vehicle	Per – Km.
(3) Course in a college	Per Student
(4) Buffet Lunch/Dinner	Per guest.
(5) Tea in a canteen	Per cup of tea.

Examples of composite cost unit

Nature of Service	Cost unit
(1) Bus or train-journey	Per passenger-km.
(2) Goods Carriage	Per tonne – km.
(3) Hotel	Per room per day
(4) Hospital	Per bed per day
(5) Cinema / Circus	Per seat per Show.

Problem, & solution

Q.1. Shankar has been promised a contract to run a tourist car on a 20km long route for the chief executive of a multinational firm. He buys a car costing Rs. 1,50,000. The annual cost of insurance and taxes are Rs. 4,500 and Rs. 900 respectively. He has to pay Rs.500 per month for a garage where he keeps the car when it is not in use. The repair costs are estimated at Rs.4,000 p.a. 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 per month plus 10% of the takings as commission. Other incidental expenses are estimated at Rs. 200 per month.

Petrol and oil will cost Rs. 100 per 100kms. The car will make 4 round trips each day. Assuming that a profit of 15% on taking is desired and that the car will be on the road for 25 days on an average per month, what should he charge per k.m.?

Solution

Particulars	Total	Per k.m.
Standard Charges		
Depreciation	10,000	
Insurance	4,500	
Tax	900	
Garage (500x12)	6,000	
Repairs	4,000	
Salary to driven (300 x12)	3,600	
Incidental expenses (200 x 12)	2,400	31,400/ 48,000
Total standing charges	31,400	= 0.654
Running Expenses		
Petrol and oil	48,000	1.000
Commission (10% of takings)	10,587	0.221

Total running expenses	58,587	1.221
Total cost	89,987	1.875
Profit (15% of takings)	15,880	0.331
Takings	1,05,867	2.206

Total annual Kms. = (20 x 2 x 4) kms. per day x 25 days x 12 months = 48,000 kms.

Computation of takings

Assume annual takings be Rs. x

Commission = 10% of Rs. x = 0.1x

Profit = 15% of Rs. x = 0.15x

Now,

Total cost excluding commission + commission + profit = takings

$$(31{,}400 + 48{,}000) + 0.1x + 0.15x = x$$

Solving, we get x = 1,05,867

Hence, annual takings are Rs. 1,05,867

Q.2. A person owns a bus which runs between Delhi and Chandigarh for 10 days in a month. The distance from Delhi to Chandigarh is 240 kms. The bus completes the trips from Delhi to Chandigarh and back in the same day. The bus goes another 10 days in a month to Agra and the distance covered being 200kms. The trip is also completed in the same day. For the rest of 4 days, it runs in the local city. Daily distance covered in local city is 60kms. Calculate the rate, the person should charge from passenger, when he wants to earn a profit of 33 1/3% on his takings. The other particulars are given below:

Cost of bus	Rs. 2,00,000.
Depreciation	20% per annum.
Salary of driver	Rs. 1,600 per month
Salary of conductor	Rs. 1,500 per month
Salary of part-time accountant	Rs. 400 per month
Insurance	Rs. 2,000 per annum
Diesel consumption : 6 kms per litre costing	Rs. 4.00 per litre
Token tax	Rs. 600 per annum
Repairs (variable cost)	Rs. 1,000 per month
Normal capacity	50 passengers

The bus is generally occupied 90% of the capacity when it goes to Chandigarh and 80% when it goes to Agra. It is always full when it runs within the city.

Solution

Operating Cost Sheet For a Month

	Per Month	
Standing Charges		
Salary of driver	1600	
Salary of conductors	1500	
Salary of part time accountant	400	
Insurance (2000/12)	167	
Token tax (600/12)	50	
Depreciation (40,000/12)	3,333	7050
Variable Cost		
Repairs	1000	
Diesel Consumption (9040 × 4/6)	6027	7027
	Total Cost per Month	14077
Cost per passenger km. (14,077/3,88,000)		0.0363
Profit (1/3 of takings) (Or) (1/2 of Cost)		0.0181
Rate per passenger-km		0.0544

Rate per passenger to be charged

1. Delhi to Chandigarh 240 km. @ .0544 = 13.06 Rs.
2. Delhi to Agra 200 km @ .0544 = 10.88 Rs.

Working Note

Journey	*Total kms.*	*Total Passenger kms.*
Delhit to Chandigarh and back	240 x 2 x 10 = 4,800	4,800 x 45 = 2,16,000
Delhit to Agra and back	200 x 2 x 10 = 4,00	4,000 x 40 = 1,60,000
Local	60 x 4 = 240	240 x 50 = 12,000
	9,040	3,88,000

Q.3. City Bus Service Ltd. runs the following fleet of buses within the limits of A jmer City :

	Carrying Capacity
10 Buses	50 Passengers
15 Buses	40 Passengers

On an average, each bus makes 10 trips a day covering a distance of 8 kms. In each trip, and 75% of the seats are occupied. The annual records show that 5 buses are generally required to be kept away front roads each day for repairs.

The following expenses were incurred by the company during March, 2000:

	Rs.	
Garage Rent, Rates and Insurance	2,500	
Road and Vehicle tax	500	
Salary : Chief Operating manager	1,500	
3 Assistant Managers	800	Each
4 Supervisors	400	Each
25 Drivers	240	Each
30 Cleaners	100	Each
Office Staff	4,000	
Consumable Stores	4,500	
Petrol	24,000	
Lubricants	5,500	
Replacement of tyres and tubes	1,750	
Gas & Electricity	350	
Miscellaneous expenses	1,800	
Repairs	3,500	

Compute cost per passenger-km. considering depreciation of Rs. 6,500 as running cost.

Solution .

In this question, we are given that 5 buses are kept away from roads every day for repairs.

Specification	Total Km.	Passenger- km.
50 Passengers (10 Buses)	8 km/trip x 10 trips/days x 31 day x 10 buses = 24,800	24,800×50×75/100 = 9,30,000
40 Passengers (15 Buses)	8x10x31x15 = 37,200	37,200 x (40 x 75/100) = 11,16,000
	62,000	20,46,000

Since 5 buses out of 25 buses are kept for repairs every day

Actual total km.	62,000 x 20/25	=	49,600
Actual Passengers km.	20,46,000 x 20/25	=	16,36,800

Operating Cost Statement

	Total	Per Passener Rs.
Standing Charges		
Garage Rent, Rate etc	2,500	
Road and Vehicle Tax	500	
Salary		
Chief operating Manager	1,500	
Assistant Manager (3x 800)	2,400	
Supervisors (4x400)	1,600	
Drivers (25 x 240)	6,000	
Cleaners (30 x 100)	3,000	
Office Staff	4,000	
Gas & Electricity	350	
Miscellaneous	1,800	
	23,650	0.0145
Running Exp.		
1) Consumable Stores (4,500 / 16,36,800)		0.0027
2) Lubricants (5,500 / 16,36,800)		0.0034
3) Depreciation (6,500 / 16,36,800)		0.0040
4) Repairs (3,500 / 16,36,800)		0.0021
5) Petrol (24,000 / 16,36,800)		0.0147
6) Replacement of tyres & tubes (1,750 / 16,36,800)		0.0011
Cost per passenger- km.		0.0425

Q.4. [CA (Inter) Nov., 1998 (10 marks)]A transport service company is running five buses between two towns which are 50 kms apart. The following particulars are obtained from their books for April, 1998 :

	Rs.
1. Wages of drivers, conductors and cleaners	24,000
2. Salaries of office staff	10,000
3. Diesel Oil	35,000
4. Repairs & maintenance	8,000
5. Insurance	16,000
6. Depreciation (running cost)	26,000
7. Misc. Expenses	20,000
	1,39,000

Actually, passengers carried were 75% of seating capacity. Seating capacity of bus is 50 passengers. All buses ran on all days of the month. Each bus made one round trip per day. Find out the cost per passenger-km.

Solution

Total kms.= 5 Buses x 50 kms x 2 x 30 days x 30 days
= 15,000 kms.

Passengers normally traveling = 50 x 75/100 = 37.5

Total passenger- kms = 15,000 x 37.5 = 5,62,500

Operating Cost Statement

A. Standing Charges		
1) Wages of drivers conductors and cleaners	24,000	
2) Salary of office staff	10,000	
3) Taxation, insurance etc	16,000	
4) Interest & other expenses	20,000	
Total standing charges	70,000	0.1244
B.) Running Expenses		
1) Repair & maintenance	80,000	0.0142
2) Diesel oil & other oil	35,000	0.0622
3) Depreciation	26,000	0.0462
Total running expenses	69,000	
Total Cost (A+B)	1,39,000	0.247

Q.5. A Transport company charges Rs.120 per ton for a 5 tons lorry-load from A station to B station. The charges for return trip are Rs.110 per ton. In the month of July, 2000, a truck has made 10 outward journeys with full load out of which 3 tons were unloaded twice at C station on the way. It returned without any load once only from C station to A station. The expenses incurred were :

Annual fixed charges Rs.38,400; annual maintenance Rs.19,200; and monthly running charges Rs.2,404. You are required to find the cost per ton-kilometre (absolute) and the profit for the month of July, 2000, assuming that no concession is made for delivery at the intermediate stations.

Distance from A station to B station is 210 kms. and from A to C station 120 kms. The truck carried a load of 8 tons 5 times in the month while returning from B station but was once caught by the police and was fined Rs.2,000.

[Ans.: Cost per absolute ton-km = Re.0.313.
The amount of fine is not included in the cost on the assumption that it is abnormal in nature. However, it may be reduced from the revenue. As such, Net Revenue = Rs.11,150.
Amount of profit = Rs.3,946. Total Absolute ton-km = 23,010].

Solution

Computation of Total absolute for-kms.

Outward Journey

Station A to B = 8 times x 210 kms. x 5 tons	=	8,400 ton-kms.
Station A to C = 2 times x120 kms. x 5 tons	=	1,200 ton-kms.
Station C to B = 2 times x 90 kms. 2 tons	=	360 ton-kms.

Return Journey

Station B to A = 4 times x 210 kms. x 5 tons	=	4,200 ton-kms.
5 times x 210 kms. x 8 tons	=	8,400 ton-kms.
Station B to C = 1 time x 90 kms. x 5 tons	=	450 ton-kms.
		23,010 ton-kms.

Computation of cost incurred per month

Annual fixed charges	= Rs. 38,400	
Annual Maintenance	= Rs. 19,200	
Total annual charges	= Rs. 57,600	
Fixed charges per month (57,600/12)	4,800	
(+) Monthly running charges	2,404	7,204
Hence, cost per ton-km. Rs. 7,203/23,010		= Re. 0.313

Computation of profit

Revenue

10 Outward Journeys x 5 tons x Rs. 120 per ton	= Rs. 6,000
5 return Journeys x 8 tons x Rs. 110 per ton	= Rs. 4,400
5 return Journeys x 5 tons x Rs. 110 per ton	= Rs. 2,750
	13,150
(–) Fine	2,000
Net Revenue	= 11,150
(–) Normal Cost	= 7,204
Profit	= 3,946

Q.6. A school has ten 50 seater buses. Cost of each bus is Rs.8,50,000 with salvage value of Rs.50,000 and an estimated effective life of 10 years. The school has a separate transportation section in the school premises. The rent apportioned to this section is Rs.60,000 per annum. Salary of transport officer is Rs.3,000 per month and establishment expenses of this section amount to Rs.8,000 per month in addition. The school is close for two months in summer, fifteen days in autumn and for fifteen days during winder. In the remaining period the buses operate on the average for 20 days in a month. However, students are charged bus fee per 11 months in a year, though the entire staff is paid salary for the full year. The bus covers a distance upto 15 kms. from the school both in the morning and evening. About 30 students in each bus are from a distance upto 5 kms, 10 students from distance upto 5 to 10 kms., and 10 students from a distance between 10 to 15 kms. The monthly charge from second category of students is double compared to that in the first and that from third category the charge is three times that from the first category. Within each category all students, are charged equally.

Expenses relating to buses are as follows :

Driver's salary Rs. 3,000 per month
Conductor's salary Rs. 2,500 per month.
Annual maintenance and repair Rs. 9,440 per bus.
Diesel Rs.8 per litre, each litre sufficing 2 kms. of running
Lubricants Rs.20 per litre, each litre sufficient for 100 kms.
Prepare operating cost sheet giving monthly transport charge from each category of students so as to recover full annual transportation cost incurred by the school.

[Ans.: Rs.250; Rs.500 and Rs.750 per student per month].

Solution :- Total annual kms. traveled
= (12-3) month x 20 days per month x 60 kms. per day
= 10,800 kms.

Operating Cost Statement

Type of cost		Amount of cost (p.a)
(A) Standing Cost		
(1) Depreciation [(8,50,000-50,000)/10]		80,000
(2) Rent	(60,000 x 1/10)	6,000
(3) Transport officer's salary	(3000x 12x1/10)	3,600
(4) Establishment expenses	(8,000x12x1/10)	9,600
(5) Driver's salary	(3,000 x 12)	36,000
(6) Conductor's salary	(2500 x 12)	30,000
(7) Maintenance and repair		9,440
Total standing charges		1,74,640
(B) Running Expenses		
1) Diesel (10,800 x 8/2)		43,200
2) Lubricating Oil (10,800 x 20/100)		2,160
Total Running expenses		45,360
Total Cost [(A) + (B)]		2,20,000

The above cost is to be recovered from
11 month fee. Hence, month fee = $\frac{2,20,000}{11}$ = Rs.20,000

Assume, amount charged per student per month
- ✓ Upto 5 kms. = Rs. X
- ✓ Upto 6 to 10 kms.= Rs. 2x
- ✓ Upto 11 to 15 kms.= Rs. 3x

Hence, total monthly collection = x × 30 + 2x × 10 + 3x × 10
= 80x
Now, 80x = 20,000. Hence, x = 250.
Amount charged per student per month
- ✓ Upto 5 kms. = x = Rs.250
- ✓ Upto 6 to 10 kms = 2x = Rs.500
- ✓ Upto 11 to 15 kms = 3x = Rs.750

Q.7. [B. Com (Hons) 2003]

A bus started from Delhi for Mussoorie with 50 passengers on board, 20 passengers got off at Dehradun and the bus proceeded with the remaining passengers. In the evening the same bus left Mussoorie with 50 passengers. 10 passengers got off at Dehradun and the bus resumed its journey with remaining passengers for Delhi. The distance between Delhi and Dehradun is 280 kms and between Dehradun and Mussoorie is 20 kms.

Compute the cost per Passenger-km, if the total cost of running the bus for this trip is Rs.5,000. (Ans. Re.0.18657)

Solution :- Computation Total Passenger-kms:			Passenger-kms.
Delhi to Dehradun	=	50 Passengers × 280 kms	= 14,000
Dehradun to Mussoorie	=	(50-20) Passengers × 20 kms	= 600
Mussoorie to Dehradun	=	50 Passengers × 20 kms	= 1,000
Dehradun to Delhi	=	(50-10) Passengers × 280 kms	= 11,200
Total Passenger-kms.			26,800
Cost per Passenger- km.		$\frac{\text{Rs.5,000}}{\text{26,800 Passenger - kms}}$	= 0.18657

Q.8. Carryall Enterprise has been permitted to run a minibus on a route covering 20 kms. one way. The minibus has been purchased at a cost of Rs.10 lacs, part of which was financed through bank loan and balance by loan form other sources.

The annual charges for the minibus are: comprehensive insurance Rs.40,000, road tax Rs.20,000 and garage rent Rs.12,000. Cost of repairs and maintenance is estimated at Rs.60,000 per annum while replacement of tyres, tubes etc. will cost Rs.4,800 per month. Office expenses are estimated at Rs.6,000 per month. Petrol and oil will cost Rs.4.50 per km.

Two drivers and two conductors are engaged at a monthly salary of Rs.5,000 and Rs.3,500 each respectively. In addition, drivers and conductors are entitled to 5% of the sale of tickets.

The effective life of the vehicle is estimated at 5 years at the end of which the vehicle will have scrap value of Rs.1,00,000. the minibus is 24 seater and is expected to run 6 two way trips during the day for 25 days in a month.

Submit passenger fare structure for approval by the transport authority which allows 20% profit on sales. Interest on loan is allowed as cost if instalments are paid regularly. Assume the amount of interest to be Rs.67,200 per annum. (Ans. Total Takings Rs.1,15,200)

Solution

Operating Cost Sheet for Minibus

Standing Charges:	***Cost per annum Rs.***	***Cost per month Rs.***
Insurance	40,000	
Road Tax	20,000	
Garage rent	12,000	
Repair and maintenance	60,000	

Office expenses 6,000 × 12		72,000	
Depreciation(10,00,000-1,00,000)÷5	1,80,000		
Driver's and Conductors' salary			
[(5,000×2) + (3,500 × 2)] × 12	2,04,000		
Interest on loans	67,200		
	6,55,200		
Total standing charges per month 6,55,200 ÷ 12			54,600
Operating Charges per month:			
Petrol and Oil (25 days × 6 trips × 2 × 20 kms × Rs.4.50)		27,000	
Tyre and tube etc.		4,800	31,800
Total Cost before Commission			86,400
Drivers' and Conductors' Commission @ 5% on total sales			5,760
Total Cost			92,160
Profit 20% on sale of Rs.1,15,200			23,040
Total Sale Proceeds of Tickets			1,15,200

Total Passenger kms. In a month = 25 days × 6 trips × 2 × 20 kms × 24 seats = 1,44,000
Fare per passenger km = Rs.1,15,200 ÷ 1,44,000 = Rs.0.80
Note : Computation of total sales, profit and commission:
Let total sales be x which is = Total Cost before commission + Commission + Profit
= Rs.86,400 + 5% of x + 20% of x.
∴ x = 86,400 + .05x + .2x
Solving the above equation we get x = Rs.1,15,200 = Sale proceeds of tickets
Commission = 5% of 1,15,200 = Rs.5,760; Profit
= 20% of 1,15,200 = Rs.23,040

Q.9. Ascertain the cost of carrying one ton of goods for a distance of one km. from the following particulars :

Freight : Full capacity outward, 50% on return journey.

Annual charges:
Insurance @ 2%;
Repairs and maintenance Rs.4,500
Garge rent Rs.3,600
Taxes Rs.6,000;
Interest @ 18% to be charged
Tyre, Battery, etc. Rs.6,500;

Monthly charges:
Driver's salary Rs.750;
Coolie Rs.500
Petrol etc., Rs.100 for every 100 kms.

Additional Information
(1) Cost of Truck = Rs.3,00,000.
(2) Scrap value after 5 years = Rs.25,000.
(3) Capacity 4 tons.

(4) Daily distance covered 200 kms. (100 outward and 100 return)

(5) Working days in a month 25.

(6) Depreciation is a running cost.

(Ans. Rs.1.17)

Solution :- Computation of ton-kms in a month:

Outward journey : 4 tons × 100 kms × 25 days	=	10,000
Return journey : (50% of 4 tons) × 100 kms × 25 days	=	5,000
Total ton-kms in a month	=	15,000
Total running in a one month	= 200 × 25 = 5,000 kms	

Operating Cost Sheet for Truck No….

Standing charges:	Per annum (Rs.)	Per ton-kms. (Rs.)
Insurance @ 2% p.a. on Rs.3,00,000	6,000	
Garage rent	3,600	
Taxes	6,000	
Interest @ 18% p.a. on Rs.3,00,000	54,000	
Driver's salary	9,000	
Coolie	6,000	
Total annual fixed cost	84,600	
Total fixed cost per month = (84,600 ÷ 12)	Rs.7,050	
Total ton-kms per month	15,000	
Fixed cost per ton-km. = Rs.(7,050 ÷ 15,000)		0.47
Operating charges:	**Per month (Rs.)**	
Petrol : Rs.100 per 100 kms. *i.e.,* Re 1 per km	5,000	
Depreciation : = $\frac{3,00,000 - 25,000}{5} \times \frac{1}{12}$	4,583	
Repairs and maintenance 4,500 ÷ 12	375	
Tyre, battery, etc. 6,500 ÷ 12	542	
Total monthly running costs	10,500	0.70
Total cost per month = 7,050 + 10,500 =	17,550	
Operating cost per ton-km. = 17,550 ÷ 15,000=		1.17

BUDGATORY CONTROL

Modern business world is full of competition, uncertainty and exposed to different types of risks. This complexity of managerial problems has led to development of various managerial tools, techniques and procedures useful for the management in managing the business successfully. Budgeting is the most common, useful and widely used standard device of planning and control. The budgetary control has now become an essential tool of the management for controlling costs and maximizing profit. Costs can be reduced, wastage can be prevented and proper relationship between costs and incomes can be established only when the various factors of production are combined in profitable way. The resources of a business can be effectively utilized by efficient conduct of its operations. This requires careful working out of proper plans in advance, co-ordination and control of activities on the part of the management.

A proper planning and control are essential for an efficient management. A good number of tools and devices are available. Of all these, the most important device used is budget. Cost accounting aims not only at cost ascertainment, but also greatly at cost control and cost reduction. Thus, the management aims at the proper and maximum utilization of resources available. It is possible when there is a pre-planning. Modern management aims that all types of operations should be predetermined in advance, so that the cost can be controlled at every step. The more important point is that the actual programme is compared with the pre-planned programme and the variances are analyzed and investigated. All are familiar with the idea of budget, at every walk of life–state, firm, business etc.

Definition

A budget is a detailed plan of operations for some specific future period. Many of us are familiar with the term 'Budget'. For instance, if we want to have a holiday trip to Kashmir, we are to estimate the cost of traveling, boarding, lodging etc. So as to have sufficient amount for the trip. On return from the trip, we may like to compare the actual amount spent with estimated or budgeted figures. Similarly, we can know the importance of budgets even from the household management. The word 'budget' is derived from a French term "Bougette" which denotes a leather pouch in which funds are appropriated for meeting anticipated expenses. The same meaning applies to the business management. A budget is a numerical statement expressing the plans, policies and goals of the enterprise for a definite period in the future. It is a plan laying down the targets to be achieved within a specific period. It is a final and approved share of a forecast. When forecasts are approved by the management as tentative plan for the future they become budget. The following are some of the important definitions:

1. “Budget is an estimate of future needs arranged according to an orderly basis, covering some or all of the activities of an enterprise for a definite period of time.”
   ---- George R. Terry

2. “A budget is a comprehensive and co-ordinated plan, expressed in financial terms, for the operations and resources of an enterprise for some specific period in the future.”
   ---- James

3. “A budget is a pre-determined statement of management policy during a given period which provides a standard for comparison with the results actually achieved.”
   -- Brown and Howard

4. “A financial and/or quantitative statement, prepared prior to a defined period of time, of the policy to be pursued during that period for the purpose of a given objective.”
   ---- ICMA, England

A study of the above definitions reveals plan of what the enterprise endeavours of a budget:

1. Budget is a comprehensive plan of what the enterprise endeavours to achieve.
2. It is a statement in terms of money or quantity or both.
3. It is prepared for a definite future period.
4. It is prepared prior to the defined period.
5. It provides yardsticks and measures for the purpose of comparison.
6. It is prepared in advance and refers to the future course of action.
7. It indicates the business policy which has to be followed so as to achieve a given objective.

Budgeting

A budget is essentially a statement of the intention of management. Budgeting refers to the management action of formulating budgets. Preparation of budgets involves study of business situations and understanding of management objectives as also the capacity of the enterprise. It includes the entire processing of making the budget plans. Preparation of budgets or budgeting is a planning function, and their application or implementation is a control function. When plans are embodied in a budget and the same is used as the basis for regulating operations, we have budgetary control. Budgetary control starts with budgeting and ends with control. Budgeting is defined as:

1. “The entire process of preparing the budgets is known as budgeting.”
   ----- Batty

2. “Budgeting may be said to be the act of building budgets.”
----- Rowland and Harry

Fixed and Flexible Budgets

Fixed Budget. This is a budget which is designed to remain unchanged irrespective of the level of activity actually attained. This is prepared for definite production and capacity level. It is not adjusted according to activity level attained. The fixed budgets are not effective tools of cost control. These types of budgets have limited use.

A fixed budget has been defined by ICMA, England as “A budget which is designed to remain unchanged irrespective of the level of activity actually attained.”

However, in practical life, conditions do not remain static. The main reason is that actual output is often different from the budgeted output. In such a case the budget cannot be used for the purpose of cost control. There may be internal or external factors which force the level of activity to change.

Flexible Budget. This is a dynamic budget. It is a budget, which is designed to change in accordance with the level of activity. Actual output may differ from the budgeted output; and as such, it is necessary to modify the budget on the basis of changed output. The budget is prepared in such a way as to present the budgeted cost for different levels of activity, it is more realistic and practical, because changes expected at different levels of activity are given due consideration. It is called variable budget or sliding scale budget. The expenses are divided into three categories – fixed, variable and semi variable. It is an important tool of cost control, as it facilitates comparison of actual results with the budgeted figures.

ICWA, UK defines flexible budget as, “a budget, which by recognizing the difference between fixed, semi-variable costs, is designed to change in relation to the level of activity.” Ascertainment of costs at various levels of activity becomes possible. Price fixation, sending quotations and tenders and finding out profit at changed capacities are facilitated.

Preparation of Flexible Budget

A budget prepared in a manner so as to give the budgeted cost for any level of activity is known as flexible budget. A flexible budget is the opposite of static budget. It is prepared for a range of activity instead of a single level. Fixed costs are related mostly to the period of time and are not concerned with the level of production or volume of sales. Variable costs vary directly and proportionately with the volume of activity. At zero level activity, the variable costs will not be in existence. The semi-variable costs occupy an “in – between”

position between the fixed and variable costs. A part of these costs is variable and the rest if fixed. They are fixed to a certain level of activity and then rise with increase in the level of activity but not in the same proportion as the activity increases. As a matter of fact budget for each department can be prepared on the lines of flexible budget by classifying the costs into 'fixed' and 'variable'. In order to appropriately fix up the costs for different volumes, the degree of variability for each item cost at various levels of output could be evolved on the basis of past experience. This requires a close study of the individual items of expenditure, their nature and variability.

1. Decided the range of activity to develop a flexible budget.
2. Determine the cost behaviour – fixed, variable and semi-variable to each element of cost.
3. Select the activity level (generally in terms of output)
4. Prepare the budget at each activity level.

Q.1. DEFINE BUDGET AND BUDGETARY CONTROL. STATE THE ADVANTAGES OF BUDGETARY CONTROL IN AN ORGANIZATION.

ANS.: BUDGET IS A WRITTEN PLAN COVERING PROJECTED ACTIVITIES OF A FIRM FOR A DEFINED PERIOD OF TIME, EXPRESSED IN QUANTITATIVE TERMS.

BUDGETARY CONTROL IS A SYSTEM WHICH USES BUDGET AS A MEANS OF PLANNING AND CONTROLLING.

ADVANTAGES OF BUDGETARY CONTROL :

1. THERE IS A PLANNED APPROACH TO EXPENDITURE AND FINANCING OF THE BUSINESS.
2. BUDGETARY CONTROL COMBINES THE IDEAS OF DIFFERENT LEVELS OF MANAGEMENT IN THE PREPARATION OF THE BUDGET.
3. A BUDGET PROVIDES AN INCENTIVE WHENEVER IT IS SET ON ATTAINABLE RESULTS.
4. IT DIRECTS CAPITAL EXPENDITURE IN THE MOST PROFITABLE CHANNELS.
5. THE BUDGET OF CASH RECEIPTS AND EXPENDITURE ENSURES SUFFICIENT WORKING CAPITAL AND OTHER RESOURCES FOR THE EFFICIENT OPERATION OF THE BUSINESS.
6. BUDGETING CO-ORDINATES THE ACTIVITIES OF THE VARIOUS DEPARTMENTS AND FUNCTIONS BY SETTING THEIR LIMITS AND GOALS.

Q.2. WHAT ARE LIMITATIONS OF BUDGETARY CONTROL ?

ANS.: BUDGETARY IS NOT A FOOLPROOF TOOL. THOSE WHO CONSIDER USING BUDGETARY CONTROL MUST BE FULLY AWARE OF ITS LIMITATIONS. THE PRINCIPAL LIMITATIONS ARE AS FOLLOWS :

1. THE BUDGET PLAN IS BASED ON ESTIMATES. THE STRENGTH OR WEAKNESS OF A BUDGETARY CONTROL SYSTEM DEPENDS TO A LARGE EXTENT ON THE ACCURACY WITH WHICH ESTIMATES ARE MADE.
2. A BUDGETARY PROGRAMME MUST BE CONTINUOUSLY ADAPTED TO FIT CHANGING CIRCUMSTANCES. NORMALLY, IT TAKES SEVERAL YEARS TO ATTAIN A REASONABLY GOOD SYSTEM OF BUDGETARY CONTROL.

3. EXECUTION OF A BUDGET WILL NOT OCCUR AUTOMATICALLY. ALL LEVELS OF MANAGEMENT MUST PARTICIPATE ENTHUSIASTICALLY IN THE PROGRAMME FOR THE REALIZATION OF BUDGETARY GOALS.
4. NO BUDGETARY SYSTEM WILL ELIMINATE THE NECESSITY FOR SUPERIOR EXECUTIVE ABILITY IN EVERY MAJOR BUSINESS DECISION. IN OTHER WORDS, BUDGETING DOES NOT TAKE THE PLACE OF MANAGEMENT BUT RATHER IT IS TOOL MANAGEMENT.
5. IT IS ESSENTIAL THAT THERE MUST BE SOME CO-RELATION BETWEEN THE COST OF THE SYSTEM AND THE BENEFITS DERIVED FROM IT. IT IS QUITE COMMON TO FIND THAT OPERATION OF BUDGETING BECOMES SO COSTLY THAT SMALL CONCERN CANNOT AFFORD TO ADOPT.

Q.3. WHAT DO YOU THINK ARE THE ESSENTIALS OF AN EFFECTIVE BUDGETARY CONTROL SYSTEM ?

ANS.: THE FOLLOWING ARE THE REQUIREMENTS OF A GOOD BUDGETING SYSTEM :

1. CO-OPERATION OF TOP MANAGEMENT : BUDGETING MUST HAVE COMPLETE CO-OPERATION OF THE TOP MANAGEMENT.
2. MAXIMUM PROFIT : THE ULTIMATE OBJECT OF RELEASING MAXIMUM PROFIT SHOULD ALWAYS BE KEPT UPPER MOST.
3. BUDGET COMMITTEE : A BUDGET COMMITTEE SHOULD BE ESTABLISHED CONSISTING OF THE BUDGET DIRECTOR, CHIEF EXECUTIVE OFFICER AND EXECUTIVES OF VARIOUS DEPARTMENTS OF THE ORGANIZATION.
4. CONSTANT VIGILANCE : EFFECTIVE SYSTEM OF BUDGETING REQUIRES THAT PERIODIC REPORTS COMPARING BUDGET AND THE ACTUAL RESULT SHOULD BE PREPARED PROMPTLY. AS SOON AS UNFAVOURABLE TRENDS ARE DETECTED IMMEDIATELY REMEDIAL ACTION SHOULD BE TAKEN.
5. REASONABLY ATTAINABLE GOODS : BUDGET FIGURES SHOULD BE REALISTIC AND REPRESENT REASONABLY ATTAINABLE GOALS.
6. ADEQUATE ACCOUNTING SYSTEM : THE ACCOUNTING SYSTEM IN THE BUSINESS SHOULD BE ADEQUATE SUCH AS TO HOLD EACH PART OF THE ORGANIZATION TO ITS RESPONSIBILITIES.

Q.4. DISTINGUISH BETWEEN FIXED BUDGET AND FLEXIBLE BUDGET. BRIEFLY STATE THE CIRCUMSTANCES IN WHICH FLEXIBLE BUDGETS ARE USED.

ANS.: A FLEXIBLE BUDGET MAY BE DEFINED AS A BUDGET WHICH IS DESIGNED TO CHANGE IN ACCORDANCE WITH THE LEVEL OF ACTIVITY ACTUALLY ATTAINED. THIS IS IN CONTRAST TO A FIXED BUDGET WHICH IS DEFINED AS A BUDGET DESIGNED TO REMAIN UNCHANGED IRRESPECTIVE OF THE LEVEL OF ACTIVITY ACTUALLY ATTAINED.

THE FIGURES USED IN A FLEXIBLE BUDGET ARE MORE ADAPTABLE TO ANY GIVEN SET OF OPERATING CONDITIONS. IT IS MORE ELASTIC, USEFUL AND PRACTICAL. FLEXIBLE BUDGETS ARE NECESSARY FOR CONTROL. THE OBJECT HERE IS TO ASSESS WHAT ANY INDIVIDUAL COST SHOULD HAVE BEEN IN VIEW OF THE LEVEL OF ACTIVITY ACTUALLY ATTAINED.

FIXED BUDGET IS PREPARED KEEPING IN MIND ONE LEVEL OF OUTPUT. IF ACTUAL OUTPUT DIFFERS FROM THE BUDGET OUTPUT, VARIANCE WILL ARISE.

FLEXIBLE BUDGETS ARE NECESSARY FOR CONTROL. A MANAGER'S ACTUAL ACHIEVEMENT CAN ONLY BE COMPARED WITH WHAT HE SHOULD HAVE ACHIEVED IN THE ACTUAL CIRCUMSTANCES PREVAILING, NOT WITH WHAT HE SHOULD HAVE ACHIEVED UNDER QUITE DIFFERENT CIRCUMSTANCES.

UNDER THE FOLLOWING CIRCUMSTANCES, FLEXIBLE BUDGETS SHOULD BE USED :

1. THOSE COMPANIES SHOULD USE FLEXIBLE BUDGETING WHICH KEEP ON INTRODUCING NEW PRODUCTS OR MAKE FREQUENT CHANGES IN THE PRODUCT DESIGN. IN SUCH COMPANIES IT IS RATHER DIFFICULT TO FORECAST SALES WITH ACCURACY.
2. INDUSTRIES WITH SEASONAL FLUCTUATIONS IN SALES AND/OR PRODUCTION LIKE ICE CREAM, SOFT DRINKS, *ETC.* SHOULD ALSO USE FLEXIBLE BUDGETS.
3. INDUSTRIES WHICH ARE MORE PRONE TO CHANGES IN FASHION, LIKE REDY MADE GARMENTS SHOULD ALSO USE FLEXIBLE BUDGETS.
4. INDUSTRIES WHICH ARE ENGAGED IS MADE TO ORDER BUSINESS LIKE SHIP BUILDING SHOULD USE FLEXIBLE BUDGETS.

Q.5. WHAT IS ZERO BASE BUDGETING ? WHAT ARE THE ADVANTAGES OF ZERO BASE BUDGETING?

ANS.: GENERALLY BUDGETS ARE PREPARED BY TAKING PREVIOUS YEAR'S BUDGET AS THE BASE. ADJUSTMENT ARE MADE IN THE BUDGET OF THE LAST YEAR FOR ANY CHANGES THAT ARE LIKELY TO TAKE PLACE IN THE BUDGET PERIOD.

ZERO BASE BUDGETING (ZBB) IS A NEW CONCEPT IN PREPARATION OF BUDGETS. IN ZBB, INSTEAD OF TAKING PREVIOUS YEAR'S FIGURES AS THE BASE, EVERY ITEM HAS TO JUSTIFY ITS INCLUSION IN THE BUDGET. ZBB IS DEFINED AS A SYSTEM WHEREBY EACH BUDGET ITEM, REGARDLESS OF WHETHER IT IS NEW OR EXISTING, MUST BE JUSTIFIED IN ITS ENTIRELY EACH TIME A NEW BUDGET IS PREPARED. UNDER ZBB THERE IS CONTINUOUS RE-EVALUATION OF THE ACTIVITIES OF THE ORGANIZATION TO ASCERTAIN THAT ACTIVITIES ARE ABSOLUTELY NECESSARY FOR THE ORGANIZATION. ZBB IN A WAY TO LOCATE THOSE ACTIVITIES WHICH ARE NOT ESSENTIAL.

THE ADVANTAGE OF ZBB ARE AS FOLLOWS :

1. IN ZBB ALL ACTIVITIES INCLUDED IN THE BUDGET ARE JUSTIFIED ON COST BENEFIT CONSIDERATION WHICH PROMOTES MORE EFFECTIVE ALLOCATION OF RESOURCES.
2. ZBB DISCARDS THE ATTITUDE OF ACCEPTING THE CURRENT POSITION IN FAVOUR OF AN ATTITUDE OF QUESTIONING AND CHALLENGING EACH ITEM OF BUDGET.
3. IT IS AN EDUCATIONAL PROCESS AND CAN PROMOTE A MANAGEMENT TEAM OF TALENTED AND SKILLFUL PEOPLE WHICH LEND TO PROMPTLY RESPOND TO CHANGES IN THE BUSINESS ENVIRONMENT.
4. IT IS AN EDUCATIONAL IDENTIFICATION OF INEFFICIENT AND UNNECESSARY ACTIVITIES AND AVOID WASTEFUL EXPENDITURE.

Q.6. WHAT DO YOU UNDERSTAND BY PERFORMANCE BUDGETING ? WHAT STEPS ARE REQUIRED TO BE TAKEN FOR PREPARING PERFORMANCE BUDGETS ?

ANS.: PERFORMANCE BUDGETING IS A RELATIVELY NEW CONCEPT WHICH FOCUSES ON FUNCTIONS, PROGRAMMES AND ACTIVITIES. PERFORMANCE BUDGETS ARE ESTABLISHED

IN SUCH A MANNER THAT EACH ITEM OF EXPENDITURE RELATED TO SPECIFIC RESPONSIBILITY CENTER IS CLOSELY LINKED WITH THE PERFORMANCE OF THAT CENTER.

THE PERFORMANCE BUDGETING LAYS STRESS ON ACTIVITIES AND PROGRAMMES. IT TRIES TO ANSWER QUESTION LIKE – WHAT IS TO BE ACHIEVED ? *ETC.*

STEPS IN PERFORMING BUDGETING

1. ESTABLISHMENT OF RESPONSIBILITY CENTERS : FIRST OF ALL, RESPONSIBILITY CENTERS ARE ESTABLISHED. A RESPONSIBILITY CENTER IS A SEGMENT OF AN ORGANIZATION WHERE AN INDIVIDUAL MANAGER IS HELD RESPONSIBLE FOR THE PERFORMANCE OF THE SEGMENT.
2. ESTABLISHMENT OF PERFORMANCE TARGETS : FOR EACH RESPONSIBILITY CENTER, TARGETS ARE SET IN TERMS OF PHYSICAL PERFORMANCE TO BE ACHIEVED. FOR EXAMPLE, FOR SALES DEPARTMENT, WHICH IS A RESPONSIBILITY CENTER, TARGETS MAY BE SET IN TERMS OF NUMBER OF UNITS TO BE SOLD DURING THE BUDGET PERIOD. FOR PRODUCTION DEPARTMENT, THE TARGET WOULD THEN BE THE NUMBER OF UNITS TO BE PRODUCED.
3. ESTIMATING FINANCIAL REQUIREMENT : IN THIS STEP, THE FINANCIAL SUPPORT NEEDED TO ACHIEVE THE PHYSICAL TARGETS IS ESTIMATED. IN OTHER WORDS, THE AMOUNT OF EXPENDITURE INVOLVED UNDER VARIOUS HEADS TO MEET THE PHYSICAL PERFORMANCE IS FORECASTED.
4. COMPARISON OF ACTUAL WITH BUDGETED PERFORMANCE : THIS IS AN USUAL STEP IN BUDGETARY CONTROL TO EVALUATE THE ACTUAL PERFORMANCE.
5. REPORTING AND ACTION : VARIANCE FROM BUDGETED PERFORMANCE ARE ANALYSED AND REPORTING FOR CORRECTIVE ACTION TO BE TAKEN.

Q.7. WHAT ARE BUDGET REPORTS ? WHAT ARE ITS ESSENTIAL CHARACTERISTICS ?

ANS.: ESTABLISHING BUDGETS IN ITSELF IS OF NO USE UNLESS THERE IS A CONTINUOUS FLOW OF BUDGET REPORTS SHOWING COMPARISON OF ACTUAL AND BUDGET FIGURES. BUDGET REPORTS SHOULD BE PREPARED AT REGULAR INTERVALS SHOWING THE REASONS FOR THE DIFFERENCES BETWEEN ACTUAL AND BUDGET FIGURES. THE REPORTS SHOULD BE PREPARED IN SUCH A WAY THAT THEY ESTABLISH THE RESPONSIBILITY FOR THE VARIANCE. REPORTS SHOULD ALSO REVEAL WHETHER A VARIANCE IS FAVOURABLE OR UNFAVOURABLE AND ALSO WHETHER A VARIANCE IS CONTROLLABLE OR UNCONTROLLABLE.

ESSENTIALS OF A BUDGET REPORT – THE FOLLOWING ESSENTIALS SHOULD BE KEPT IN MIND WHILE PREPARING BUDGET REPORTS :

(a) THE BUDGET REPORTS SHOULD BE SIMPLE AND SUITABLE FOR THE LEVEL OF UNDERSTANDING OF THE USER.
(b) REPORTS SHOULD BE PRESENTED PROMPTLY.
(c) REPORTS SHOULD BE ACCURATE.
(d) THE REPORT SHOULD CONTAIN ONLY ESSENTIAL INFORMATION ACCORDING TO THE NEEDS OF THE USER.

Q.8. DEFINE FUNCTIONAL BUDGETS, MASTER BUDGET, LONG-TERM BUDGET, SHORT-TERM BUDGET, BASIC BUDGET AND CURRENT BUDGET.

ANS.: FUNCTIONAL BUDGET : BUDGETS WHICH RELATE TO THE INDIVIDUAL FUNCTIONS IN AN ORGANIZATION ARE KNOWN AS FUNCTIONAL BUDGETS. FOR EXAMPLE, PURCHASE BUDGET; SALES BUDGET; PRODUCTION BUDGET; PLANT-UTILISATION BUDGET AND CASH BUDGET.

MASTER BUDGET : IT IS A CONSOLIDATED SUMMARY OF THE VARIOUS FUNCTIONAL BUDGETS. IT SERVES AS THE BASIS UPON WHICH BUDGETED P & L A/C. AND FORECASTED BALANCE SHEET ARE BUILT UP.

LONG-TERM BUDGETS : THE BUDGETS WHICH ARE PREPARED FOR PERIODS LONGER THAN A YEAR ARE CALLED LONG-TERM BUDGETS. SUCH BUDGETS ARE HELPFUL IN BUSINESS FORECASTING AND FORWARD PLANNING. CAPITAL EXPENDITURE BUDGET AND RESEARCH AND DEVELOPMENT BUDGET ARE EXAMPLES OF LONG-TERM BUDGETS.

SHORT TERM BUDGETS : BUDGETS WHICH ARE PREPARED FOR PERIODS LESS THAN A YEAR ARE KNOWN AS SHORT-TERM BUDGETS. CASH BUDGET IS AN EXAMPLE OF SHORT-TERM BUDGET. SUCH TYPES OF BUDGETS ARE PREPARED IN CASES WHERE A SPECIFIC ACTION HAS TO BE IMMEDIATELY TAKEN TO BRING ANY VARIATION UNDER CONTROL, AS IN CASH BUDGETS.

BASIC BUDGETS : A BUDGET WHICH REMAINS UNALTERED OVER A LONG PERIOD OF TIME IS CALLED BASIC BUDGET.

Current Budgets : A budget which is established for use over a short period of time and is related to the current conditions is called current budget.

Q.9 Distinguish between Standard Costing and Budgetary Control?

Ans.: Budget control and Standard costs have the commmon objective of cost control by estblishing pre-determined costs. There are certain basic principes which are common to both budgetary control and standard costing. These are being given below:

- Establishment of pre-determined targets of performance.
- The measurement of actual performance.
- The comparison of actual performance with the predertermined performance.
- Analysis of the difference between actual and predetermined performance.
- To take remedial steps where necessary.

Inspite of these points of similarity, there are some important differnces between budgtary control and standard costing:

1. Budgets are prepared for different functions of the organization like sales, purchases, productino etc. This clasification like sales, purchases, production etc. This classification is as per financial records. In standard costing, on the other hand, costs are complied by clasifying, recording and allocatiing expenses.
2. Budget costs are used for forecasting requirements of diferent functions like finance, sales etc., whereas standard costs do nto tel what the costs are expected to be but

what the costs should be, if certain performances are aceihved. These can not be used for forecasting requiremnets.

3. IN budgetary control, variances are not revalead through accouns. Variances are used only as statistical informaton for exercising control. But under standard costing system, variances are revealed through diffferent accounts.

Q.10 Distinguish betwene conventional budgeting and zero base budgeting

Ans.: Zero Base Budgeting (ZBB) is an alternative budget system in which while preparing budets, pevious year's budget is not taken as base. Conventional budgeting in any organization is mostly done in such a way that each year all departmetns are given a maximum amount to spend. No justification is required on the part of any departmetn for spending the budgeted amount. This may be because the amoount spent might be equal to the last year's budget. The main disadvantage of such budgeting is that the inefficiencies of the previous years creep into this year's budget. In such a budget, justification is to be given only for new or addiional funds required.

In ZBB, each item in the budget is required to be justified each year. In presenting the budget, the manager of each deaprtment is asked to justify the needs of the deaprtmetn according to his perception. The budet committee considers the requests of all the departments and makes budget allocations according to the available sources. A ZBB may be defined as a system whereby each budget item, whether it is new or existing, has to be justified in its entirely. ZBB discards the attitude of accepting the existing position blindly. However, ZBB is a costly system of budgeting as it requires high volume of paper work.

Q1: The budgeted output of a factory specializing in the production of single product at the optimum capacity of 6,400 units per annum amounts to Rs.1,76,048 as detailed below:

	Rs.	Rs.
Fixed Cost		20,688
Variable costs:		
Power	1,440	
Repairs etc.	1,700	
Miscellaneous	540	
Direct materials	49,280	
Direct labour	1,02,400	1,55,360
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		1,76,048

Having regard to possible impact on sales turnover by market trends, the company decides to have a flexible budget with a production of 3,200 and 4,800 units (the actual quantity proposed to be produced being left to a later date before commencement of budget period.) Prepare a flexible budget for production levels at 50% and 75%. Assuming the sale per unit is maintained at Rs.40 as at present, indicate the effect on net profit.

Administration, selling and distribution expenses continue at Rs.3,600.

Control Ratios

Ratios are used to determine the production efficiency and the costs. It tells the ratio of actual level of activity attained, degree of efficiency attained and the actual capacity utilized during a budgeted period. Three important ratios are commonly used by the management to find out whether the deviations of actuals from budgeted results are favourable or otherwise.

These rations are expressed in terms of percentages. They are:

(a) Activity Ratios. It is a measure of the level of activity attained over a period. This ratio expresses relationship between standard hours for actual production and budgeted hours. The formula is:

$$\text{Activity Ratio} = \frac{\text{Standard hours for actual output}}{\text{Budgeted Standard Hours}} \times 100$$

(b) Capacity Ratio: This ratio indicates whether and to what extent budgeted hours of activity are actually utilized. The object is to show whether or not the available hours are being fully utilized.

The formula is :

$$\text{Capacity Ratio} = \frac{\text{Actual Hours Worked}}{\text{Budgeted Hours}} \times 100$$

(c) Efficiency Ratio or Productivity Ratio: The ratio is an important measure of the level of efficiency attained by the productive processes. This ratio indicates the efficiency attained in producing a stated output. The formula is

$$\text{Efficiency Ratio} = \frac{\text{Standard Hrs for Actual Production}}{\text{Actual Hours Worked}} \times 100$$

The results of the above ratios are interpreted as below:

Result	Interpretation
100%	No deviation
Above 100%	Favourable Deviation
Below 100%	Unfavourable Deviation

Calendar Ratio

This ratio indicates if the actual working days have been equal to more than or less than the budgeted number of days in the period under study. The formula is:

$$\text{Calendar Ratio} = \frac{\text{Actual working days in the period}}{\text{Working days on the basis of Budget during the period}} \times 100$$

Q2: A factory manufactures two types of products X and Y. Product X takes 5 hours to make and Y requires 10 hours. In a month of 25 effective days of 8 hours a day, 1,000 units of X and 600 units of Y were produced. The company employs 50 workers in the production department. The budgeted hours are 1,02,000 for the year. Calculate capacity ratio, Activity ratio and efficiency ratio.

Q3: Narang Ltd. Produces two commodities, Good and Better, one of its department. Each unit takes 5 hours and 10 hours as production time respectively. 1,000 units of Good and 600 units of Better were produced during March. Actual Man-hours spent in this

production were 10,000. Yearly budgeted hours are 96,000. Compute the various control ratios.

Q4: Prepare a flexible budget for overheads on the basis of the following data. Ascertain the overhead rates at 50%, 60% and 70% capacity.

	At 60% Capacity
Variable overheads:	Rs.
Indirect material	6,000
Indirect labour	18,000
Semi-variable overheads:	
Electricity (40% fixed 60% variable)	30,000
Repairs (80% fixed 20% variable)	3,000
Fixed Overheads:	
Depreciation	16,500
Insurance	4,500
Salaries	15,000
Total Overheads	93,000
Estimated direct labour hours	1,86,000

Q5: A company working at 50% capacity manufactures 10,000 units of a product. At 50% capacity the product cost is Rs.180 and sale price Rs.200. The break up of the cost is as below:

	Cost per unit
	Rs.
Material	100
Wages	30
Factory overheads	30 (40% fixed)
Administration overheads	20 (50% fixed)

At 60% working raw material cost goes up by 2% and sales price falls by 2%. At 80% working the raw material cost increases by 5% and sale price decreases by same percentage i.e. 5%.

Prepare a statement to show profitability at 60% and 80% capacity.

Q6: For the production of 10,000 electric automatic irons; the following the budgeted expenses:

		Per unit
		Rs.
Direct Material		60
Direct Labour	30	
Variable overhead		25
Fixed overhead (Rs.1,50,000)		15
Variable expenses (direct)	5	
Selling expenses (10%) fixed	15	
Administration expenses (Rs.50,000		
Rigid for all levels of production)	5	
Distribution expenses (20%) fixed	5	
The total cost of sale per unit		160

Prepare a budget for the production of 6,000 and 7,000 and 8,000 irons, showing distinctly the marginal cost and the total cost.

Q7: S.M. Ltd. Produces two products and budget for 60% level of activity for the year gives the following information.

Particulars	Product A	Product B
	Rs.	Rs.

Raw material cost per unit	7.50	3.50
Direct labour cost per unit	4.00	3.00
Variable overhead per unit	2.00	1.50
Fixed overheads per unit	6.00	4.50
Selling price per unit	20.00	15.00
Production and sales	4,000 units	6,000 units

The Managing Director, not being satisfied with the projected results as stated above, referred the Budget to the Marketing Director for improvement of performance. The Marketing Director proposed that the sales quantities of products A and B could each by increased by 50% provided the selling price were reduced by 5% in case of product A and 10% in the case of product B. The price reduction should be made applicable to the entire quantity of sales of each of the products.

1. Present the overall profitability under the original Budget and the revised budget after taking the increased sales into consideration.
2. Find that overall Break-even sales under original budget and the revised budget.

Q8: A factory engaged in manufacturing plastic buckets is working at 40% capacity and produces 10,000 buckets per month.

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

Material Rs.10

Labour Rs.3

Overheads Rs.5 (60% fixed)

The selling price is Rs.20 per bucket. If it is desired to work the factory at 50% capacity the selling price falls by 3%. At 90% capacity the selling price falls by 5% accompanied by a similar fall in the price of material.

You are required to prepare a statement showing the profit at 50% and 90%, capacities and also calculate the break-even points at this capacity production.

1. Sales Budget. Generally, sales factor becomes a key-factor in the majority of cases, and therefore, it is the staring point. This is the most important budget, as it is usually the most difficult to forecast. It is prepared by the sales manager. In the preparation, the sales manager should consider the following points:

   (a) Analysis of the sales of the previous year.
   (b) Salesman's assessment.
   (c) General trade conditions.
   (d) Availability of raw materials.
   (e) Availability of funds.
   (f) Plant capacity.
   (g) Seasonal fluctuations.
   (h) Restrictions imposed by the government.
   (i) Competition and consumer's preference.
   (j) Efficiency of advertising.

   Sales budget must show in terms of finished products, quantities and price; and it is prepared according to products, territories, periods, types of customer or salesman etc.

2. Production Budget. It is budget prepared by the production manager, showing the forecast of output. The objective is to determine the quantity of production for a budgeted period. It is an quantity of units to be produced during the budget period. It is based on the sales budget. It is in two parts – one part contains the volume of production and the other part shows the cost of production. Apart from the sales budget, optimum utilization of plant, availability of raw materials, labour etc. Are to be considered. It must avoid overwork in rush reasons. It must maintain a minimum stock of finished goods.

   Cost of Production Budget is divided into material cost budget, labour cost budget and overhead cost budget, because cost of production includes materials, labour and overheads. Therefore, separate budgets are required for each item.

3. Material Budget. To carry out the production satisfactorily regular supply of materials during the budget period is ensured by preparing a budget. In this, the decision regarding the quantity of materials as shown at different items during that period is followed. Only direct materials are taken into account; indirect materials are not taken into account and they are considered under overheads. The material budget helps

proper planning of purchases. It shows the estimated quantities as well as the cost of raw materials, required for production budget.

4. Labour Budget. It is a part of the production budget. The budget is prepared by the personnel department and it shows an estimate of the requirements of labour to meet the production target, on the basis of previous records and budgeted production. This budget gives detailed information relating to the number of workers, rates of wages and cost of labour hours to be employed.

5. Works Overload Budget. It sets out the estimated costs of indirect materials, indirect labour and indirect factory expenses, during the budget period is order to achieve the target. This is classified into fixed, variable and semi-variable. This facilitates preparation of budgets and further department-wise sub-division to have effective control. The overheads; and budget targets are verified for variable expenses, which are bound to change with the change of output.

Q10: From the following particulars, prepare a Production Budget of a Company for the year ended June 30, 1994.

Product	Sales (units) (as per sales Budgets)	Estimated Stock (units) 1st July 1993	30th June 1994
A	1,50,000	14,000	15,000
B	1,00,000	5,000	14,500
C	70,000	8,000	8,000

Q11: Draw a material procurement budget (quantitative) from the following information:

Estimated sales of a product 40,000 units. Each unit of the product requires 3 units of material A and 4 units of material B.

Estimated opening balances at the commencement of the next year:

	Units
Finished Products	5,000
Material A	12,000

Material B	20,000

Material on order:

Material A	7,000
Material B	11,000

The desirable closing balances at the end of the next year:

Finished product	7,000
Material A	15,000
Material B	25,000

Material on order

Material A	8,000
Material B	10,000

Q12: The Sales Director of a manufacturing Company reports that next year he expects to sell 50,000 units of a particular product:

The Production Manager consults the store-keeper and casts his figures as follows:

Two kinds of raw materials A and B are required for manufacturing the products.

Each unit of the product requires 2 units of A and 3 units of B.

The estimated opening balances at the commencement of the next year:

Finished Products :	10,000 units
Material A	12,000 “
Material B	15,000 “

The desirable closing balances at the end of the next year are:

Finished Products :	14,000 units
Material A	13,000 "
Material B	16,000 "

Draw up a quantitative chart showing materials purchase budget for the next year.

Q13: The budget manager of Cosmetics Limited is preparing a budget for the accounting year starting from 1st July 1994.

As part of the budget operations, some items of factory overhead costs have been estimated by him under specified conditions of volume as follows:

Volume of Production (Units)	1,20,000	1,50,000
	Rs.	Rs.
Expenses:		
Indirect Materials	2,64,000	3,30,000
Indirect labour	1,50,000	1,87,500
Maintenance	84,000	2,02,000
Supervision	1,98,000	2,34,000
Engineering Service	94,000	94,000

Calculate the cost of factory overhead items given above at 1,40,000 units of production.

6. *(a)* *Administration Overheads Budget.* This budget covers the Expenditure of administrative office and management salaries. It is prepared with the help of past experiences and expected changes in future. The administration cost of each budget centre is drawn separately and incorporated in administrative cost budget.

(b) *Selling and Distribution Overhead Budget.* This budget relates to selling and distribution of products for the budget period and is based of sales

budget. It is generally prepared territory-wise by the sales manager of each territory. The costs are divided into fixed variable and semi-variable and estimate is taken on the basis of past records.

7. Capital Expenditure Budget. This budget shows the estimated expenditure on fixed assets – land, building, plant, machinery etc. It is a long-term budget. The capital expenditure is necessitated on account of replacement of old machines, increased demand of products, expansion of industry, adoption of new technological progresses etc.

8. Cash Budget. This budget represents the amount of cash receipts and payments, and a balance during the budgeted period. It is prepared after monthly or weekly giving the following hints
   (1) It ensures sufficient cash for business requirements.
   (2) It proposes arrangements to be made overdraft to meet any shortage of cash.
   (3) It reveals the surplus amount, and the effect of the seasonal fluctuations on cash position. The objective of cash budget is the proper co-ordination of total working capital, sale, investment and credit.

Q14: From the following forecasts of income and expenditure prepare a cash budget for the three months commencing 1st June, when the bank balance was Rs.1,00,000.

	Sales	Purchases	Wages	Factory Expenses	Admin. & Selling Expenses
	Rs.	Rs.	Rs.	Rs.	Rs.
April	80,000	41,000	5,600	3,900	10,000
May	76,500	40,500	5,400	4,200	14,000
June	78,500	38,000	5,400	5,100	15,000
July	90,000	37,000	4,800	5,100	17,000
August	95,000	35,000	4,700	6,000	13,000

A sales commission of 5 per cent on sales, due two months after sales, is payable in addition to selling expenses. Plant value at Rs.65,000 will be purchased and paid in August, and the dividend for the last financial year of Rs.15,000 will be paid in July. There is a two month credit period allowed to customers and received from suppliers.

Q15: A department of Company X attains sales of Rs.6,00,000 at 80% of its normal capacity and its expenses are given below:

Administration Costs:

Office Salaries	Rs.90,000
General expenses	2% of sales
Depreciation	Rs.7,500

Rates and Taxes	Rs.8,750

Selling Costs:

Salaries	8% of sales
Traveling expenses	2% of sales
Sales office	1% of sales
General expenses	1% of sales

Distribution Costs:

Wages	Rs.15,000
Rent	1% of sales
Other expenses	4% of sales

Draw up flexible administration, selling and distribution costs budget, operating at 90%, 100% and 110% of normal capacity.

Q16: A company expects to have Rs.37,500 cash in hand on 1st April, and requires you to prepare an estimate of cash position during the three months, April, May and June. The following information is supplied to you:

	Sales	Purchases	Wages	Factory Expenses	Office Expenses	Selling Expenses
		Rs.	Rs.	Rs.	Rs.	Rs.
Feb	75,000	45,000	9,000	7,500	6,000	4,500
March	84,000	48,000	9,750	8,250	6,000	4,500
April	90,000	52,500	10,500	9,000	6,000	5,250
May	1,20,000	60,000	13,500	11,250	6,000	6,570
June	1,35,000	60,000	14,250	14,000	7,000	7,000

Other Information:

(1) Period of credit allowed by suppliers 2 months.
(2) 20% of sales is for cash and period of credit allowed to customers for credit is one month.
(3) Delay in payment of all expenses – 1 month.
(4) Income tax of Rs.57,500 is due to be paid on June 15th.
(5) The company is to pay dividends to shareholders and bonus to workers of Rs.15,000 and Rs.22,000 respectively in the month of April.
(6) Plant has been ordered to be received and paid in May. It will cost Rs.1,20,000.

Q17: Prepare a Cash Budget for the three months ending 30th June from the following information:

(a)

Month	Sales	Materials	Wages	Overheads
	Rs.	Rs.	Rs.	Rs.
February	14,000	9,600	3,000	1,700

March	15,000	9,000	3,000	1,900
April	16,000	9,200	3,200	2,000
May	17,000	10,000	3,600	2,200
June	18,000	10,400	4,000	2,300

(b) Credit terms are:
Sales/Debtors – 10% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month.

(c) Creditors : Materials, 2 months
Wages, ¼ month
Overheads, ½ month

(d) Cash and Bank Balance on 1st April is expected to be Rs.6,000.

(e) Other relevant information's are:
(1) Plant and Machinery will be installed in February at a cost of Rs.96,000. The monthly instalments of Rs.2,000 are payable from April onwards.
(2) Dividend @ 5% on Preference share capital of Rs.2,00,000 will be paid on 1st June.
(3) Advance to be received for sale of vehicles Rs.9,000 in June.
(4) Dividends from investments amounting to Rs.1,000 are expected to be received in June.
(5) Income-tax (advance) to be paid in June is Rs.2,000.

Q18: A Glass Manufacturing Company requires you calculate and present the budget for the next year from the following information:
Sales :

Toughened Glass	Rs.3,00,000
Bent Toughened Glass	Rs.5,00,000
Direct materials cost :	60% of sales
Direct wages :	20 workers @ Rs.1.50 per month

Factory Overheads:
Indirect labour :
Works Manager : Rs.500 per month.
Foreman : Rs.400 per month.
Stores and spares : 2½% on sales
Depreciation on machinery : Rs.12,600
Light and power : Rs.8,000
Repairs and maintenance : Rs.8,000
Other sundries : 10% on direct wages.
Administration, selling and distribution expenses : Rs.14,000 p.a.

Zero Base Budgeting

In common practice building the functional budgets is to base the budget year's figures on the previous year's budget. Taking the previous figures as the base, the required adjustments are made for the impact of inflation proposed increased or decreased level of activity etc. In the light of experience. Thus, in the traditional budgeting system, budgets are based on trends or historical level of expenditure. Thus, a budget is developed on the concept of incremental basis. Mostly, what is done is to add some percentage to the figures of previous year to determine the budget figures. That is, under the incremental basis. Mostly, what is done is to add some percentage to the figures of previous year to determine the budget figures. That is, under the incremental system, the figures of the previous budget, on the basis of which future budget is drawn, are considered to be acceptable. It is the experience of many, particularly in the government departments and public undertakings that the actual expenditure should be in line with the budgeted amount otherwise the higher authorities will reduce the future budgeted and allocated amounts. The managers justify the need to spend more than that of the previous budget. But they do not review their past activities and thus expenditure and inefficiencies are brought forward to the subsequent period i.e. The incremental budgeting perpetuates inefficiency instead of promoting operational efficiency .

In order, therefore, to streamline the allocation, to curb this tendency of equalizing the expenditure with budgeted figures and to control the costs, a new technique is called "Zero Base Budgeting" or "Zero Based Budgeting" emerged. Under this technique, no special budget is prepared but the approach is changed.

The use of Zero Base Budgeting (ZBB) as a managerial tool has become increasingly popular since the early 1970's. It first came into being when Ex-President Jimmy Carter of the United States of America introduced it as a means of controlling state expenditure. The underlying idea of ZBB is that there is no given base figure for a budget. A fresh budgeted figure is to be determined keeping the circumstances and requirements. The basic concept of ZBB is simple: budgeting starts from scratch or zero. That is, every activity is an organization must be examined and justified, any alternatives must be considered and the results evaluated. It is a method whereby all activities are re-valuated each time when a budget is formulated.

It implies that:

(1) Every budget starts with a zero base.
(2) No previous figure is to be taken as a base figure for adjustments.
(3) Each activity is to be examined afresh.
(4) Every budget allocation is to be justified in the light of anticipated circumstances.
(5) Alternatives are to be given due consideration.

Benefits

1. Effective cost control can be exercised.
2. Careful planning is facilitated.

3. Management by objectives becomes a reality.
4. Uneconomical activities are identified.

BUDGETARY CONTROL PROBLEM AND SOLUTION

Sales Overhead Budget

Q.1 Prepare a Sales Overhead Budget for the month of January, February and March from the estimates given below:

Advertisement	Rs.2,500
Salaries of the Sales Department	5,000
Expenses of the Sales Department	1,500
Counter Salesmen's Salaries and Dearness Allowance	6,000

Counter salesmen's commission is 1% on their sales. Trawling salesmen's commission at 10% on their sales and expenses at 5% on their sales. The sales during the period were estimated as follows:

Month	Counter Sales	Traveling Salesmen's
January	Rs.80,000	Rs.10,000
February	1,20,000	15,000
March	1,40,000	20,000

Solution: Sales Overhead Budget (For the month January, February and March)

Month	**January**	**February**	**March**
Variable Overheads:			
Commission to counter salesmen @ 1% on their sales	Rs.800	Rs.1,200	Rs.1,400
Travelling salesmen's commission @ 10% on their sales	1,000	1,500	2,000
Travelling salesmen's expenses @ 5% on their sales	500	750	1,000
1. Total variable overheads	2,300	3,450	4,400
Fixed Overheads			

Advertisement	2,500	2,500	2,500
Salaries of Sales Dept.	5,000	5,000	5,000
Expenses of Sales Dept.	1,500	1,500	1,500
Salaries etc. of counter salesmen	6,000	6,000	6,000
2. Total fixed overheads	15,000	15,000	15,000
3. Total sales overheads (1+2)	17,300	18,450	19,400

Production Budget

Q.2 Prepare a Production Budget for the 3 months ending March 31, 2005, for a factory producing four products, on the basis of the following information:

Type of Products	**Estimated Stock on Jan. 1, 2005 (units)**	**Estimated Sales during Jan. – March 2005 (units)**	**Desired Closing Stock on March 31. 2005 (Units)**
W	4,000	20,000	6,000
X	6,000	30,000	10,000
Y	8,000	26,000	6,000
Z	6,000	24,000	4,000

Solution: Production Budget for three months to March 31. 2005

Products	**W**	**X**	**Y**	**Z**
Estimated Sales (Units)	20,000	30,000	26,000	24,000
(+) Desired Closing Stock (Units)	6,000	10,000	6,000	4,000
(-) Estimated Opening Stock (Units)	(4,000)	(6,000)	(8,000)	(6,000)
Estimated Production (Units)	22,000	34,000	24,000	22,000

Q.3 From the following data, prepare a production budget for the ABC Co. Ltd.:

Stocks for the budgeted period:

Product	As on 1st January	As on 30th June
A	8,000	10,000
B	9,000	8,000
C	12,000	14,000

Normal loss in production:		Requirements to fulfill sales programmer:
A	4%	A 60,000 units
B	2%	B 50,000 units
C	6%	C 80,000 units

Solution: Production Budget for six months ending 30th June

Details	**Products**		
	A	**B**	**C**
	Units	**Units**	**Units**
Budgeted Sales	60,000	50,000	80,000
Add: Closing Stock	10,000	8,000	14,000
Total required stock	70,000	58,000	94,000
Less: Opening Stock	8,000	9,000	12,000
Net production	62,000	49,000	82,000
Add: Normal Loss in production	2,583	1,000	5,234
Gross production	64,583	50,000	87,234

A – (4 ÷ 96) × 62,000 = 2,583;

B – (2 ÷ 98) × 49,000 = 1,000;

C – (6 ÷ 94) × 82,000 = 5,234

Production & Raw Material Purchase Budget

Q.4 The following are the estimated sales of a company for eight months ending 30.11.2007:

Months	Estimated Sales (units)
April 2007	12,000

May 2007	13,000
June 2007	9,000
July 2007	8,000
August 2007	10,000
September 2007	12,000
October 2007	14,000
November 2007	12,000

As a matter of policy, the company maintains the closing balance of finished goods and raw materials as follows:

Stock item	Closing balance of a month
Finished Goods	50% of estimated sales for the next month
Raw Materials	Estimated consumption for the next month.

Every unit of production requires 2 kg. of raw material costing Rs5 per kg.

Prepare Production Budget (in units) and Raw Material Purchase Budget (in units and cost) of the company for the half year ending 30 September, 2007.

Solution: Production Budget (Units) for the half-year ending 30th September. 2007

Month	Sales (in units)	Closing Balances 50% of the estimated Sales for the next month	Opening Balances	Production
1	2	3	4	5 = (2) + (3) – (4)
2007				
April	12,000	6,500	6,000	12,500
May	13,000	4,500	6,500	11,000
June	9,000	4,000	4,500	8,500
July	8,000	5,000	4,000	9,000
August	10,000	6,000	5,000	11,000

September	12,000	7,000	6,000	13,000
	64,000			65,000

Purchase Budget (Cost & Units) for the year ending 30th September, 2007

Month	Production in units	Consumption (kg.) @ 2 kg. per units	Closing Balance	Opening Balance	Purchase in kg.	Rate Rs.	Amount Rs.
2007							
April	12,500	25,000	22,000	25,000	22,000	5	1,10,000
May	11,000	22,000	17,000	22,000	17,000	5	85,000
June	8,500	17,000	18,000	17,000	18,000	5	90,000
July	9,000	18,000	22,000	18,000	22,000	5	1,10,000
August	11,000	22,000	26,000	22,000	26,000	5	1,30,000
September	13,000	26,000	26,000	26,000	26,000	5	1,30,000
	65,000	1,30,000					6,55,000

Manufacturing overhead budget

Q.5 From the following average figures of previous quarters, prepare a manufacturing overhead budget for the quarter ending on March 31,2005. The budgeted output during this quarter is 4,000 units.

	Rs.
Fixed overheads	20,000
Variable overheads	10,000 (varying @ Rs.5 per unit)
Semi-Overheads	10,000 (40% fixed and 60% varying @ Rs.3 per unit)

Solution: Manufacturing Overheads Budget for the quarter ending on March 31, 2005

	Rs.
Fixed overheads	20,000
Variable overheads (Rs.5 × 4,000 units)	20,000

Semi-variable overheads		
Fixed	4,000	
Variable (Rs.3 × 4,000 units)		16,000
12,000		
Total Overhead Costs		56,000

Production cost Budget

Q.6 Production costs of a factory for a year are as follows:

	Rs.
Direct Wages	80,000
Direct Materials	1,20,000
Production Overheads, Fixed	40,000
Production Overheads, Variable	60,000

During the forthcoming year it is anticipated that:

(a) The average rate for direct labour remuneration will fall from Rs.3 per hour to Rs.2.50 per hour;
(b) Production will remain unchanged.
(c) Direct labour hours will increase by 331/3%.

The purchase price per unit of direct materials and other materials and services which comprise overheads will remaing unchanged. Draw up a budget and compute a factory overhead rate, the overheads being absorbed on a direct wage basis.

Solution:

Existing Direct Labour Hours = 80,000 = 26,667

3

Expected Direct Labour Hours = 26,667 × 1331/3%

= 35,556 hrs.

Direct Wages = 35,556 hrs. X Rs.2.50 hrs.

= Rs.88,890

Direct Material	1,20,000
(+) Direct Wages	88,890

Prime Cost	2,08,890
(+) Factory Overhead	
Fixed Production Overheads	40,000
Variable Production Overheads	60,000
Factory Cost	3,08,890

Factory overhead absorption rate on Direct Wages = $\frac{\text{Factory overhead}}{\text{Direct Wages}} \times 100$

$= \frac{1,00,000}{88,890} \times 100 = 112.5\%$

Flexible Budget

Q.7 A department of Company X attains sale of Rs.6,00,000 at 80 percent of its normal capacity and its expenses are given below:

Administration costs:	Rs.
Office salaries	90,000
General expenses	2 percent of sales
Depreciation	7,500
Rates and taxes	8,750
Selling costs:	
Salaries	8 percent of sales
Travelling expenses	2 Percent of sales
Sales office expenses	1 percent of sales
General expenses	1 percent of sales
Distribution costs:	
Salaries	15,000
Rent	1 percent of sales
Other expenses	4 percent of sales

Draw up flexible administration, selling and distribution costs budget, operating at 90 percent, 100 percent and 110 percent of normal capacity.

Solution: Flexible budget of Department ….of Company 'X' Rs.

Expenses	**Basis**	**Level of activity**			
		80%	90%	100%	110%
(1)	(2)	(3)	(4)	(5)	(6)
Sales		6,00,000	6,75,000	7,50,000	8,25,000
Administration costs:					
Office salaries	Fixed	90,000	90,000	90,000	90,000
General expenses	2% of sales	12,000	13,500	15,000	16,500
Depreciation	Fixed	7,500	7,500	7,500	7,500
Rates & taxes	Fixed	8,750	8,750	8,750	8,750
Total administration costs		1,18,250	1,19,750	1,21,250	1,22,750
Selling costs:					
Salaries	8% of sales	48,000	54,000	60,000	66,000
Travelling expenses	2% of sales	12,000	13,500	15,000	16,500
Sales office expenses	1% of sales	6,000	6,750	7,500	8,250
General expenses	1% of sales	6,000	6,750	7,500	8,250
Total selling costs:		72,000	81,000	90,000	99,000
Distribution costs:					
Wages	Fixed	15,000	15,000	15,000	15,000
Rent	1% of sales	6,000	6,750	7,500	8,250
Other expenses	4% of	24,000	27,000	30,000	33,000

sales				
Total Distribution Cost	45,000	48,750	52,500	56,2520
Total Admn., Selling & Dist. Costs	2,35,250	2,49,500	2,63,750	2,78,000

Note: In the absence of information it has been assumed that office salaries, depreciation, rates and taxes and wages remain the same at 110% level of activity also.

Q.8 Prime Printing Co. Private Limited ended with the following Profit/Loss during the year 2004:

		(All figures inn lakhs of Rs.)
Sales		35.58
Less Expenses: Raw Materials	7.42	
Stores	4.88	
Expenses	20.40	
Interest	2.00	
Depreciation	2.00	36.70
Loss for the year		(1.12)

The press had been working at 60% of capacity during 2004. Of the expenses of Rs.20.40 lakhs, 25% is variable. In 2005 production/sales volume at 80% of capacity is expected to be achieved. Fixed cost is however expected to increase by Rs.1.20 lakhs. Draw the 2005 Budget.

Solution: Budget for 2005 **(Rs. In lakhs)**

Sales $\left[\frac{35.58}{60} \times 80\right]$	47.44
(-) Variable Expenses	
(a) Raw Material $\left[\frac{7.42}{60} \times 80\right]$	(9.89)
(b) Stores $\left[\frac{4.88}{60} \times 80\right]$	(6.51)

(c) Other expenses [5.1 × 80 / 60]	(6.80)
(-) Fixed Expenses	
(a) Expenses (20.4 × 75%)	(15.3)
(b) Interest	(2.0)
(c) Depreciation	(2.0)
(d) Additional Fixed Cost	(1.20)
Profit	3.74

Q.9 The cost of an article at a capacity level of 5,000 units is given under A below:

	Amount	**Cost behavior**
Material Cost	Rs.25,000	100% varying
Labour cost	15,000	100% varying
Power	1,250	80% varying
Repairs and maintenance	2,000	75%
Stores	1,000	100%
Inspection	500	20%
Depreciation	10,000	100%
Administration Overhead	5,000	25%
Selling Overhead	3,000	50%
	Rs.62,750	
Cost per unit	Rs.12.55	

Find the unit cost of the product under each individual expense at production levels of 4,000 units and 6,000 units.

Solution: Particulars	5,000 units	4,000 units	6,000 units

Material cost (Variable)		25,000	20,000	30,000
Labour cost (Variable)		15,000	12,000	18,000
Power:	(Variable)	1,000	800	1,200
	(Fixed)	250	250	250
Repairs & Maintenance	(Variable)	1,500	1,200	1,800
	(Fixed)	500	500	500
Stores	(Variable)	1,000	800	1,200
Inspection	(Variable)	100	80	120
	(Fixed)	400	400	400
Dep.	(Variable)	10,000	8,000	12,000
Administration Overheads	(Variable)	1,250	1,000	1,500
	(Fixed)	3,750	3,750	3,750
Selling Overheads	(Variable)	1,50	1,200	1,800
	(Fixed)	1,50	1,500	1,500
		62,750	51,480	74,020
No. of units		5,000	4,000	6,000
Cost Per unit		12.55	12.87	12.34

Q.10 Genini Steel Ltd. manufactures a single product for which market demand exists for additional quantity. Present sales of Rs.60, 000 per month utilizes only 60% capacity of the plant. Marketing Manager assures that with the reduction of 10% in the price he would be in a position to increase the sale by about 25% to 30%.

The following data are available:

(i) Selling price Rs.10 per unit
(ii) Variable cost Rs.3 per unit
(iii) Semi-variable cost Rs.6,000 fixed + 50 paise per unit
(iv) Fixed cost Rs.20,000 at present level estimated to be Rs.24,000 at 80% output.

You are required to prepare the following statements:

(1) The operating profit at (a) 60%, (b) 70% and (c) 80% levels at current selling prices, and
(2) The operating profits at proposed selling price at the above levels.

Solution: Sales volume	6,000 units	7,000 units	8,000 units
Sales Value (Rs.10 per unit) (A)	60,000	70,000	80,000
Variable Cost (Rs.3 per unit)	18,000	21,000	24,000
Semi-variable Cost			
- Fixed Cost	6,000	6,000	6,000
- Variable Cost	3,000	3,500	4,000
Fixed Cost	20,000	20,000	24,000
Total Cost (B)	47,000	50,500	58,000
(1) Profit (A) - (B)	13,000	19,500	22,000
(2) Reduction in profits due to reduction in SP	(6,000)	(7,000)	(8,000)
Revised profits	7,000	12,500	14,000

Q.11 A Limited company is engaged in the business of manufacturing standard toys. It has prepared a six-monthly budget, which shows the following particulars:

Sales	80,000 units @ Rs.20 per unit
Variable Cost: Manufacturing	Rs.6 per unit
Selling	Re.1 per unit
Distribution	Re.0.25 per unit
Semi-Variable costs:	Rs.
Manufacturing	60,000
Selling	30,000
Administration	16,000
Fixed Costs:	
Manufacturing	60,000
Selling	40,000
Administration	80,000

It is decided to provide a plastic tray along with sales of toys. It is estimated this gesture on the part of the Company would boost up the sales from 80,000 units to 1,00,000 units.

The above proposal would involve an additional expenditure. The same is estimated as under:

Semi-variable cost:	Rs.
Manufacturing	4,000
Selling	4,000
Administration	2,000
Fixed Costs:	
Manufacturing	10,000

You are required to prepare a statement showing comparative Profitability.

Solution:

Particulars	**80,000 units**	**1,00,000 units**
Sales (A)	16,00,000	20,00,000
Variable cost		
Manufacturing	4,80,000	6,00,000
Selling	80,000	1,00,000
Distribution	20,000	25,000
(1)	5,80,000	7,25,000
Semi-variable Cost		
Manufacturing	60,000	64,000
Selling	30,000	34,000
Distribution	16,000	18,000
(2)	1,06,000	1,16,000
Fixed Cost		
Manufacturing	60,000	70,000
Selling	40,000	40,000

Distribution	80,000	80,000
(3)	1,80,000	1,90,000
Total Cost [(1) + (2) + (3)] (B)	8,66,000	10,31,000
Profit (A) - (B)	7,34,000	9,69,000

Q.12 Figures regarding sales, cost and profit at 50% capacity are given below:

	Rs.
Sales	20,00,000
Direct cost	8,00,000
Factory	4,00,000
Office overheads	2,00,000
Selling overheads	3,00,000
Profit	3,00,000

Every 10% increase in sales beyond 50% capacity is possible only after reducing the price by 1% on the base level of 50% capacity. Direct material cost is 25% of the total direct cost at 50% capacity. With every 10% increase in capacity above this level, the price of direct material comes down by 2%. 50% of the factory overheads are fixed and the rest are fully variable. Office overheads are of step character. Every 10% increase in output results in 2% increase in office overheads over 50% capacity. Selling overheads increase in proportion of sales value. Prepare a flexible budget at 80% capacity.

Solution: Budget for 80% capacity (Rs.)

Sales Value (A)	31,04,000
[20,00,000 × 80%/50%] × 97/100	
Direct Material Cost	3,00,800
[25% of 8,00,000] × 80%/50% × 94/100	
Other Direct Cost	9,60,000

{75% of 8,00,000 × 80%}	
50%	
Variable Factory Overheads	3,20,000
{2,00,000 × 80% }	
50%	
Selling Overhead	4,65,600
{3,00,000 × 31,04,000}	
20,00,000	
Total Variable Cost (B)	20,46,400
Step Cost	
Office Overheads [2,00,000 × 106%] (C)	2,12,000
Fixed Overheads	
Factory [50% of factory overheads] (D)	2,00,000
Profit = A – B – C – D	6,45,600

Q.13 The following data are available in a manufacturing company for a half-yearly period:

	Rs.	Rs.
Fixed Expenses:	(lakhs)	(lakhs)
Wages and Salaries	8.40	
Rent, Rates and Taxes	5.60	
Depreciation	7.00	
Sundry Administration Expenses	8.90	29.90
Semi-Variable Expenses: (at 50% of capacity)		
Maintenance and Repairs	2.50	
Indirect Labour	9.90	
Sales Dept. Salaries etc.	2.90	17.90

Sundry Administrative Expenses	
Variable Expenses: (at 50% of capacity)	
Materials	24.00
Labour	25.60
Other Expenses	3.80
53.40	

Assume that the fixed expenses remain constant for all levels of production, semi-variable expenses remain constant between 45% and 65% of capacity increasing by 10% between 65% and 80% capacity, and by 20% between 100% capacity.

Sales at the various levels are:	(Rs. Lakhs)
60% Capacity	100.00
75% Capacity	120.00
90% Capacity	150.00
100% Capacity	170.00

Prepare a flexible budget for the half year and forecast the profits at 60%, 75%, 90% and 100% of capacity.

Solution:

Production level	**60%**	**75%**	**90%**	**100%**
Variable Expenses				
Material	28.80	36.00	43.20	48.00
Labour	30.7222	38.40	46.08	51.20
Other Expenses	4.56	5.70	6.84	76.00
(A)	64.08	80.10	96.12	106.80
Semi-variable Expenses				
Maintenance Expenses	2.50	2.75	3.00	3.00
Indirect labour	9.90	10.89	11.88	11.88
Sales Department Expenses	2.90	3.19	3.48	3.48

Administration Expenses	2.60	2.86	3.12	3.12
(B)	17.90	19.69	21.48	21.48
Fixed Expenses				
Wages	8.40	8.40	8.40	8.40
Rent	5.60	5.60	5.60	5.60
Depreciation	7.00	7.00	7.00	7.00
Administration Expenses	8.90	8.90	8.90	8.90
(C)	29.90	29.90	29.90	29.90
T.C. (A) + (B) + (C)	111.88	129.69	147.50	158.18
Profit/Loss	(11.88)	(9.69)	2.50	11.82
Sales	100.00	120.00	150.00	170.00

Q.14 A newly established manufacturing company has an installed capacity to produce 1,00,000 units of a consumer product annually. However its practical capacity is only 90%. The actual capacity utilization may be substantially lower, as the firm is new to the market and demand is uncertain. The following budget has been prepared for 90% capacity utilization:

	Cost per units Rs.	
Direct Materials	12	
Direct Labour	8	
Direct Expense	5	
Production Overheads	10	(40% variable)
Administrative Overheads	5	(100% fixed)
Selling and Distribution	6	(50% variable)

You are required to prepare budgets at 60%, 70% and 80% levels of capacity utilization given clearly the unit variable cost; the unit fixed cost and the total costs under various heads heads at all the above levels.

Solution:	**90%**	**60%**	**70%**	**80%**

Units		90,000	60,000	70,000	80,000
Direct Material	Rs.12	10,80,000	7,20,000	8,40,000	9,60,000
Direct Labour	Rs.8	7,20,000	4,80,000	5,60,000	6,40,000
Direct Expenses	Rs.5	4,50,000	3,00,000	3,50,000	4,00,000
Variable Production Overhead	Rs.4	3,60,000	2,40,000	2,80,000	3,20,000
Variable Selling Overhead	Rs.3	2,70,000	1,80,000	2,10,000	2,40,000
Total Variable Cost		28,80,000	19,20,000	22,40,000	25,60,000
Variable Cost per unit		Rs.32	Rs.32	Rs.32	Rs.
Fixed Production Overheads		5,40,000	5,40,000	5,40,000	5,40,000
Fixed Administrative Overheads		4,50,000	4,50,000	4,50,000	4,50,000
Fixed Selling Overheads		2,70,000	2,70,000	2,70,000	2,70,000
Total Fixed cost		12,60,000	12,60,000	12,60,000	12,60,000
Fixed Cost Per unit		Rs.14	Rs.21	Rs.18	Rs.15.75
Total Cost Per unit		Rs.46	Rs.53	Rs.53	Rs.47.75

Functional Budgets:

Q.15 A single product company estimated its sales for the next year quarter wise as under:

Quarter	Sales (Units)
I	30,000
II	37,500
III	41,250
IV	45,000

The opening stock of finished goods is 10,000 units and the company expects to maintain the closing stock of finished goods at 16,250 units at the end of the year. The production pattern in each quarter is based on 80% of the sales of the current quarter and 20% of the sales of the next quarter.

The opening stock of raw materials in the beginning of the year is 10,000 kg. And the closing stock at the end of the year is required to be maintained at 5,000 kg. Each unit of finished output requires 2 kg. Of raw materials. The company proposes to purchase the entire annual

requirement of raw materials in the first three quarters in the proportion and at the prices given below:

Quarter Annual requirement in quantity	Purchase of raw materials % to total	Price per kg. Rs.
I	30%	2
II	50%	3
III	20%	4

The value of the opening stock of raw materials in the beginning of the year is Rs.20,000. You are required to present the following for the next year, quarter wise:

(i) Production budget (in units).
(ii) Raw material consumption budget (in units).
(iii) Raw material purchase budget (in quantity and value).

Solution: Working Note: Total Annual Production (in units)

Sales in 4 quarters	1,53,750
Add: Closing Stock of Finished Goods	16,250
	1,70,000
Less: Opening Stock of Finished Goods	(10,000)
Total number of units to be produced in the next year	1,60,000

(i) Production Budget (in units)

	Quarters				
	I	II	III	IV	Total
	Units	Units	Units	Units	Units
Sales	30,000	37,500	41,250	45,000	1,53,750
Production in current quarter (80% of the sale of current quarter)	24,000	30,000	33,000	36,000	
Production for next quarter (20% of the sale of next quarter)	7,500	8,250	9,000	12,250*	
Total production	31,500	38,250	42,000	48,250	1,60,000

* Difference figure.					

(ii) Raw material consumption budget in quantity

	Quarters				Total
	I	II	III	IV	
Units to be produced in each quarter: (A)	31,500	38,250	42,000	48,250	1,60,000
Raw material consumption p.u. (kg.) (B)	2	2	2	2	2
Total raw material consumption (kg.) (A+B)	63,000	76,500	84,000	96,500	3,20,000

(iii) Raw material purchase budget (in quantity)

Raw material required for production (kg.)	3,20,000
Add: Closing balance of raw material (kg.)	5,000
Less: Opening balance (kg.)	(10,000)
Raw Material to be purchased (kg.)	3,15,000

Raw material purchase budget (in value)

Quarters	% of annual requirement (Qty.) for purchasing raw material	Quantity of raw material to be purchased	Rate per kg.	Amount
	(Kg)		(Rs.)	(Rs.)
(1)	(2)	(3)	(4)	(5)=(3)×(4)
I	30	94,500 (3,15,000 kg × 30%)	2	1,89,000
II	50	1,57,500 (3,15,000 kg × 50%)	3	4,72,500
III	20	63,000 (3,15,000 kg × 20%)	4	2,52,000
Total		3,15,000		9,13,500

Sales Budgets:

Q.16 XYZ & Co. Ltd. Manufactures two products X and Y and sells them through two divisions East and West. For the purpose of submission of sales budget to the budget committee the following information has been made available:

Budgeted sales for the current year were:

Product	East	West
X	400 at Rs.9	600 at Rs.9
Y	300 at Rs.21	500 at Rs.21

Actual sales for the current year were:

Product	East	West
X	500 at Rs.9	700 at Rs.9
Y	200 at Rs.21	400 at Rs.21

Adequate market studies reveal that Product X is popular but under-priced. It is observed that if price of X is increased by Re.1, it will find a ready market. On the other hand Y is over-priced to customers and market could absorb more if sales price of Y be reduced by Re.1. The management has agreed to give effect to the above price changes.

From the information based on these price changes and reports from salesmen, the following estimates have been prepared by divisional managers:

Percentage increase in sales over budget is:

Product	East	West
X	+10%	+5%
Y	+20%	+10

With the help of an intensive advertisement campaign the following additional sales above the estimated sales of divisional managers are possible:

Product	East	West
X	60	70
Y	40	50

You are required to prepare a Budget for sales incorporating the above estimates and also show the budgeted and actual sales of the current year.

Solution: Sales Budgets

Division	Product	Budget for future period			Budget for current period			Actual Sales for current period		
		Qty.	Price	Value	Qty.	Price	Value	Qty.	Price	Value
			Rs.	Rs.		Rs.	Rs.		Rs.	Rs.
East	X	500	10	5,000	400	9	3,600	500	9	4,500
	Y	400	20	8,000	300	21	6,300	20	21	4,200
Total		900		13,000	700		9,900	700		8,700
West	X	700	10	7,000	600	9	5,400	700	9	6,300
	Y	600	20	12,000	500	21	10,500	400	21	8,400
Total		1,300		19,000	1,100		15,900	1,100		14,700
TOTAL	X	1,200	10	12,000	1,000	9	9,000	1,200	9	10,800
	Y	1,000	20	20,000	800	21	16,800	600	21	12,600
Total		2,200		32,000	1,800		25,800	1,800		23,400

Cash Budget

Q.17 Prepare a Cash Budget for the three months ending 30th June, 2006 from the information given below:

(a) Month	Sales	Materials	Wages	Overheads
February	Rs.14,000	Rs.9,600	Rs.3,000	Rs.1,700
March	15,000	9,000	3,000	1,900
April	16,000	9,200	3,200	2,000
May	17,000	10,000	3,600	2,200
June	18,000	10,400	4,000	2,300

(b) Credit terms are:-

Sales/Debtor – 10% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month.

Creditors' — Materials 2 months

— Wages ¼ month

— Overheads ½ month

(c) Cash and Bank balance on 1st April, 2006 is expected to be Rs.6,000.

(d) Other relevant information is:

(i) Plant and Machinery will be installed in February 2006 at a cost of 96,000. The monthly installments of 2,000 is payable from April onwards.

(ii) Dividend @ 5% on Preference Share Capital of 2,00,000 will be paid on 1st June.

(iii) Advance to be received for sale of vehicles 9,000 in June.

(iv) Dividends from investments amounting to 1,000 are expected to receive in June.

(v) Income tax (advance) to be paid in June is 2,000.

Solution: **Cash Budget (April – June 2006)**

	April	May	June	Total
1. Balance b/f	6,000	3,950	3,000	6,000
2. **Receipts:** Sales (Note 1)	14,650	15,650	16,650	46,950
Dividend			1,000	1,000
Advance against vehicle			9,000	9,000
Total	20,650	19,600	29,650	62,950
3. **Payments:** Creditors*	9,600	9,000	9,200	27,800
Wages*	3,150	3,500	3,900	10,550
Overhead*	1,950	2,100	2,250	6,300
Capital Expenditure	2,000	—	2,000	6,000
Dividend on preference shares			10,000	10,000
Income tax advance			2,000	2,000
Total	16,700	16,600	29,350	62,650
4. Balance c/f	3,950	3,000	300	300

Working Notes: **Collection from Debtors**

Month	Calculation	April (Rs.)	May (Rs.)	June (Rs.)
Feb.	(14,000 – 10%) of (14,000) × 50%	6,300		
March	(15,000 – 10% of 15,000) × 50%	6,750	6,750	
April	10% of 16,000	1,600		
	(16,000 – 10% of 16,000) × 50%		7,200	7,200
May	10% of 17,000		1,700	
	(17,000 – 10% of 17,000) × 50%			7,650
June	10% of 18,000	———	——— 1,800	
		14,650	15,650	16,650

*Payments for creditors, wages and overhead have been computed on the same pattern.

Q.18 Based on the following information prepare a cash budget for ABC Ltd.

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Opening cash balance	Rs.10,000			
Collection from customers	1,25,000	Rs.1,50,000	Rs.1,60,000	Rs.2,21,000
Payment:				
Purchase of materials	20,000	35,000	35,000	54,200
Other expenses	25,000	20,000	20,000	17,000
Salary and wages	90,000	95,000	95,000	1,09,200
Income tax	5,000	—	—	—
Purchase of machinery	—	—	—	20,000

The company desires to maintain a cash balance of Rs.15,000 at the end of the each quarter. Cash can be borrowed or repaid in multiples of Rs.500 at an interest of 10% per annum. Management does not want to borrow cash more than what is necessary and wants to repay as early as possible. In any event, loans cannot be extended beyond four quarters. Interest is computed and paid when repayment is made at the end of the quarter.

Solution: Cash budget

Particulars	**1st quarter**	**2nd quarter**	**3rd quarter**	**4th quarter**
Opening cash balance	10,000	15,000	15,000	15,325
Receipts:				
Collection from Customers	1,25,000	1,50,000	1,60,000	2,21,000
(A)	1,35,000	1,65,000	1,75,000	2,36,325
Payments:				
Purchase of materials	20,000	35,000	35,000	54,200
Other expenses:	25,000	20,000	20,000	17,000
Salary and wages	90,000	95,000	95,000	1,09,200
Income Tax	5,000	…….	…….	…….
Purchase of machinery	-------	…….	…….	20,000
(B)	1,40,000	1,50,000	1,50,000	2,00,400
(A) – (B)	(5,000)	15,000	25,000	35,925
Add: Loan taken	20,000	……	…….	……..
*Less: Loan Repaid	…….	…...	(9,000)	(11,000)
*Payment of interest	……..	……	(675)	(1,100)
Closing balance	15,000	15,000	15,325	23,825

*9,000 X 10% X 9/12

Q.19. From the following information relating to a departmental store for the three months period ending 31st January, 1987, you are required to prepare the following:

Monthly cash budget on receipts and payments basis, and

It is anticipated that the working capital items 1st November, 1986 will be a follows:

	Rs. 0000's
Cash in hand and at bank	545
Short-term investments	300
Debtors	2,570
Stock	1,300
Trade Creditors	2,110
Other Creditors	200
Dividend due	485
Tax Due	320

Budgeted Profit Statement

	Rs. 000's		
	November	**December**	**January**
Sales	2,100	1,800	1,700
Cost of Sales	1,635	1,405	1,330
Gross profit	465	395	370
Administrative, Selling and Distribution Expenses and Interest	315	270	255
Net profit prior to tax	150	125	115

Budgeted Balances at the end of each month

	Rs. 000,s		
	30th November	**31st December**	**31st January**
Short Term Investments	700	---	200
Debtors	2,600	2,500	2,350
Stock	1,200	1,100	1,000
Trade Creditors	2,000	1,950	1,900
Other Creditors	200	200	200

Dividend Due	485	---	---
Tax Due	320	320	320

Depreciation amounting to Rs. 60,0000 is included in the budgeted expenditure for each month. Capital expenditure amounting to Rs. 8,00,000 is expected to be incurred is during December 1986 and proceeds from the sale of plant and equipment of Rs. 50,000 is expected is January, 1987.

Solution: Cash Budget

Particulars	November	December	January
Opening cash balance	545	315	65
Receipts:			
Sales of short term investment		700	
Cash received from debtors	2,070	1,900	1850
(See working note1)			50
Sales proceeds of plant & equipment			
(A)	2,615	2,915	1,965
Payments :			
Purchases of investment	400	----	200
Cash paid to suppliers	1,645	1,355	1,280
Payment of dividend	----	485	----
Payment of overhead (excluding Depreciation)			
Capital expenditure	255	210	195
		800	
Closing balance	315	65	290

Working notes: (i) Computation of cash received from debtors

Particulars	November	December	January
Opening debtors	2.570	2,600	2,500
Add: credit sales	2.100	1,800	1,700
Less: Closing debtors	(2,600)	(2,500)	(2,350)
	2,070	1,900	1,850

(2) Computation of purchases

Particulars	November	December	January
Cost of sales	1,635	1,405	1,330
Add: closing stock	1,200	1,100	1,000
Less: opening stock	(1,300)	(1,200)	(1,100)
Purchases	1,535	1,305	1,230
Add: opening creditors	2,110	2,000	1,950
Less: Closing Creditors	(2000)	(1950)	(1,900)
Cash paid to suppliers	16,45	1,355	1,280

Control Ratios

Q.20. Activity ratio of a company is 80% and its capacity ratio is 120%. Find out its efficiency ratio

Solution: Activity Ratio = Capacity × Efficiency Ratio

80 = 120 × X

120X = 80

X = 80 = 2 = or 66.67%

120 3

Q.21. A factory manufactures two types of articles – X and Z. Article X takes 10 hours to make and article Y requires 20 hours. In a month (25 days or 8 hours each) 500 units of X and 300 units of Y are produced. The budgeted hours are 8,500 per month. The factory employs 60 men in the department concerned. Compute Activity Ratio, Capacity Ratio and Efficiency Ratio.

Solution: Hrs.

Standard hours for actual production

X 500 units × 10 5,000

Y 300 units × 20 6,000

11,000

Budgeted Hours 8,500

Actual Hours Worked 60 × 8 × 25 = 12,000

$$\text{Activity Ratio} = \frac{\text{Standard hours for actual production}}{\text{Budgeted hours}} \times 100$$

$$= \frac{11,000}{8,500} \times 100 = 129\%$$

$$\text{Capacity Ratio} = \frac{\text{Actual hours worked}}{\text{Budgeted hours}} \times 100$$

$$= \frac{12,000}{8,500} \times 100 = 141\%$$

$$\text{Efficiency Ratio} = \frac{\text{Standard hours for actual production}}{\text{Actual hours worked}} \times 100$$

$$= \frac{11,000}{12,000} \times 100 = 92\%$$

Q.22 Calculate Efficiency and Capacity ration from the following figures:

Budgeted production 80 units

Actual production 60 units

Standard time per unit 8 hours

Actual hours worked 500

Solution: Efficiency ratio = $\frac{\text{Std. hours for actual production}}{}$ × 100

Actual hours worked

= 8 hours × 60 units × 100

= 500 hours

= 96%

Capacity ratio = Actual hours worked × 100

Budgeted working hours

= 500 hours × 100

8 hours × 80 units

= 78.125%

Q.23 Calculate efficiency and activity ratio from the following data:

Capacity ratio	=	75%
Budgeted output	=	6,000 units
Actual output	=	5,000 units
Standard Time per unit	=	4 hours

Solution:

Capacity Ratio = Actual Hours (AH) × 100

Budgeted Hours

75% = AH

6000 units × 4 hour per unit

75 = AH

24000 Hours

AH = 18000 Hours

Efficiency Ratio = Standard hours for actual output × 100

Actual Working Hours

= 5000 units × 4 hours per unit × 100

18000 Hours

$= \frac{20000 \text{ Hours}}{18000 \text{ Hours}} \times 100 = 111.11\%$

Activity Ratio $= \frac{\text{Standard Hours for actual output}}{\text{Budgeted hours}} \times 100$

$= \frac{20000 \text{ units}}{6000 \text{ units} \times 4 \text{ hours per unit}} \times 100$

$= \frac{20000 \text{ units}}{24000 \text{ units}} \times 100 = 83.33\%$

Q.24 A factory produces two products P and Q. P takes 10 hours to produce and Q requires 16 hours as per the budget. A month has 25 budgeted days of 8 hours each. During the month 500 units of P and 400 units of Q were produced. The factory employs 50 workers. They actually worked for 9 hours daily for 24 days because there was an unexpected holiday for one day. Calculate: (i) Efficiency Ratio (ii) Capacity Ratio (iii) Efficiency Ratio (iv) Calendar Ratio.

Solution: Total budgeted man-hours in the month = 50 × 8 × 25 = 10,000 hours

Total actual man-hours worked during the month = 50 × 9 × 24 = 10,800 hours

Budgeted hours for actual output = 10 × 500 + 16 × 400 = 11,400 hours

(i) Efficiency Ratio $= \frac{\text{Budgeted Hours for Actual Output}}{\text{Actual Hours Worked}} \times 100 = \frac{11,400}{10,800} \times 100 = 105.55\%$

(ii) Capacity Ratio $= \frac{\text{Actual Hours Worked}}{\text{Budgeted Hours}} \times 100 = \frac{10,800}{10,000} \times 100 = 108\%$

(iii) Activity Ratio $= \frac{\text{Budgeted Hours for Actual Output}}{\text{Budgeted Hours}} \times 100 = \frac{11,400}{10,800} \times 100 = 114\%$

Also, Activity Ratio = Efficiency ratio × Capacity ratio = 105.55 × 108 = 114%

(iv) Calendar Ratio $= \frac{\text{Actual days working in the month}}{\text{Budgeted days in the month}} \times 100 = \frac{24}{25} \times 100 = 96\%$

PROCESS COSTING

Process costing is a method of costing. This method refers to costing of distinct process involved, while converting raw material into finished product. It helps to ascertain the cost of the product at each distinct process or operation or stage of production. Here the raw material has to pass through two or more processes before completion. For instance, this method of costing is adopted by industries engaged in the manufacturing of textiles, soaps, biscuits, paints, cement, chemicals, medicines, papers and also oil refining, milk dairy etc. The raw material passes from one process to another process. This, from the last processes the final product comes out. The distinct processes are in sequential order; and the output (finished product) of one process becomes the raw materials of the next process and so on until the final product is obtained. The cost finding method followed in such industries is known as process costing.

Features: Characteristics of process costing in brief are as under:

1. The factory is divided into a number of process cost centers or departments and in each cost centre an account is maintained – setting up progress cost centers.
2. All types of costs – direct and indirect relating to process are recorded for each process.
3. The finished product of one process is the raw material for the next process and this procedure continues until the final product arrives. The products and processes are standardized.
4. The cost of the previous process is transferred to the subsequent process alongwith the output.
5. Total cost of the finished final product comprises of all costs incurred in all the processes.
6. Finished products at the end are homogeneous i.e. indistinguishable.
7. The cost of normal wastages is added to the good units produced. Apart from this, there occur abnormal wastages and abnormal gains.
8. In certain industries, there arise by–products or joint – products, which require further processing.

Costing Procedure.

The factory or concern is divided into distinct processes or operations and a separate account is opened for each process (cost centre). All expenditure of materials, labour, direct expenses and overheads – are charged to the process concerned. In brief:

(a) **Materials.** Materials required for each process are drawn from store against Material Requisitions or Bill of Materials and debited to cost. When the materials are issued in bulk, the person-in-charge of the department has to keep the account of materials consumed. When the finished product of one process becomes the raw material of the next process, the account of the receiving process should be debited with the cost of transfer, in addition to the cost of additional materials, if any.

(b) **Labour.** Wages paid to labourers and workmen who are engaged in particular processes are directly allocated to the process. If workers are engaged in a number of processes, the wages paid may be apportioned on the basis of time-booking.

(c) **Direct Expenses.** Direct expenses such as depreciation, insurance, electricity, repairs etc. are directly allocated to the respective accounts.

(d) **Overhead.** Rent, telephone, lightning, gas, water etc. which are some common expenses of one or more processes, may be apportioned to the various processes on suitable basis. Generally, these overheads are recovered at predetermined rates or based on direct wages or prime cost.

Losses and Gains in process

When materials are processed, they lose or gain in volume or weight as a result of the process. It is common that process long or scrap or wastage occur in process industries. These process losses may be of two types, viz. controllable and uncontrollable.

(a) Normal and Uncontrollable Loss

Because of the nature of the raw materials, some loss is inherent and is unavoidable. This is known as normal wastage or normal loss. And this type of loss is expected in normal condition (for example, stamping process, evaporation etc.) The percentage of such losses is anticipated from past experience by the management. Losses of this type should be absorbed by good units produced, i.e. the cost of units lost is charged to the good units – output. Any value realizable on the normal loss will be credited to the process account.

(b) Abnormal Loss

In certain cases, it can be seen that the loss exceeds the predetermined normal loss. Any loss exceeding the normal loss is called abnormal loss. Abnormal loss should not affect the normal cost of production. It is caused by accidents, sub-standard materials, carelessness etc. Therefore, abnormal loss is valued just like good units and transferred to Profit and Loss Account.

(c) Abnormal gain or effectiveness

The normal wastage is an estimate only. The actual loss or wastage may be more or less than the determined percentage of normal loss, it is known as abnormal wastage; but if the actual wastage is less than the normal wastage; it is known as Abnormal Gain or Abnormal Effectiveness. Like Abnormal Loss, Abnormal Gain does not effect the cost of normal production. The abnormal gain is valued in the same manner as abnormal loss and credited to Abnormal Gain Account. Abnormal Loss or Wastage is shown on credit side of the Process Account and Abnormal Gain is shown on the debit side of the Process Account.

Important to Note:

1. Abnormal gain is valued in the same manner is abnormal loss.
2. The amount of abnormal gain is debited to relevant Process Account and credited to Abnormal Gain Account.
3. Abnormal Gain Account is debited for the loss the of income on account of less quantity of sale of scrap available as a result of abnormal gain and Normal Loss is credited. In the above illustration, the sale of scrap is only 150 units and not 200 units. Thus, the 50 units are not available for sale as scrap as they are good units.
4. The balance in Abnormal Gain Account is transferred to Costing Profit and Loss Account. In the above illustration. Abnormal Gain Account is closed by transferring the difference to Costing Profit and Loss Account.

(d) Scrap

Scrap is defined as "the incidental residue from certain types of manufacture, usually of small amount and of low value, recoverable without further processing". It is another form of waste. Excessive amount of scrap shows inefficiency. Scrap may be either sold or reused. For accounting purposes, the amount realized from the scrap is credited to the process account. For example, scrap may be in the form of turning of materials, boring and trimmings.

(e) Defective

Finished products that are not up to the aimed standard, are known as defectives. Spoilage cannot be repaired, but defectives can be repaired by additional labour and materials into effective units. If defectives are sold as seconds the amount received is credited to the process account. If the defectives are reprocessed into good units, the extra amount of materials and labour will be treated as factory overheads. If the defectives cannot be identified, the normal cost is charged to factory overheads and abnormal cost will be transferred to costing profit and loss account.

By-Products and Joint Products

Sometimes, two or more products are produced simultaneously from a common process. If a manufacturing process using the same inputs produces two or more products, they can be either by-products; or joint products; and also major products and by-products. The classification of the products into joint-products and by-products depends upon relative importance of the products, objectives and policies of the management etc. In the case of edible oil, which is the main product, oil cake emerges ; petroleum industry gives several joint-products like gasoline, kerosene, fuel oil etc. When two or more products of equal importance are simultaneously produced from the same raw materials, such products are generally known as joint-products. In the case of dairy industry skimmed milk, butter-cream, butter milk etc., are joint-products.

The distinction between by-product and joint-product is a matter of degree of importance of the products. It is difficult to draw a distinction, but from the accounting point of view, it is necessary. If the products are of equal commercial importance, then they can be called as joint-products and if the products are not of the same importance, then the products of lesser commercial importance are known as by-products. The by-products are of secondary importance in terms of relative sales revenue. Generally, no additional expense is necessary on by-products, but additional expense is needed on joint-products before sale.

Joint-Product. Joint Products are the products which are jointly produced, having equal economic importance from the same or basic raw materials, possessing comparable value. For example, petroleum, diesel oil, paraffin etc. are joint products arising from processing crude oil. The joint-products have the following characteristics:

(a) The products are the simultaneous outcome of the joint process and from the same raw materials.
(b) The products have equal commercial value.
(c) The joint-products cannot be identified as separate products upto a certain stage in manufacturing. This stage is known as split off point. Cost prior to split off stage is known as joint-cost and cost after this split off stage is known as subsequent cost.

The cost before the separation stage has to be distributed to each product. The accounting methods employed in costing joint-products are:

(a) **Average Unit Cost Method.** In this method, it is assumed that the total cost of the process is borne by all units equally. The total process cost of pre-separation is divided by the total units produced to get the average cost per unit of production. This method is applicable where processes are common and inseparable from products and expressed in common units, i.e. weight or volume applicable to all products.

(b) **Physical Units Method.** In this method the joint costs are apportioned on the basis of some physical units (raw materials) i.e. in metres, tonnes etc. Physical units are the units in which the basic raw materials are measured and are determinable at the point of separation of the joint-products. This method cannot be applied when one product is gas and another, a liquid.

(c) **Survey Method (Points Value Method).** This method is adopted after a technical survey of all factors involved in the production and distribution of products. Percentage or points value is assigned to each product to denote its relative importance and common costs are apportioned on the basis of total points.

(d) **Market Value Method.** In this, the joint costs are apportioned on the basis of proportion of market price of the products. Thus, products having higher price are charged with higher portion of the joint-costs and products having lesser price get lesser share of the joint-costs.

By-product

By products can be two types – certain products can be sold in their original condition and certain products need further processing after separation. By-products are produced alongwith main products and the same are of comparatively less value. In accounts, they are treated in any one of the following ways:

I. Non-cost Methods (Sale Value Methods)

(a) Other Income Method. The value realized by the sale of by-products is treated as other or miscellaneous income because of negligible value. The stock of by-products is valued at zero value for Balance Sheet purposes.

(b) Crediting Sales Value to the Process Account. Under this method, the value of by-product is credited to the process account, so that the cost of the main product is reduced. For balance Sheet purposes, the unsold stock of by-product carries zero value.

(c) Crediting Sales Value less Selling & Distribution. In certain cases, by-products need selling and distribution expenses, and these expenses are deducted from the sale-value. The net amount is credited to the Process Amount.

(d) Crediting Actual Cost to the Process. In case the by-products need further processing before sale, the amount is ascertained and deducted from the sale – value. The net amount is credited to the process account.

II. Cost Methods.

(a) Replacement Cost. Under this method, the by-products are utilized in the same industry as raw materials and valued at the markets price, the process account is credited to the value.
(b) Standard Price. In this method, the by-products are valued at standard cost (predetermined cost) and credit is given to the process account.
(c) Apportionment on Suitable Basis. Where by-products are prominent they will be treated as joint products and as such joint-cost is to be apportioned.

Inter-Process Profits

Sometimes in certain industries, the output of one processes is transferred to the next process at market price or cost plus a percentage of profit. This is in order to assess the efficiency of each process. Each process makes a profit. The difference between the cost and the transfer price is known as inter-process profit. Thus, the last processes is not unnecessarily inflated with profits. This brings complication in accounts because of unrealized profits in respect of stock. Special provision should be made for stock. For Balance Sheet purposes, cost price or market price, whichever is less taken into account, not to process, but cost to the firm as a whole.

Equivalent Production

The average cost per unit is determined in progressing type of industries, by dividing the total cost incurred by the total units produced during the period. But when the process is continuous, there is always incomplete work in the opening and closing periods of each process. In such cases, if unit cost is arrived at on the basis of total process cost and units produced, ignoring incomplete units will not represent the correct cost. But the incomplete units should not bear the same cost, because the units may be at various stages of completion. Since, the work-in-progress cannot bear the cost of completed units, the work-in-progress is required to be converted into their equivalent of completed units. Wheldon defines the equivalent production as “the production of a process in terms of completed units”. Thus, equivalent production represents the output of a process expressed in terms of completed units. This is done on the basis of an estimate or a percentage of degree of completion units. This is done on the basis of an estimate or a percentage of degree of completion in respect of materials consumed, machine-hours, labour-hours etc. In certain cases, it is on the basis of past experience. For example, 200 units, 50% complete, then equivalent product is 200 x 50% = 100 units.

Procedure of Computation

(a) Find out equivalent production after taking the percentage of degree of completion in respect of opening stock of work-in-progress.
(b) To (a) add the units introduced deducting the closing work-in-progress.
(c) Convert the equivalent production of closing work-in-progress and add to the above.
(d) Find out the net process costs, element wise i.e. materials, labour, overheads.
(e) Find out the cost per unit of equivalent production for each element of cost separately.
(f) Find out the value of output of finished and transferred products and the work-in-progress.

The above steps invite the preparation of three statements:

(1) Statement of equivalent production.
(2) Statement of cost.
(3) Statement of evaluation.

Problem of Opening stock of work-in-progress

Since costs tend to vary from time to time, each lot may carry different unit costs. The procedure of calculating equivalent production for opening work-in-progress units depends on which method of costing has been used. If standard costing is not used, a method of costing can be selected from the following methods:

(i) First-in-first-out (FIFO) Method.
(ii) Average Cost Method.

(i) First-in-first-out (FIFO) Method.

The opening stock of a particular year inherits the incomplete units included in the closing stock of the previous year. These incomplete units of the opening stock are first taken up for completion, and the new units are taken up next, for manufacture. So this method is called FIFO method. As a result of application of this method, no unit of the opening work-in-process remains incomplete in manufacture, nor such a unit funds place in the closing stock of the current year has the incomplete units belonging only to the current year, and are, therefore, valued at the current year's costs. Therefore, no units of opening work-in-process will find place in closing work-in-process. Thus, the cost of units completed in a period is ascertained in parts

(i) Opening work-in-process completed and
(ii) Units introduced and completed during the concerned period.

(ii) Average Cost Method.

Under this method we do not start with the assumption that the units of the opening work-in-process will be completed first and thereafter the other units will be taken up for being worked out as is done under FIFO method. Under this method, all the units are taken up together, whether belonging to the opening WIP or to new lot started in the current period. So the cost of opening WIP is not separated from the cost of new units, but mixed together, as both types of units are manufactured together. The average cost is determined by dividing the total cost of all the units by the units manufactured together.

Q.1. Write short notes on the following :

i) Process costing
ii) Equivalent Production
iii) Inter-Process Profits
iv) Joint Products
v) By product.

Ans. *Process Costing:* Process Costing is a costing technique adopted by those industries which satisfied the following conditions :

a) The production is continuous and the end result is the sequence of process.
b) The product is homogeneous.
c) The finished output of one process is used as a raw material for next process until completion.
d) Output of last process is transferred to finished stock account.

Process costing is suitable in following manufacturing industries :

1) Paper, 2) Sugar, 3) Shoes, 4) Paint, 5) Food, 6) Chemicals, and 7) Rubber etc.

2. *Equivalent Production :* In process industries, production is on continuous basis and at the end of accounting period, there is some production which is semi finished or incomplete. Such incomplete production is known as work-in-progress. Such work-in-progress is valued in terms of equivalent production. Equivalent production is calculated in terms of equivalent units with the help of following formula :

   Equivalent Units = (Units of WIP) (Percentage of work completed)

   Suppose, closing work in progress is 200 units, which is 75% complete in respect of material, labour and overheads, it is equivalent to 200 units X 75% = 150 completed units.

3. *Inter-Process Profit :* Sometimes, the output from one process is transferred to another process not at cost but at an inflated amount. This transfer price can either be the current wholesale market price or cost plus an agreed percentage. The result is that there is a profit to the transferor process. There are following two objectives of inter process profits:

   i) To show whether cost of production competes with the market prices.

   ii) To make each process stand on its own efficiency and economics, i.e. the transferee process do not receive the benefits of economics effects in previous process.

4. *Joint Products:* When two or more products of almost equal importance are simultaneously produced from the same raw material, such products are termed as joint products. For example, in case of oil refinery following joint products emerge :

   I) Kerosene
   II) Gasoline
   III) Fuel, Oil, etc.

   Joint products has the following features :

   a) They are produced from same raw material.
   b) They are of almost equal value of importance.
   c) They are produced simultaneously.
   d) They may require further process after split-off point.

5. *By-Products :* These are products of comparatively small value and are produced jointly with the main products for example, in case of Sugar Industry, sugar is the main product, whereas the molasses are the by-product.

Q.2. Distinguish between Job Costing and Process Costing.

Ans.: 1. In Job Costing, production is against specific orders, whereas in Process Costing, production of homogenous goods is continuous.

2. In Job Costing, cost are collected and accumulated for each job separately. In Process Costing, costs are collected and accumulated process-wise.

3. In Job Costing, cost computation is done after completion of job. In Process Costing, cost computation is done at the end of each period.

4. In Job Costing, there are usually no transfers from one job to another unless there is some surplus work. In Process Costing, the product moves from one process to another.
5. In Job Costing, proper control is comparatively difficult as each job has different characteristics, whereas in process costing, the control is comparatively easy because there is standard and continuous production.

Q.3. How will you deal with by-products in costing :

1. Where they are of small total value.
2. Where they are of consideration total value.
3. Where they require further processing.

Ans.: *a) Where By-Products are of Small Sales Value :* In such case, the net income realised by the sale of by-product is to be credited to the process account in which the by-product has arisen.

b) Where they are of Considerable Total Value : In such case, the joint cost of by-product should be apportioned and transferred from main product account to the by-product A/c. Any further cost is also debited to by-product A/c. The By-product A/c is credited with the sales value and the balance of account represents profit or loss of by-product which is to be transferred to costing profit and loss A/c.

c) where they require further Processing : In such case, the net realisable value of by-products is calculated with the help of Reverse cost method. If this amount is small or negligible, it may be treated as per the method (a) discussed above. On the contrary, if this amount is of considerable amount, it is treated as per method (b) discussed above.

Q.4. Define normal loss, abnormal loss and abnormal gain ? Explain their accounting treatment.

Ans.: *Normal Loss :* Such loss is unavoidable and estimated in advance on the basis of past experience and technical specifications. If such loss fetches no value, it is recorded at nil amount at the credit side of process account. If such loss fetches some value, the value is credited to the process account.

Abnormal Loss : Any loss caused by unexpected or abnormal conditions is considered as abnormal loss. It is credited to the process account at the amount calculated as follows :

(Units of Abnormal Loss (Cost per Unit)

$$\text{Where Cost per Unit} = \frac{\text{Normal Cost of Normal Output}}{\text{Normal Output}}$$

Abnormal Gain : If actual process loss is than the estimated normal loss, the difference is the abnormal gain, it is debited to process account at the amount calculated as follows :

(Units of Abnormal Gain) (Cost per unit)

Q.5. Distinguish between Joint Products and By-products.

Ans.: There is no definite criterion for distinguishing between joint products and by-products. Generally, the difference between joint product is based on their relative commercial value. The joint products are almost of same value and importance. However, if there is wide difference between the commercial values of product combindly product, the

product with relatively less commercial value is by-product and the product with higher commercial value is termed as main-product.

There are some other factors which make a distinction between joint products and by-products, e.g. objective of manufacture, policy of management, profitability of products, accounting treatment, etc.

The distinction between joint products and by-products is not academic, it is all based on

practical circumstances and other relevant factors.

Q.6. Distinguish between joint products and co-products.

Ans.: Often joint products and co-products are considered as synonymous. However, there are some points of difference between the two terms. In case of co-products two or more products are produced at same time, but with different inputs. But, for joint products, the same input and processing is used.

One important point is that the change in production of one co-product may not necessarily lead to a change in production of other product. However, in case of joint products, if any change has occurred in joint process or input, the output is bound to have some adverse or favourable effect.

Q.7. Where the objectives of accounting for joint products and by-products ?

Ans.: 1. Cost control is made feasible.
2. Reliable product cost information is collected.
1. Determination of profitability of each product.
2. Helps in pricing cost-plus contracts.
3. For setting selling prices of products.
4. For valuation of stock and work-in-progress.

Q.8. What are the limitations of distributing total joint cost among various joint products ?

Ans.: Analysis of joint cost over joint products suffers from the following limitations:

1) Apportionment of joint cost over various products is mainly arbitrary and the true costs of various individual products cannot be known.
2) Approtionment of joint cost is based on certain assumptions which may be unrealistic or even misleading.
3) Arbitrary apportionment of joint costs makes inter-firm comparison difficult.
4) There is no clear cut distinction between joint products and by-products.
5) Where by-products are of very small value, no worthwhile purpose is served by joint cost analysis.

PREVIOUS YEAR QUESTIONS

Q1: (Nov 2002) A product passes through two processes. The output of process 1 becomes the input of process 2 and output of process 2 is transferred to warehouse. The quantity of raw materials introduced into process 1 is 20,000 kgs at Rs.10 per kg. The cost and output data for the month under review are as under:

	Process 1	Process 2
Direct Materials	Rs.60,000	Rs.40,000
Direct wages	Rs.40,000	Rs.30,000
Production overheads	Rs.39,000	Rs.40,250
Normal loss	8%	5%
Output	18,000	17,400
Loss realization Rs./unit	2.00	3.00

The company's policy is to fix the selling price of the end product in such a way as to yield a profit of 20% on selling price.

Required :

(i) Prepare the process accounts.

(ii) Determine the selling price per unit of the end product.

Q2: (May 1993) A product passes through three processes – A, B and C. The details of expenses incurred on the three processes during the year 1992 were as under:

Process	A	B	C
Units issued/introduced	10,000		
Cost per unit Rs.100	Rs.	Rs.	Rs.
Sundry Materials	10,000	15,000	5,000
Labour	30,000	80,000	65,000
Direct Expenses	6,000	18,150	27,200
Selling price per unit of output	120	165	250

Management expenses during the year were Rs.80,000 and selling expenses were Rs.50,000. These are not allocable to the processes.

A -9,300 units, B-5,400 units and C-2,100 units. Two-thirds of the output of process and the balance was sold. The entire output of process C was sold.

The normal loss of the three processes, calculated on the input of every process was:

Process A-5%; B-15% and C-20%.

The loss of process A was sold at Rs.2 per unit, that of B at Rs.5 per unit and of C at Rs.10 per unit.

Prepare the three processes accounts and the Profit and Loss Account.

Q3: (CS Inter Dec 1997) Growmore Chemicals Ltd. Manufacture three varieties of manures X, Y and Z by mixing chemical fertilizers in different proportions. Two operations (i) mixing and (ii) packing are involved. There is no costing system. On technical estimation, relative cost values are fixed on points basis per weight of output. However, the financial accounts data are segregated into two operations mentioned above. The relevant data for a particular month are as follows:

Varieties	Point values per unit weight		Production (tones)
X	2	5	250
Y	3	3	150
Z	5	2	100

Total cost Rs.1,45,000 19,000
Compute cost per tonne of each variety pre operation.

Q4: A company is manufacturing building bricks and the fire bricks. Two processes: brick forming and heat treating are required for completion of both the products

Time required (in hours)

	Building bricks	Fire bricks
Brick forming per 100 bricks	3	2
Heat treating per 100 bricks	2	5

Total cost of the two processing departments in a particular month were:
Brick forming Rs.21,200
Heat treating Rs.48,800
Production during that month was:
Building bricks 1,30,000 pieces
Fire bricks 70,000 pieces
Prepare a statement of manufacturing costs for the two varieties of bricks.

Q5: **(CIMA London)** A chemical compound is made by raw material being processed through two processes. The output of Process B where further material is added to the mix. The details of the process costs for the financial period were as follows:

	Process A		Process B
Direct material	2,000 kgs @ Rs.5	Direct material	1400 kgs @ Rs.12
Direct Labour	Rs.7,200	Direct labour	Rs.4,200
Process plant time	140 hours at Rs.60 per hour	Process plant time	80 hours @ Rs.72.5 per hr

The departmental overhead for period was Rs.6,840 and is absorbed into the costs of each process on direct labour cost.

	Process A	Process B
Expected output was	80% our input	90% of input
Actual output was	1,400 kgs	2,620 kgs.

Normal loss is contaminated material which is sold as scrap for Rs.0.50 per kg from Process A and Rs.1,825 per kg from Process B, for both of which immediate payment is received.

Required:
(i) Process A account
(ii) Process B account
(iii) Normal loss / gain account

(iv) Abnormal loss / gain account
(v) Finished goods.

Q6: **(May 1996)** The input to purifying process was 16,000 kgs. Of basic material purchased @ Rs.1.20 per kg. Process wages amounted to Rs.720 and overhead was applied @ 240% of the labour cost. Indirect materials of negligible weight were introduced into the process at a cost of Rs.336. The actual output from the process weighed 15,000 kgs. The normal yield of the process is 92%. Any difference in weight between the input of basic material and output of purified material (product) is sold @ Re.0.50 per kg.

The process is operated under a Licence which provides for the payment of royalty @ Re.0.15 per kg. of the purified material produced.

Q7: A Limited produces 'AXE' which passes through two processes before it is completed and transferred to finished stock. The following data relating to October 1998:

Particulars	1st process	2nd process	Finished stock
Opening stock	7,500	9,000	22,500
Direct materials	15,000	15,750	
Direct wages	11,200	11,200	
Factory overheads	10,500	4,500	
Closing stock	3,700	4,500	11,250
Inter process profit included in opening stock	1,500	8,250	

Output of process 1 is transferred to Process 2 at 25% profit on the transfer price.

Output of process 2 is transferred to finished stock at 20% profit on the transfer price. Stock in process is valued at prime cost. Finished stock is valued at the price at which it is received from process 2. Sales during the period are Rs.1,40,000.

Prepare process cost accounts and finished goods account showing the profit element at each stage.

Q8: The following are the details in respect of two processes X and Y of a process industry:

	Process X	Process Y
Materials	10,000	---
Labour	12,000	20,000
Overheads	6,000	10,000
Closing stock (valued at total cost)	4,000	8,000

The output of process X is transferred to process Y at a price calculated to gve a profit of 20% on the transfer price and the output of process Y is charged to finished stock account on a similar basis.

Of the output transferred to finished stock, stock costing Rs.10,000 remained unsold at the end of accounting period and the balance realized was Rs.1,00,000. There was no opening or closing stock of WIP.

Show process accounts, finished stock account and prepare a statement of total profits.

Q9: Opening work in progress 1000 units (60% complete) cost Rs.1100 units introduced during the period 10,000 units; Cost Rs.19,300. Transferred to next process 9,000 units. Closing work in progress 800 units (75% complete). Normal loss is estimated at 10% of total input including units in process at the beginning. Scrap realize Re.1 per unit. Scrapped are 100% complete.

Compute equivalent production and cost per equivalent unit. Also evaluate the output.

Q10: Following information is available regarding process A for the month of February, 1999:

Production record

Units in process as on 1.2.99	4,000
(All materials used, 25% complete for labour and overhead)	
New units introduced	16,000
Units completed	14,000
Units in process as on 28.2.99	6,000
(all materials used, 33.33% complete for labour and overhead)	

Cost records

Work in process as on 1.2.99	
Materials	6,000
Labour	1,000
Overhead	1,000

	8,000
Cost during the month	
Materials	25,600
Labour	15,000
Overhead	15,000

	55,600

Presuming that average method of inventory is used, prepare:

(i) Statement of equipment production.
(ii) Statement showing cost for each element.
(iii) Statement of apportionment of cost.
(iv) Process cost account for process A.

Q11: **(Nov 1995)** Process 2 receives units Process 1 and after carrying out work on the units transfers them to Process 3. For the accounting period the relevant data were as follows:

Opening WIP 200 units (25% complete) valued at	Rs.5,000
800 units received from Process 1 valued at	Rs.8,600

840 units were transferred to Process 3

Closing WIP 160 units (50% complete)

The costs of the period were Rs.33,160 and no units were scrapped.

Required:

Prepare the Process account for the Process 2 using the average cost method of valuation.

Q12: (May 1996) The following data relate to Process Q:

(i) Opening WIP 4,000 units

Degree of completion:

Materials	100%	Rs.24,000
Labour	60%	Rs.14,400
Overheads	60%	Rs. 7,200

(ii) Received during the month of April, 1998 from Process P 40,000 units Rs.1,71,000

(iii) Expenses incurred in process Q during the month:

Materials	Rs.79,000
Labour	Rs.1,38,230
Overheads	Rs.69,120

(iv) Closing WIP 3,000 units

Degree of completion:

Materials	100%
Labour & Overheads	50%

(v) Units scrapped 4,000 units

Degree of completion:

Materials	100%
Labour & Overheads	80%

(vi) Normal loss 5% of current input.

(vii) Spoiled goods realized Rs.1.50 each on sale.

(viii) Completed units are transferred to warehouse.

Required:

(i) Equivalent units statement.

(ii) Statement of cost per equivalent unit and total cost.

(iii) Process Q account.

(iv) Any other account necessary.

Q13: (CS Inter Dec 2002) Royal Ltd. Has given the following information relating to process no 001 for the month of May 2002:

Opening WIP	NIL
Units introduced: 10,000 units @ 3 per unit	
Expenses debited to the process:	
Materials	14,650
Labour	21,148
Overheads	42,000
Normal loss	1% on input.
Closing work in progress	350 units (degree of completion material 100%, labour and overheads 50%)
Finished output	9,500 units

Degree of completion of abnormal loss is 80%.
Units scrapped as normal loss were sold at Rs.2.50 per unit.

Prepare:
(i) Statement of equivalent production.
(ii) Statement of cost of finished goods, abnormal loss and closing wip.
(iii) Process 001 A/c.

Q14: (CIMA London) C Limited manufactures a range of products and the data below refer to one product which goes through one process only. The company operates a thirteen four weekly reporting system for process and product costs and the data given below relate to period X.

There was no opening work in progress stock: -
5,000 units of materials input at Rs.2.94 per unit entered the process:

Further material added	13,830
Direct wages	6,555
Production overhead	7,470

Normal loss is 3% of input.

Closing work in progress was 800 units but these were incomplete, having reached the following percentages of completion for each of the element of cost listed:

Direct materials added	75%
Direct wages	50%
Production overhead	25%

270 Units were scrapped after a quality control check when the units were at the following degrees of completion:

Direct materials added	66.66%
Direct wages	33.33%
Production overhead	16.66%

Units scrapped, regardless of the degree of completion, are sold for Re.1 each and it is company policy to credit the process account with the scrap value of normal loss units.
You are required to prepare the period X accounts for the process and abnormal gain/loss.

Q15: (Nov 1993) The following data are available for a product for the month of July, 1993:

	Process 1	Process 2
Opening work-in-progress	NIL	NIL
	Rs.	Rs.
Costs incurred during the month:		
Direct material	60,000	----
Labour	12,000	16,000
Factory overheads	24,000	20,000
Units production:		
Received in process	40,000	36,000
Completed and transferred	36,000	32,000
Closing work in progress	2,000	?

Normal loss in process	2,000	1,500

Production remaining in process has to be valued as follows:

Materials	100%
Labour	50%
Overheads	50%

There has been no abnormal loss in process II.
Prepare process accounts after working out the missing figures and with detailed workings.

Q16: (ICWA Dec 2003) The details of operation of process A of a factory for the month of July 2003 are given below:

(i) Opening work in progress : 200 units
   a. Materials (100% complete) Rs.2500
   b. Labour (60% complete) 800
   c. Overheads (60% complete) 1200

(ii) No. of units put in process A during the month
(iii) No. of units completed and transferred to next process.
(iv) Costs incurred during the month.
   a. Materials 85,660
   b. Labour 27,772
   c. Overheads 41,658

(v) Closing Work in progress 400 units (Degree of completion : M 100%, L & O 50%)
(vi) Normal scrap in processing in 10% of input including work in progress. Scrapped units are sold at Rs.2 per unit. During the month, the scrapped units also had the same degree of completion as closing work in progress.
(vii) From the above the details prepare the statement of equivalent production, statement of cost, statement of distribution and process A account.

Q17: The following information is given in respect of Process No. 3 for the month of January 2001:

Opening stock – 2,000 units made up of:

Direct materials – I	Rs.12,350
Direct materials – II	Rs.13,200
Direct Labour	Rs.17,500
Overheads	Rs.11,000

Transferred from Process No.2: 20,000 units @ Rs.6 per unit.
Transferred to Process No.4: 17,000 units.
Expenditure incurred in Process No.3:

Direct materials	Rs.30,000
Direct Labour	Rs.60,000
Overheads	Rs.60,000

Scrap: 1,000 units – direct materials 100%, Direct Labour 60%, Overheads 40%.
Normal loss 10% of production.
Scrapped units realized Rs.4 per unit.

Closing stock: 4,000 units – Degree of completion: Direct Materials 80%, Direct Labour 60% and overheads 40%.

Prepare Process No. 3 Account using average price method alongwith necessary supporting statements.

Q18: From the following data, prepare process accounts indicating the cost of each process and the total cost. The total units that pass through each process were 240 for the period.

	Process A	Process B	Process C
Materials	1,500	500	200
Labour	800	2,000	600
Other expenses	260	720	250

Indirect expenses amounting to Rs.850 may be apportioned on the basis of wages. There was no opening or closing stock.

Q19: A product passes through three processes. The output of each process is treated as the raw material of the next process to which it is transferred and output of the third process is transferred to finished stock.

	Process A	Process B	Process C
Materials issued	40,000	20,000	10,000
Labour	6,000	4,000	1,000
Manufacturing expenses	10,000	10,000	15,000

10,000 units have been issued to the 1st Process and after processing, the output of each process is as under:

	Output	Normal Loss
Process A	9,750 units	2%
Process B	9,400 units	5%
Process C	8,000 units	10%

No stock of materials or of work in progress was left at the end. Calculate the cost of the finished articles.

Q20: From the following information relating to the month of April 98, calculate the equivalent production units and the value of finished production and work in progress, using the LIFO method.

Opening work in progress on 1st April: 5000 units: 50% complete

	COST
Materials	6,000
Labour	8,000
Overheads	8,000

	22,000

Units introduced into the process: 10,000

	COST
Materials	30,000
Labour	52,000
Overheads	70,000

	1,52,500

During the period 7,500 units were completed and transferred to the next process. Closing work in progress on 30th April: 7500 units, 50% complete.

JOINT PRODUCT & BY PRODUCT

Q1: Find out the cost of joint products A, B and C using average unit cost method from the following data: -

(a) Pre-separation joint cost Rs.60,000.

(b) Production data: -

A	500 units
B	200 units
C	300 units

Q2: Find out the cost of joint products A and B using contribution margin method from the following data:

Sales A 100 kgs @ Rs.60 per kg
B 120 kgs @ Rs.30 per kg

Joint Sales: Marginal cost Rs.4400
Fixed cost Rs.3900

Q3: **(Nov 1999)** The Sunshine Oil Co. purchases crude vegetable oil. It does refining of the same. The refining process results in four products at the split – off point: M, N, O and P.

Product O is fully processed at the split off point. Product M, N and P can be individually further refined into 'Super M', 'Super N', and 'Super P'. In the most recent month (October 1999), the output at split off point was:

Product M	3,00,000 Gallons
Product N	1,00,000 Gallons
Product O	50,000 Gallons
Purchase P	50,000 Gallons

The joint cost of purchasing the crude vegetable oil and processing it were Rs.4,00,000.

Sunshine had no beginning or ending inventories. Sales of Product O in October were Rs.20,00,000. Total output of products M, N and P was further refined and then sold. Data related to October 1999 are as follows:

	Further Processing Costs to Make Super Products	Sales
	Rs.	Rs.
Super M	80,00,000	1,20,00,000
Super N	32,00,000	40,00,000
Super Purchase	36,00,000	48,00,000

Sunshine had the option of selling products M, N and P at the split-off point. This alternative would have yielded the following sales for the October 1999 production:

Product M	Rs. 20,00,000
Product N	Rs. 12,00,000
Product O	Rs. 28,00,000

You are required to:

(i) How the joint cost of Rs.40,00,000 would be allocated between each product under each of the following methods
   (a) sales value at split-off;
   (b) physical output (gallons); and
   (c) estimated net realizable value?

(ii) Could Sunshine have increased its October 1999 operating profits by making different decisions about the further refining of product M, N or P? Show the effect of any change you recommend on operating profits.

Q4: **(ICWA June 2003)** A manufacturing company engaged in process industry gets four joint products from one of the operations. The cost of input amounted to Rs.2,33,250. These products can be sold at the split off point or after further processing. Further details are given below:

Product	Output (kg)	Sales value if sold at split off point (Rs.)	Further processing cost (Rs.)	Sales value if sold after further processing
A	8,000	1,20,000	80,000	2,10,000
B	6,000	90,000	65,000	1,60,000
C	4,000	48,000	22,000	60,000
D	2,000	32,000	24,000	62,000

(a) Which of the products have to be processed further and sold ?
(b) Prepare a cost sheet and profitability statement apportioning joint cost on the basis of relative sales value.

Q5: **(May 2000)** Inorganic Chemicals purchases salt and processes it into more-refined products such as caustic soda, chlorine and PVC. During the month of April 2000, Inorganic Chemicals purchased salt for Rs.10,00,000. Conversion cost of Rs.15,00,000 were incurred up to the split – off point, at which time two saleable products were produced: Caustic soda and chlorine. Chlorine can be further processed into PVC. The April production and sales information are as follows:

	Production Tons	Sales Tons	Sales price per ton Rs.
Caustic soda	1,200	1,200	1,250
Chlorine	800		
PVC	500	500	5,000

All 800 tons of chlorine were further processed at an incremental cost of Rs.5,00,000 to yield 500 tons of PVC. There were no by products or scrap from this further processing of chlorine.

There is an active market for chlorine. Inorganic Chemicals could have sold all its April production of chlorine at Rs.1,875 a ton.

Required:

(i) Calculate how the joint costs of Rs.25,00,000 would be allocated between caustic soda and chlorine under each of the following methods:
   i. Sales value at split off
   ii. Physical measure (tons) and
   iii. Estimated net realizable value

(ii) What is the gross margin percentage of caustic soda and PVC under the three methods cited in requirement (i) ?

(iii) Lifetime Swimming Pool Products offer to purchase 800 tons of chlorine in May 2000 at Rs.1,875 at ton. This sale would mean that no PVC would be produced in May. How would accepting the offer affect May operating income ?

Q6: **(Nov 1997)** Sunmoon Ltd. produces 2,00,000; 3,00,000; 25,000; 20,000 and 75,000 units of its five products A, B, C, D and E respectively in a manufacturing process and sells them at Rs.17, Rs.13, Rs.8, Rs.10 and Rs.14 per unit. Except product D remaining products can be further processed and then can be sold at Rs.25, Rs.17, Rs.12 and Rs.20 per unit in case of A, B, C and E respectively.

Raw material costs Rs.35,90,000 and other manufacturing expenses cost Rs.5,47,000 in the manufacturing process which are absorbed on the products on the basis of their 'Net realizable value'. The further processing costs of A, B, C and E are Rs.12,50,000; Rs.1,50,000 respectively. Fixed costs are Rs.4,73,000.

You are required to prepare the following in respect of the coming year.

(i) Statement showing income forecast of the company assuming that none of its products are to be further processed.

(ii) Statement showing income forecast of the company assuming that products A, B, C and E are to be processed further.

Can you suggest any other production plan whereby the company can maximize its profits. If yes, then submit a statement showing income forecast arising out of adoption of that plan.

Q7: **(ICWA Dec 1999)** A firm manufactures three joint products A, B and C and a by product "X" by processing a common stock of raw material which costs Rs.8 per kg. The details of output, market price and the initial processing cost for an input of 10,000 kg of raw material are as follows:

Product	Output (kg)	Current market Price (Rs.)	Initial processing cost
A	5,000	18	Direct labour: 1000 hrs @ Rs.20 per hour
B	2,500	20	Variable overheads: 80% of labour
C	1,500	24	Fixed overheads: Rs. 21,000.
X	500	4	

The company apportions common cost among joint products on physical unit basis.
All the products including by product can be processed further and sold at a higher market price with some sales promotion effort. The estimated further processing cost, marketing cost and the final selling price are given below:

Product	Further processing cost per kg	Further marketing cost per kg.	Final market price per kg
A	4	2	28
B	5	2	26
C	6	2	34
X	2	1	6

Required:
(i) Cost of the joint products at the point of separation after initial processing. Comment on the method of apportioning the joint cost.
(ii) Profit or loss if the products are sold without further processing.
(iii) Which of the products have to be processed further for maximizing profits? Show workings.

Q8: **(May 1994)** A company operates a chemical process which products four products K, L, M and N from basic raw material. The company's budget for a month is as under:

	Rs.
Raw material consumption	17,520
Initial processing wages	16,240
Initial processing overheads	16,240

Product	Production Kgs	Sales Rs.	Additional Processing Costs after spilt off Rs.
K	16,000	1,09,000	28,800
L	200	5,600	-----
M	2,000	30,000	16,000
N	360	21,600	6,600

The company presently intends to sell product L at the point of spilt – off without further processing. The remaining products K, M and N are to be further processed and sold. However, the management has been advised that it would be possible to sell all the four products at the split – off point without further processing and if this course was adopted, the selling prices would be as under:

Product	K	L	M	N
Selling price Rs. per kg.	4.00	28.00	8.00	40.00

The joint costs are to be apportioned on the basis of the sales value realization at the point of split – off.

Required:

(i) Prepare the statement showing the apportionment of joint costs.

(ii) Present a statement showing the product wise and total budgeted profit or loss based on the proposal to sell product L at the split – off point and products K, M and N after further processing.

(iii) Prepare a statement to show the product wise and total profit or loss if the alternative strategy to sell all the products at split – off stage was adopted.

(iv) Recommend any other alternative, which in your opinion can increase the total profit further. Calculate the total profit as also the product wise profit or loss, based on your recommendation.

Q9: **(May 2002)** In a chemical manufacturing company three products A, B and C emerge at a single split off stage in department P. Product A is further processed in department Q, product B in department R and Product C in department S. There is no loss in further processing of any of the three products. The cost data for a month are as under:

Cost of raw materials introduced in department P	Rs.12,68,000
Direct Wages Department	Rs.
P	3,84,000
Q	96,000
R	64,000
S	36,000

Factory overheads of Rs.4,64,000 are to be apportioned to the departments on direct wages basis.

During the month under reference the company sold all three products after processing them further as under:

Products	A	B	C
Output sold kg	44,000	40,000	20,000
Selling price per kg Rs.	32	24	16

There are no opening or closing stocks. If these products were sold at the split off stage, that is, without further processing the selling prices would have been Rs.20, Rs.22 and Rs.10 each per kg. respectively for A, B and C.

Required:

(i) Prepare a statement showing the apportionment of joint costs to joint products.

(ii) Present a statement showing product wise and total profit for the month under reference as per the company's current processing policy.

(iii) What processing decision should have been taken to improve the profitability of the company ?

(iv) Calculate the product wise and total profit arising from your recommendation in (iii) and above.

Q10: (ICWA Dec 1993) In a factory, engaged in chemical processing, 4000 kgs. Of a particular type of raw material RX are used for each production batch. Four joint products are obtained after processing. Estimated output and sale price for such joint products are as follows:

Products	Output per 4000 kgs of RX (kg)	Sale price per kg (Rs.)
P	300	50
Q	1,200	40
Y	600	60
Z	1,800	25

The estimated processing cost per production batch is Rs.20,800. Selling and distribution cost is estimated at 20% of sales. Management's expected rate of return is 10% on sales. The unaccounted raw material is taken as invisible waste.

(a) The purchase price per kg of the raw material with a view to achieving the above outcome and

(b) The unit cost of sales of P, Q, Y and Z on the basis of their sales value.

Q11: (CS Inter Dec 2002) Two products P and Q are obtained in a crude form and require further processing at a cost of Rs.5 per unit of product P and Rs.4 per unit of product Q before sale. Assuming a net margin of 25% on cost, their sales prices are fixed at Rs.13.75 per unit and Rs.8.75 per unit respectively. During the period, the joint cost was Rs.88.00 and outputs were 8,00 units of Product P and 6,000 units of Product Q. You are required to ascertain the joint cost per unit.

Q12: (Nov 1992) A company's plant processes 1,50,00 kgs. of raw material in a month to produce two products viz. 'P' and 'Q'. The cost of raw material is Rs.12 per kg. The process costs per month are:

	Rs.
Direct Material	90,000
Direct wages	1,20,000
Variable overheads	1,00,000
Fixed overheads	1,00,000

The loss in process is 5% of input and the output ratio of P and Q, which emerge simultaneously is 1:2. The selling price of the two products at the point of split off are: P Rs.12 per kg and Q Rs.20 per kg. A proposal is available to process P further by mixing it with other purchased material. The entire current output of the plant can be so processed further to obtain a new product 'S'. The price per kg. of S is Rs.15 and each kg. of output of S will require one kilogram of input P. The cost of processing P into S (including other material) is Rs.1,85,000 per month.

You are required to prepare a statement showing the monthly profitability based both on the existing manufacturing operations and on further processing.

Q13: (ICWA Dec 2002) Three products A, B and C are produced from a single process, each product can be sold at the end of the each process or can be further processed independently to produce superior products which are marketed under different names – X, Y and Z respectively.
Details for a period are given below:

Product	Initial output	Sales value (Rs.)	Further processing cost	Rejection rate
A	5,000 units	24 per unit	14 per unit	Nil
B	8,000 units	10 per unit	6 per unit	Nil
C	10,000 units	30 per unit	16 per unit	Nil
X		44 per unit	--	5%
Y		18 per unit	--	10%
Z		48 per unit	--	8%

Initial process costs:
Material Rs.2,00,000
Labour and overhead Rs.2,00,000
Further processing cost are incurred at the commencement of the second stage of operation. during this stage vigorous quality control causes a percentage of input to be rejected, with zero scrap value.
Required:
(i) Calculate the apportionment of costs to products A, B and C using sales value of production as the basis of apportionment.
(ii) Explain whether the initial process should be undertaken and also state whether the further processing is to be undertaken or not.

Q14: (ICWA Dec 1991) Bright Chemicals Ltd. electrolysis common salt to obtain 3 joint products: Caustic soda, Chlorine and Hydrogen. During a costing period, the expenditure relating to the inputs for the common process amounted to Rs.3,50,000. After separation expenses amounting to Rs.1,60,000, Rs. 75,000, Rs.10,000 were incurred for Caustic Soda, chlorine and hydrogen respectively.
The entire production was sold and Rs.3,75,000, Rs.2,50,000 and Rs.60,000 were realized for Caustic Soda, Chlorine and Hydrogen respectively.

The selling expenses were estimated at 5% of the realization from the sales. The management expected profits at 15%, 10% and 5% of realizations from sale of caustic soda, chlorine and hydrogen respectively.

Draw a columnar statement showing the apportionment of joint cost and the profitability of each product.

Q15: (ICWA June 1990) In a process line of XY company three joint products are produced. For the month of May, 1990 the following data were available:

	L	M	N
Sales price per kg	5	10	20
Post separation point cost	10,000	5,000	15,000
Output in kg	2,500	1,000	1,500

Pre separation point cost amounted to Rs.20,000.

The joint products are manufactured in one common process, after which they are separated and may undergo further individual processing. The pre separation point cost are apportioned to joint products according to weight. You are required to prepare a statement showing the estimated profit or loss for each product and in total.

Q16: (ICWA Final Dec 1994) Work out the estimated pre separation costs per ton of by products Y and Z from the following data:

Cost of manufacture before separation: Rs.25,60,000

Main product X

There are two by products Y and Z, whose normal selling prices are as under:

Sales price of Y: Rs.500 per ton.

Sales price of Z: Rs.800 per ton.

Selling and distribution expenses have been estimated to be 25% of selling price and the net profit is expected to be 10% of selling price. Costs to manufacture each ton after separation from the main product are:

Rs.95 for by product Y,

Rs.145 for by product Z

Assume equal weight for Y and Z.

Q17: (CA Inter May 1990) A factory is engaged in the production of a chemical "BOMEX" and in the course of its manufacture, a by product "BRUCIL" is produced, which after further processing has a commercial value. For the month of April, 1990 the following are summarized cost data:

	Joint Expenses (Rs.)	Separate BOMEX (Rs.)	Expenses BRUCIL
Materials	1,00,000	6,000	4,000
Labour	50,000	20,000	18,000
Overheads	30,000	10,000	6,000
Selling price per unit		98	34
Estimated profit per unit of BRUCIL			4
No of units produced		2,000	2,000

The factory uses reverse cost method of accounting for by products where by the sales value of by products after deduction for the estimated profits, post separation cost and selling and distribution expenses relating to the by products is credited to the joint process cost account.

You are required to prepare statement showing:

(i) The joint cost allocable to BOMEX.

(ii) The product wise and overall profitability of the factory for April, 1990.

Q18: (Nov 1996) A company processes raw material in its department 1 to produce three products viz. A, B and X at the same split – off stage. During a period 1,80,000 kgs of raw materials were processed in department 1 at a total cost of Rs.12,88,000 and the resultant output of A, B and X were 18,000, 10,000 and 54,000 kgs respectively. A and B were further processed in department 2 at a cost of Rs.1,80,000 and Rs.1,50,000 respectively.

X was further processed in department 3 at a cost of Rs.1,08,000. There is no waste in further processing. The details of sales effected during the period were as under: -

	A	B	X
Quantity sold (kgs)	17,000	5,000	44,000
Sales value (Rs.)	12,24,000	2,50,000	7,92,000

There were no opening stocks. If these products were sold at split – off stage, the selling prices of A, B and X would have been Rs.50, Rs.40 and Rs.10 per kg respectively.

Required:

(i) Prepare a statement showing the apportionment of joint cost to A, B and X.

(ii) Present a statement showing the cost per kg of each product indicating joint cost, further processing cost and total cost separately.

(iii) Prepare a statement showing the product wise and total profit for the period.

(iv) State with supporting calculations as to whether any or all the products should be further processed or not.

Q19: A coke manufacturing company produces the following products by using 5,000 tonnes of coal @ Rs.15 per tone into a common process.

Coke	3500 tonnes
Tar	1200 tonnes
Sulphate of ammonia	52 tonnes
Benzol	48 tonnes

Apportion the joint cost amongst the products on the basis of the physical unit method.

CONTRACT COSTING

Q.1. Write Short Notes on:

1. Contract Costing
2. Cost-Plus Contracts
3. Escalation Clause
4. Sub-Contract

Ans.: *Contract Costing :* This type of costing technique is adopted in case of big job. This costing technique is adopted by builders and civil contractors engaged in construction. Under this method, a separate account is prepared for each contract for calculating profit or loss from each contract.

1. *Cost-Plus Contract :* In these types of contracts, the contract price is ascertained by adding a percentage of profit to the total cost of the contract. This method is adopted in those cases where it is not possible to compute the cost in advance with a reasonable degree of accuracy due to unstable conditions. In these contracts, it is provided in the agreement about the items of cost that may be allowed and the percentage of profit to be added. Hence, the contractor is also assured of a fair return. The contractee has the right to verify and inspect all documents related to the expenditure on contract.
2. *Escalation Clause :* This clause is provided in the contract as a safeguard against the likely changes in the prices and actual utilisation of material and labour. If during the period of contract the prices of material and labour rise beyond a certain limit, the contract price will be increased by an agreed amount. The inclusion of such a term in the contract is known as escalation clause.
3. *Sub-Contract :* Sometimes the contractor may not find it feasible to do all the work himself. In such a cases, he may entrust some portion of the work to another who is called a sub-contractor and the work allotted to him is known as sub-contract. The sub-contractor is accountable to the main contractor. The costs of sub-contract is treated as direct costs of the contract.

Q.2. Distinguish between job costing and contract costing ?

Ans.: Contract costing differs from job costing in the following respects :

1. The number of jobs undertaken at a time are usually large as compared to number of contracts because contracts are generally much bigger in size.
2. Allocation and apportionment of overhead costs is simpler in contract costing as compared to job costing.
3. Contract is generally big while job is small. It is well said, “a job is a small contract and a contract is a big job.”
4. Jobs are usually carried out in factory premises while contract work is done at site.

Q.3. What are the features of contract costing ?

Ans.: Contract costing usually shows the following features :

1. Contracts are generally of large size and, therefore, a contractor usually carries out a small number of contracts in the course of one year.
2. A contract generally takes more than one year to complete.
3. Work on contracts is carried out at the site of contracts and not in factory premises.
4. Each contract undertaken is a cost unit.
5. A separate contract account is prepared for each contract in the books of contractor to ascertain profit or loss on each contract.

Practical Question

Q.1. A firm of builders carrying out large contracts kept in contract ledger separate account for each contract. On 30th June, 2008 the following was shown as being the expenditure in connection with contract No. 777.

	Rs.
Material purchased	58,063
Materials from stores	9,785
Value of Plant	20,000
Wages	73,634
Direct expenses	2,026
Production or establishment charges	8,720

The contract which had been commenced on 1st Feb., 2008, was of Rs. 3,00,000 and the amount certified by the architect after deduction of 20% retention money, was Rs.1,20,800 representing 80% of work certified upto 30th June, 2008. The materials on the site at that date were valued at Rs. 9,858. The value of plant as on 30.6.2008 is Rs. 18,870.

You are required to prepare an account showing the profit on the contract to 30th June, 2008. There is no work uncertified.

Ans. Profit transferred to P & L A/c Rs. 4,000; to Reserve Rs. 3,500.

Q.2. Two contracts, commenced on 1st January and 1st July 2009 respectively, were undertaken by a contractor and their accounts on 31st December, 2009 showed the following position :

	Contract 1	*Contract 2*
	Rs.	*Rs.*
Contract price	4,00,000	2,70,000
Expenditure :		
Materials	72,000	58,000
Wages paid	1,10,000	1,12,000
General charges	4,000	2,800
Plant installed	20,000	16,000
Materials on hand	4,000	4,000
Wages accrued	4,000	4,000
Work certified	2,00,000	1,60,000
Cash received in respect thereof	1,50,000	1,20,000
Work done but not certified (at cost)	6,000	8,000

The plant was installed on the date of commencement of each contract; depreciation thereon is to be taken at 10% per annum.

Prepare the Contract Accounts in the tabular form and ascertain the profit or loss to be taken to Profit and Loss Account.

Ans. Contract 1 – Total Profit Rs. 18,000; Profit taken to Profit & Loss A/c Rs. 9,000.
Contract – 2 Loss Rs. 5,600.

Q.3. The following information is available in respect of a contract undertaken by a building contractor on 1st January, 2008. The contract was for Rs. 4,00,000.

	Rs.
Materials issued	75,000
Wages paid	1,10,000
General Charges	4,000
Plant installed at site on 1st July, 2008	20,000
Materials in hand on close	4,000
Wages accrued due	4,000
Work certified	2,00,000
Work completed but not certified	6,000
Cash received	1,50,000
Materials transferred to other contracts	4,000
Materials received from other contracts	1,000

Depreciation on plant is to be provided at 10% per annum.

Prepare Contract A/c and show what part of the profit on contract should be taken credit for the year ended on 31st December, 2008.

Ans. Profit to Profit & Loss A/c Rs. 9,500; Balance as Reserve Rs. 9,500.

Q.4. Mr. Bhagwandas undertook a contract for Rs. 15,00,000 on an arrangement that 80% of the value of the work done as certified by the architect of the contractee, should be paid immediately and that the remaining 20% be retained until the contract was completed.

In 1993 the amounts expended were – Materials Rs. 1,80,000; Wages Rs. 1,70,000; Carriage Rs. 6,000; Cartage Rs. 1,000; Sundry Expenses Rs. 3,000. The work was certified for Rs. 3,75,000 and 80% of this was paid as agreed.

In 1994 the amounts expended were – Materials Rs. 2,20,000; Wages Rs. 2,30,000. Carriages Rs. 23,000; Cartage Rs. 2,000; Sundry Expenses Rs. 4,000. Three- Fourth of the contract was certified as done by 31st December and 80% of this was received accordingly. The cost of work-in-progress uncertified was ascertained at Rs. 20,000.

In 1995 the amounts expended were : Materials Rs. 1,26,000; Wages Rs. 1,70,000; Cartage Rs. 6,000; Sundry Expenses Rs. 3,000 and on 30th June the whole contract was completed.

Show the Contract Account and also Contractee's Account would appear each of these years in the books of the contractor assuming that the balance due to him was received on completion of the contract.

Ans. 1993 Profit P & L Rs. 4,000
1994 Profit P & L Rs. 1,61,067
1995 Profit P & L Rs. 1,90,933
Total Profit Rs. 3,56,000

Q.5. [CS (Inter) June 1995 (15 marks)]

Prabhu Building Ltd. commenced work on 1st April 2007 on a contract of which the agreed price was Rs. 5 lakhs. The following expenditure was incurred during the year upto 31st March 2008 :

	Rs.
Wages	1,40,000
Plant	35,000
Materials	1,05,000
Head office expenses	12,500

Materials costing Rs. 10,000 proved unsuitable and were sold for Rs. 11,500 and a part of the plant was scrapped and sold for Rs. 1,700.

Of the contract price Rs. 2,40,000 representing 80% of work certified had been received by 31st March, 2008 and on that date the value of the plant on the job was Rs. 8,000 and the value of materials was Rs. 3,000. The cost of work done but not certified was Rs. 25,000.

It was decided to (a) estimate what further expenditure would be incurred in completing the contract (b) compute from the estimate and the expenditure already incurred, the total profit that would be made on the contract and (c) ascertain the amount of profit to be taken to the credit of profit and loss account for the year ending 31st March, 2008. While taking profit to the credit of profit and loss account, the portion of the total profit should be taken which the value of work certified bears to the contract price. Details of the estimates were as follows:

(i) That the contract would be completed by 30th September, 2008.

(ii) The wages to complete would amount to Rs. 84,750.

(iii) That materials in addition to those in stock on 31st March, 20088 would cost Rs. 50,000.

(iv) That further Rs. 15,000 would have to be spent on plant and the residual value of the plant on 30th September, 2008 would be Rs. 6,000.

(v) The head office expenses to the contract would be at the same annual rate as in 2007-08.

(vi) That claims, temporary maintenance and contingencies would require Rs. 9,000.

Prepare contract account for the year ended 31st March, 2008 and show your calculations of the sum to be credited to profit and loss account for the year.

Ans. Rs. 36,120.

Q.6. [CA (Inter) Nov., 1994]

A company undertook a contract for construction of a large building complex. The construction work commenced on 1st April, 2008 and the following data are available for the year ended 31st March, 2009 :

	Rs. '000
Contract Price	35,000
Work Certified	20,000
Progress Payments Received	15,000
Materials Issued to Site	7,500
Planning & Estimating Costs	1,000
Direct Wages Paid	4,000
Materials Returned from Site	250
Plant Hire Charges	1,750
Wage Related Costs	500
Site Office Costs	678
Head Office Expenses Apportioned	375
Direct Expenses Incurred	902
Work Not Certified	149

The contractors own a plant which originally cost Rs.20 lakhs has been continuously in use in this contract throughout the year. The residual value of the plant after 5 years of life is expected to be Rs.5 lakhs. Straight line method of depreciation is in use.

As on 31st March, 2009 the direct wages due and payable amounted to Rs.2,70,000 and the materials at site were estimated at Rs.2,00,000.

Required :

(i) Prepare the contract account for the year ended 31st march, 2009.

(ii) Show the calculation of profit to be taken to the profit and loss account of the year.

(iii) Show the relevant balance sheet entries.

[Ans.: Rs.16,62,000].

Q.7. Pioneer Construction Company Ltd. obtained a contract for the erection of a multi-storey building. Building operations started in July. The contract price was Rs.9,00,000. On 30th June, the end of the financial year, the cash received on account was Rs.3,60,000, being 80% of the amount on the surveyor's certificate. The following additional information is given :

Material issued to contract	Rs. 1,80,000
Materials on hand at site as on 30th June	7,500
Wages	2,46,600
Plant purchased specially for contract and to be depreciated at 10% per annum	30,000
Direct expenses incurred	12,900
General overhead allocated to contract	7,000
Provision to be made for substandard work	600
Work finished but not yet certified at cost	15,000

You are required to prepare the contract account and statement showing the profit on the contract to 30th June indicating what proportion of the profit the company would be justified in taking to the credit of the profit and loss account. Show what entries in respect of the contract would appear in the balance sheet.

Ans.: Profit credited to P&L A/c. Rs.11,946.

Q.8. From the following information prepare the Contract Account in tabular form and show how these figures should appear in the Balance Sheets as on 31.3.2003.

	Contract A	*Contract B*	*Contract C*
Commencement	01:04:2002	01:10:2002	01:01:2003
Contract Price	Rs.80,000	Rs.54,000	Rs.60,000
Raw Material	14,400	11,600	4,000
Wages paid	22,000	22,400	2,800
General charges	800	560	200
Plant installed	4,000	3,200	2,400
Material at the end	800	800	400
Wages accrued	800	800	360
Work certified	40,000	32,000	7,200
Work uncertified	1,200	1,600	420
Cash Received	30,000	24,000	5,400

Depreciation is to be charged on the plant @ 10% p.a.

Ans.:

	A	*B*	*C*
Amount transferred to -			
→ P&L A/c.	1,800	(1,120)	--
→ WIP (Reserve)	1,800	--	600

Q.9. A company of contractors began to trade on 1st Jan., 2009. During 2009 the company was engaged on only one contract of which the contract the contract price was Rs.5,00,000.
Of the plant and materials charged to contract, plant costing Rs.5,000 and material costing Rs.4,000 were lost in an accident. On 31st Dec., 2009, plant costing Rs.5,000 was returned to the stores. Cost of work uncertified, but finished Rs.2,000 and materials costing Rs.4,000 were in hand on site.

Charge 10% depreciation on plant and compile Contract Account and Balance Sheet from the following :

Share Capital		Rs. 1,20,000
Creditors		10,000
Cash received (80% of work certified)		2,00,000
Land and building	Rs. 43,000	
Bank balance	25,000	
Charged to contract :		
Materials	90,000	
Plant	25,000	
Wages	1,40,000	
Expenses	7,000	
	3,30,000	3,30,000

Ans.: Notional Profit Rs.21,000

Q.10. [CA (Inter) May, 2000]

MNP Ltd. commenced a contract on April 1, 2008 at a total cost of Rs.17,50,000. It was decided to estimate the total profit and to take to the credit of P&L A/c. the proportion of estimated profit on cash basis which work completed before to the total value of contract. Actual expenditure in 2008-09 and estimated expenditure in 2009-2010 are given below:

	2008-2009 (Actual)	*2009-2010 (Estimated)*	
Materials issued	Rs.3,00,000	Rs.5,50,000	
Labour : Paid	2,00,000	2,50,000	
Outstanding at end	20,000	30,000	
Plant purchased	1,50,000	---	
Expenses : Paid	75,000	1,50,000	
Prepaid at end	15,000	---	
Plant returned to stores (historical cost)	50,000	1,00,000	(on Dec. 31, 2009)
Material at site	20,000	50,000	
Work certified	8,00,000	Full	
Work uncertified	25,000	---	
Cash received	6,00,000	Full	

The plant is subject to annual depreciation @ 25% of WDV cost. The contract is likely to be completed on Dec. 31, 2009. Prepare the Contract A/c. and determine the profit on the contract for the year 2008-2009, which has to be credited to P&L A/c.

Ans.: Amount transferred to P&L A/c. Rs.66,321 by using the formule –

$$\text{Estimated Profit} \times \frac{\text{Work certified}}{\text{Contract Price}} \times \frac{\text{Cash received}}{\text{Work certified}}$$

Q.11. Alcon Construction Company Ltd., commenced its business of construction on 1-1-2009. The trial balance as on 31-12-2009 showed the following balances :

	Dr. (Rs.)	Cr. (Rs.)
Paid-up share capital		1,00,000
Cash received on account of contract (80% of work certified)		1,20,000
Land and Buildings	30,000	
Machinery at cost (75% at site)	40,000	
Bank	4,000	
Materials at site	40,000	
Direct labour	55,000	
Expenses at site	2,000	
Lorries and Vehicles	30,000	
Furniture	1,000	
Office equipment	10,000	
Postage and Telegrams	500	
Office expenses	2,000	
Rates and Taxes	3,000	
Sundry Expenses	2,500	
	2,20,000	2,20,000

The contract price is Rs.3,00,000 and work certified is Rs.1,50,000. The work completed since certification is estimated at Rs.1,000 (at cost). Machinery costing Rs.2,000 was returned to stores at the end of the year. Stock of material at site on 31-12-2009 was of the value of Rs.5,000. Wages outstanding were Rs.200. Depreciation on Machinery at 10%. You are required to calculate the profit from the contract the show how the work-in-progress will appear in the balance sheet on 31-12-2009.

Ans. Notional Profit from contract Rs.55,800 out of which Rs.29,760 is transferred to P & L A/c

Q.12 British Contractors Ltd. undertook three contracts in a year – the first on 1st January, second on 1st July and third on 1st October. On 31st December, when their accounts were made up, the position was as follows :

Contract	1 (Rs.)	2 (Rs.)	3 (Rs.)
Contract price	2,00,000	1,35,000	1,50,000
Expenditure : Materials	39,400	29,000	10,000
Wages	63,250	56,200	7,000
General Expenses	2,000	1,400	500
Plant installed	10,000	8,000	6,000
Materials on hand	2,000	2,000	1,000
Wages accrued	1,725	1,800	800
General expenses accrued	300	200	100
Work certified	1,20,000	80,000	18,000
Cash received in respect thereof	90,000	60,000	13,500
Work finished but uncertified	3,000	4,000	1,050

Contract 1 had been negotiated two years back with an escalation clause providing that should material prices and wage rates increase by more than 2.5%, the contractee would bear the increased cost by 20% of the rise in the cost of materials and 40% of the rise in the wage rates beyond 2.5% in each case.

It is seen that since the signing of the agreement the material prices had gone up by 10% and wage rates by 15%, The value of work certified does not take into account the effect of the escalation cause.

The plant was installed on the dates of the contracts and depreciation is taken at 10% per annum. Prepare the respective accounts in the contract ledger and give suitable entries in the company's Balance Sheet.

Ans. Contract 1 Notional Profit Rs.20,660 out of which Rs.10,330 is transferred to P & L A/c

Contract 2 Loss of Rs.3,000 which is completely taken to P & L A/c

Contract 3 Notional Profit Rs.1,500 which is fully transferred to WIP (Reserve)

Q.13. Prepare contract account, from the following figures. The term of the contract is Rs.10 per square ft. of the covered floor area as accepted and certified to the correct by the engineering authority of the project. The total area to be covered under contract is 15,000 sq. feet.

(a) Materials : Building material in stock at the commencement of work Rs.10,000. Purchases during the currency of the contract were as under :

(i) Cement	600 bags	@ Rs.75 per bag.	
(ii) Bricks	1,00,000	@ Rs.50 per thousand.	
(iii) Sand	10,000 cu. Ft.	@ Rs.10 per 100 cr. Ft.	
(iv)	Woodwork	90 cu. ft.	@ Rs.100 per cu.ft.

Value of balances of various materials in hand after the completion of the work is Rs.10,000.

(b) Labour 5 masons @ Rs.50 per day for 40 days, 20 collies @ Rs.25 per day for 40 days.

(c) Tools and Plants : Two new concrete mixers were brought at Rs.10,000 each at the beginning of the contract. Residual value as assessed after completion of the contract is Rs.3,500 each.

(d) Supervision : 50% of 4 engineers' pay at Rs.500 p.m. for each engineer – 2 months. 50% of 10 overseers' pay Rs.200 p.m. for each for 4 months.

(e) Administrative overhead : 20% of head office expenses for the period of the contract. The total head office expenses amounted to Rs.5,000.

(f) Quantity of work done : 12,500 sq. feet of which 96% was certified against which 90% cash was received.

Ans. Notional Profit Rs.16,480, out of which Rs.9,888 is transferred to P & L A/c.

Q.14 Ideal Construction Co. commenced work on Contract No. 121 at site No.12 with effect from April 1, 2008. Cost records reveal the following information relating to the progress of the contract during 2008-2009:

Materials sent to site Rs.4,00,000; Labour Rs.5,00,000; Machinery sent to site costing Rs.5,20,000. The machine has salvage value of Rs.20,000 and an estimated effective life of 5 years. Half of the machinery was returned to head office on 1st July 2008. Materials at site at the end of the year are valued at Rs.45,000. Materials stolen form site amount to Rs.5,000.

There was a labour strike for one week at the site. As a result of settlement with the workers they were paid Rs.10,000 as wages for the strike period included in the total wages bill. It was decided that 10% of the normal material and labour cost should be charged to the contract on account of general administration costs of the head office.

The contractor estimated that as on 31st March 2009 he had completed 60% of the total contract, though the Architect issued certificate only for Rs.8,00,000. The contractee paid him Rs.6,40,000.

Prepare Contract No.121 A/c for 2008-2009 appropriating profit on the basis of percentage of work certified to total value of contract as reduced by the percentage of cash received to work certified. The contract price is Rs.20,00,000.

(Ans. Notional Profit is Rs.1,42,333 out of which Rs.45,547 is taken to P&L A/c)

Q.15 At the end of year, a Contract Accounts stands debited with the cost of materials issued, labour and overheads expended and plant issued, and it stands credited with materials at site Rs.2,000 and plant at site revalued at Rs.8,000, after charging depreciation at 20%. The net cost of contract is Rs.30,000. The materials, labour and overheads debited to the Contract Account are in the ratio of 3 : 2 : 1. The contract price is Rs.50,000. 4/5 of the contract has been certified by the contractee's architect as completed, a month before the end of the year and 80% of the certified work value has been received in cash. The accountant informs that $\frac{2}{3}$ of the profit on cash basis credited to profit and loss account on the contract is Rs.8,000. Prepare the Contract Account for the current year 2000-01 showing the cost of work done but uncertified, and the Work-in-progress from the above information.

Prepare the Contract Account for the current year.

(Ans. Notional profit is Rs.15,000 and Rs.8,000 is taken to P&L A/c).

Q.16 M/s Manholes and Sewers Ltd. Undertook for erecting a sewerage treatment plant for a municipality for a total value of Rs.24 lakhs. You are required to prepare a contract account for the year ending 31st March 2008, from the following particulars:

(i) Wages Rs.6,00,000. (ii) Special plant Rs.2,00,000. (iii) Materials Rs.3,00,000. (iv) Overheads Rs.1,20,000. (v) Depreciation @ Rs.10% to be provided on plant. (vi) Materials lying at site on 31.3.2001 Rs.40,000 (vii) Work certified was to the extent of Rs.16,00,000 and 80% of the same was received in cash. (viii) 5 per cent of the value of materials issued and 6 per cent of wages may be taken to have been incurred for the portion of work completed but not yet certified. (ix) Overheads are 20% of direct wages. (x) Ignore depreciation on plant for use on uncertified portion of the work. (xi) Ascertain the amount to be transferred to profit and loss account on the basis of realised profit.

(Ans. Cost of work uncertified = Rs.58,200; Notional Profit Rs.6,58,200)

Q.17 Messrs Kishore and Company commenced the work on a particular contract on 1st April 2009. They close their books of accounts for the year on 31st December each year. The following information is available from their costing records on 31st December, 2009:

Material sent to site Rs.50,000; Foreman's salary Rs.12,000; Wages paid Rs.1,00,000.

A machine costing Rs.32,000 remained in use on site for 73 days during the year. Its working life was estimated at 5 years and scrap value at Rs.2,000. A supervisor is paid Rs.2,000 per month and had devoted one-half of his time on the contract.

All other expenses were Rs.15,000. The materials on site were Rs.9,000. The contract price Rs.4,00,000. On 31st December, 2009, 2/3 of the contract was completed; However, the architect gave certificate only for Rs.2,00,000 on which 75% was paid. Prepare the Contract Account.

(Ans. Cost of work uncertified = Rs.44,550; Notional Profit = Rs.66,350)

Q.18 Uddan Constructors Pvt. Ltd. Provide you the following information:–

(a) The project commenced on 1st December 1999 and it was estimated to be completed by 31st March, 2001.

(b) The contract price was negotiated at Rs.680 lacs.

(c) The actual expenditure upto 31st March, 2000 and subsequent additional estimated expenditure upto 31st March, 2001 is furnished as under :–

Particulars	*Actual Expenditure during 1-12-1999 to 31-3-2000*	*Estimated Additional Expenditure during 1-4-2000 to 31-3-2001*
Direct Material	1,95,60,000	1,27,40,000

Indirect Material	14,23,000	11,77,000
Direct Wages	42,46,500	41,33,500
Supervision Charges	4,14,400	5,55,600
Architect Fees	8,17,500	12,82,500
Construction Overheads	31,52,600	21,47,400
Administrative Overheads	14,16,000	24,34,000
Closing Material at site	7,50,000	–
Work Uncertified at the end of the year	13,80,000	–
Work Certified during the year	3,50,00,000	3,30,00,000

The value of Plant and Machinery sent to site was Rs.60 lacs, whereas the scrap value of the plant and Machinery at the end of the project was estimated to be Rs.3 lacs.

It was decided that the profit to be taken credit for should be that proportion of the estimated net profit to be realised on completion of the project which the certified value of work as on 31-3-2000 bears to the total contract price.

You are required to prepare Contract. Account for the period ended 31st March, 2000 along with the working of profit to be taken credit for.

(Ans. Notional Profit is Rs.46,75,000 and Rs.35,00,000 is taken to P&L A/c).

Q.19 M/s. Everfine Constructions commenced a contract for the construction of a Bunglow on 1st July, 2000. Originally the contract price was Rs.50,00,000 but finally the same was fixed at Rs.45,00,000.

Their actual expenditure during the year 2000 and estimated expenditure during 2001, till the completion of the contract is as under:–

Particulars	*Actual Expenditure upto 31-12-2000*	*Estimated Expenditure during 2001*
Building Materials	8,00,000	13,00,000
Labour Charges	6,00,000	6,00,000
Plant installed at site (at cost)	4,00,000	–
Materials at site on 31-12-2000	50,000	–
General Expenses	2,50,000	3,55,000
Plant returned to stores at cost at the end of the year	1,00,000	–
Works certified	20,00,000	–
Works uncertified	75,000	contract completed
Cash Received	90% of the work certified	45,00,000

The contract is expected to be completed by 30th September, 2001.

The plant is subject to depreciation at 20% p.a. on the original cost.

In order to calculate the correct account of profit made on the contract for the year 2000, it was decided to take certain proportion of the estimated profit on completion of the contract to the credit of Profit and Loss Account; such proportion being cash received to the total contract price.

Prepare the Contract Account for the year ending 31st December, 2000 and work out the estimated profit on the completion of the contract by 30th September, 2001.

(Ans. Notional Profit is Rs.4,35,000 and Rs.2,04,000 is taken to P/L A/c)

Q.20 The following Trial Balance was extracted on 31st December, 2001 from the books of Swastick Co. Ltd. Contractors:

(Rs.)

Particulars	*Dr.*	*Cr.*
Share capital (shares of Rs.10 each)		3,50,000
Profit and Loss A/c on 1-1-2001		25,000
Provision for depreciation of machinery		63,000
Cash received on account of Contract No.10		12,80,000
Creditors		82,000
Land and Buildings (Cost)	70,000	
Machinery (Cost)	52,000	
Bank	48,000	
Contract No. 10:		
Materials	6,10,000	
Direct Labour	8,40,000	
Expenses	20,000	
Machinery on Site (Cost)	1,60,000	
	18,00,000	18,00,000

Contract No. 10 was begun on 1st January 2001. The contract price is Rs.24,00,000 and the contractee has, so far, paid Rs.12,80,000 being 80% of work certified. The cost of work done since certification is estimated at Rs.20,000. On 31st December, 2001, after the above Trial Balance was extracted, machinery costing Rs.32,000 was returned to stores and materials then on site were valued at Rs.23,000.

Provision is to be made for direct labour due Rs.6,000 and for depreciation on all machinery at 12½% on cost. You are required to prepare (a) Contract account, and (b) Balance Sheet of the company as on 31-12-2001.

(Ans. Notional Profit is Rs.1,47,000 and Rs.78,400 is taken to P/L A/c)

Q.21 XYZ Ltd. was engaged on one contract during the year 2001. The contract price was Rs.2,00,000. The trial balance extracted from the books on 31-12-2001 stood as follows:

Rs.

Particulars	*Dr.*	*Cr.*
Share capital		40,000
Sundry creditors		4,000
Building	17,000	
Cash at Bank	4,500	
Contract a/c :		
Materials	37,500	
Plant	10,000	
Wages	52,500	
Cash received from contractor (80% of work certified)		80,000
Expenses	2,500	
	1,24,000	1,24,000

Of the plant and materials charged to the contract, plant costing Rs.1,500 and materials costing Rs.1,200 were destroyed by an accident. On 31-12-2001 plant costing Rs.2,000 was returned to stores and material at site was valued at Rs.1,500. Cost of uncertified work was Rs.1,000. Charge 10% as depreciation on plant. Prepare contract account for the year 2001 and Balance Sheet as on 31-12-2001.

(Ans. Notional Profit is Rs.10,350 and Rs.5,520 is taken to P/L A/c)

Q.22 Mr. Behram Contractor has undertaken two contracts one at Mubai and another at Thane. The details of the contracts are given below for the year ended 31st March, 2001:

(Rs.)

Particulars	*Contract at Mumbai*	*Contract at Thane*
Date of Commencement	*1st July, 2000*	*1st Oct., 2000*
Contract Price	10,00,000	15,00,000
Direct Labour	2,55,000	1,82,000
Material issued from stores	2,20,000	2,00,000
Material returned	10,000	15,000
Plant installed at site	2,00,000	3,50,000
Direct Expenses	40,000	30,000
Overheads	15,000	10,000
Material sold (cost Rs.8,000)	10,000	–
Material at Site	18,000	16,000
Cash received from contractee (representing 80% of work certified)	4,80,000	1,92,000
Work uncertified	13,000	9,000
Architects Fees	7,000	3,000

(i) Provide depreciation on plant at 20% p.a.

(ii) During the year materials costing Rs.10,000 were transferred from Thane contract to Mumbai contract.

You are required to prepare contract A/c. of Mumbai and Thane contracts.

(Ans. Notional Profit from Mumbai Contract Rs.72,000 and loss from than contract Rs.1,70,000)

Q.23 Rajesh Contractor obtained a contract to build a house at a contract price of Rs.15,00,000. The Contractee agrees to pay 90% of the value of the work done as certified by the architect immediately on receipt of the certificate and to pay the balance after completion of the Contract.

The contractor commenced the work on 1st May, 1999. A Plant costing Rs.20,000 was specially bought for the contract. The value of the plant at the end of 1999, 2000 and 2001 was Rs.16,000; Rs.10,000 and Rs.4,000 respectively. The work done and certified by the architect as at the end of 1999 and 2000 was Rs.3,50,000 and Rs.11,50,000 respectively Work costing Rs.20,000 done as at the end of 2000 was not certified as on that date.

Other details of the contract were as under:

Rs.

Particulars	*1999*	*2000*	*2001*
Material sent to the site	1,80,000	2,20,000	1,26,000
Wages paid	1,70,000	2,30,000	1,70,000
Direct Expenses incurred	7,000	25,000	9,000
Indirect Expenses incurred	3,000	4,000	–

You are required to prepare contract account for the year ended 31st December, 1999, 2000 and 2001, considering that contract is fully completed in 2001.

(Ans. Amount taken to P/L A/c Rs. 2,01,000 is 2,000 and Rs.1,53,000 in 2001. There is loss of Rs.14,000 in 1999).

Q.24 The following information relate to a road contract for Rs.10,00,000.

Rs.

	2000	*2001*
Materials Issued	3,00,000	84,000
Direct Wages	2,30,000	1,05,000
Direct Expenses	22,000	10,000
Indirect Expenses	6,000	1,400
Work Certified	7,50,000	10,00,000
Work not Certified	8,000	–
Materials at site	5,000	7,000
Plant Purchased	14,000	2,000
Cash Received from Contractee	6,00,000	4,00,000

The value of Plant at the end of 2000 and 2001 were Rs.7,000 and Rs.5,000 respectively.

Prepare (i) the Contract A/c and (ii) the Contractee A/c for the years 2000 and 2001 taking into consideration such profit for transfer to profit & Loss A/c as you think proper.

(Ans. Amount taken to P/L A/c Rs.1,05,600 in 2000 and Rs.1,32,000 in 2001).

Q.25 A firm of building contractors began to trade on 1-4-2000. The following was the expenditure on the contract for Rs.30,00,000.

(Rs.)

Materials issued to contract	5,10,000
Plant issued for the contract	1,50,000
Wages issued	8,10,000
Other Expenses	50,000

Cash received on account to 31-3-2001 amounted to Rs.12,80,000 being 80% of the work certified of the materials and plant charged to contract, plant which cost Rs.30,000 and materials which cost Rs.25,000 were lost on 31-3-2001, plant which cost Rs.20,000 were returned to stores. The cost of work done uncertified was Rs.10,000 and materials costing Rs.23,000 were in hand on site.

Charge 15% depreciation on Plant. Prepare the Contract Account and show the relevant particulars in the Balance Sheet. No depreciation is to be charged on lost plant.

(Ans. Notional Profit is Rs.2,70,000 and Rs.1,44,000 is taken to P/L A/c)

Q.26 ABC Ltd. began to trade on 1st January, 2006. During 2006 the company was engaged on only one contract of which the contract price was Rs. 5,00,000. Of the plant and materials charged to the contract, plant which cost Rs. 5,000 and materials which cost Rs. 4,000 were lost in an accident. On 31st December, 2006 plant with original cost of Rs. 5,000 was returned to the store, the cost of work done but uncertified was Rs. 2,000 and materials costing Rs. 4,000 were in hand on site. Charge 10% depreciation on plant. Prepare Contract Account and the Balance Sheet from the following:

Trial Balance as on 31st December, 2006

	Rs.	*Rs.*
Share capital		1,20,000
Creditors		10,000
Cash received (80% of work certified)		2,00,000
Land and Building	43,000	
Bank Balance	25,000	
Charged to contract:		
Materials	90,000	
Plant	25,000	
Wages	1,40,000	
Expenses	7,000	
	3,30,000	3,30,000

(Ans. Notional Profit is Rs. 21,000 and Rs. 11,200 is taken to P&L A/c)

Q.1.(CA INTER MAY 2000) Define Job Costing ? Explain, in brief, the Job Costing procedure ?

Ans.: JOB COSTING : Job Costing is a method of ascertaining cost in those industries in which goods are manufactured or services rendered against specific orders from customers. Special features of Job Costing are :

(i) Production is against customers' order and not for stock.
(ii) Each job has its own characteristics and needs special treatment.
(iii) Each job undertaken is a cost unit.
(iv) A separate job cost sheet is prepared for each job to ascertain cost and profit/loss on the job.

Examples of industries in which Job Costing is applicable are printing press, repair workshops, general engineering companies, interior decoration, etc.

JOB COSTING PROCEDURE :

1. *Job Order Number :* Since job costing accumulates costs by specific jobs, a number must be assigned to each job so that each job may be identified.
2. *Production Order :* It is a written order to the foreman to proceed with a job. It gives the foreman instructions relating to the job and also authorizes him to start the work.
3. *Job Cost Sheet :* Costs for each job are accumulated on job cost sheets.

Q.2. Define Batch Costing ? Explain, in brief the batch costing procedure ?

Ans.: BATCH COSTING : This is a variation of job costing. While job costing is concerned with costing of jobs made to a customer's particular requirements, batch costing is used when production involves limited repetition work and a definite number of articles are manufactured in each batch to be held in stock for sale to customers generally. Thus, a batch is cost unit consisting of a group of identical items.

Batch Costing is applied in the manufacture of shoes, toys, ready-made garments, component parts of cars, radios, watches, etc.

BATCH COSTING PROCEDURE : Each batch is given a batch number in the same way a job is given a job number. Direct materials, direct labour and direct expenses identified with the batch are recorded on the Batch Cost Card. Overheads are absorbed on one of the bases already explained as is done in the Job Costing. When a batch is completed, the cost is totaled and the total cost is divided by the quantity produced to arrive at the cost per unit or per dozen, etc., as required.

Q.3. Write a note on Economic Batch Quantity.

Ans. Economic Batch Quantity (EBQ).

Industries using batch costing have to determine the economic batch quantity. The economic batch quantity may be defined as the optimum quantity in a batch of production with minimum cost with the purpose of maximising profits.

While determining economic batch quantity, two types of cost are considered.

a) Setting up Cost : This is the cost of setting the machine and tools for production of a particular batch. This is of a fixed nature. Therefore, when the size of the batch is large, setting up cost per article in the batch is lower.

b) Carrying Cost : This includes the cost of storage, interest on capital invested, etc. Larger size of a batch leads to higher carrying cost.

A simple formula for determining the economic batch quantity is given below :

$$\text{Economic Batch Quantity} = \sqrt{\frac{2.U.S.}{C}}$$

Where U = No. of units to be produced in a year

S = Set up cost per batch

C = Carrying cost per unit p.a.

PRATICIAL QUESTION

Q.10 (CA Inter nov. 1989) A factory uses job costing. The following data are obtained from its books for the year 31.3.98.

	₹.
Direct materials	90,000
Direct wages	75,000
Selling and distribution overheads	52,500
Administration overheads	42,000
Factory overheads	45,000
Profit	60,900

(a) Prepare a Job Cost Sheet indicating the Prime cost, Works cost, Production cost, Cost of sales and Sales value.

(b) In 1999, the factory receives an order for a number of jobs. It is estimated that direct materials required will be ₹.1,20,000 and direct labour will cost ₹75,000. What should be the price for these jobs if factory intends to earn the same rate of profit on sales assuming that the selling and distribution overheads have gone up by 15%? The factory recovers factory overheads as a percentage of direct wages and administration and selling and distribution overheads as a percentage of works cost, based on cost rates prevailing in the previous year.

[Ans : (a) ₹.3,65,400 (Sales), (b) ₹.4,28,400 (Sales)

Q.No 2 (CA Inter Nov. 1985) In a factory following the job Costing Method, an abstract from the work in process as at 30th September ,was prepared as under :

Job No.	Material ₹.	Direct Labour Hours	Labour applied ₹.	Factory Overheads applied ₹.
115	1,325	400 hours	800	640
118	810	250 hours	500	400
120	765	300 hours	475	380
	2,900		1,775	1,420

Materials used in October were as follows:

Material Requisition No.	Job No.	Cost ₹.
54	118	300
55	118	425
56	118	515
57	120	665
58	121	910
59	124	720
		3,535

A summary of Labour Hours deployed during October is as under :

Job No.	Number of Hours	
	Shop A.	Shop B
115	25	25
118	90	30
120	75	10
121	65	—
124	20	10
	275	75
Indirect Labour :		
Waiting for Material	l20	10
Machine Breakdown	10	5
Idle Time	5	6
Overtime Premium	6	5
	316	101

A shop credit slip was issued in October, that material issued under Requisition No. 54 was returned back to stores as being not suitable. A Material Transfer Note issued in October indicated that material issued under Requisition No. 55 for Job 118 was directed to Job 124.

The hourly rate in Shop A per labour is ₹ 3 per hour while at Shop B, it is ₹. 2 per hour. The factory overhead is applied at the same rate as in September. Jobs 115, 118 and 120 were completed in October.

You are asked to compute the factory cost of the completed jobs. It is the practice of the management to put a 10% on the factory cost to cover administration and selling overheads and invoice the job to the customer on a total cost plus 20%basis What would be the invoice price of these three job?

[Ans :- Job 115:- ₹3,947;Job 118-₹3,721;Job-120-₹3,599]

Q.No 3 In an engineering company, the factory overheads are recovered on fixed percentage basis on direct wages and administration overheads are absorbed on fixed percentage basis on factory cost.

The company has furnished the following data relating to two jobs undertaken by it in a period :

	Job 101	Job 102
Direct Material	₹ 54,000	₹ 37,500
Direct Wages	₹42,000	₹ 30,000
Selling Price	₹1,66,650	₹1,28,250
Profit percentage on Total Cost	10%	20%

Required :

(i) Computation of percentage recovery rates of factory and administration overheads.

(ii) Calculation of amount of factory overheads, administration overheads and profit for each of the two jobs.

(iii) Using the above recovery rates, fix the selling price of Job 103. The additional data being :

Direct Material ₹.24,000

Direct Wages ₹.20,000

Profit percentage on selling price 12 ½ %

(Ans :- Factory overhead =60% of wages ,Adminstration Overheads =25% of Factory cost (ii) Factory overheads =₹25,200 ₹ 18,000 ,Adminstrative overheads =₹30,300 , ₹21,375 profit = ₹15,150 , ₹21,375(iii) selling price of job 103 =₹80,000.)

Q.4. The following direct costs were incurred on Job No.415 of Standard Radio Company.

Materials ₹4,010

Wages :

Deptt. A — 60 hours @ ₹3 per hr.

B — 40 hours @ ₹.2 per hr.

C — 20 hours @ ₹5 per hr.

Overhead expenses for these three departments were estimated as follows:

Variable overheads: Deptt. A ₹.5,000 for 5,000 labour hours

B ₹.3,000 for 1,500 " "

C ₹. 2000 for 500 " "

Fixed overheads: Estimated at ₹.20,000 for 10,000 normal working hours.

You are required to calculate the cost of Job 415 and calculate the price to give profit of 25% on selling price.

[Ans : Rs.6,440]

Q.5. A factory uses job costing. The following data are obtained from its books for the year 31.3.98.

		₹.
Direct materials	90,000	
Direct wages		75,000
Selling and distribution overheads		52,500
Administration overheads		42,000
Factory overheads		45,000
Profit		60,900

(a) Prepare a Job Cost Sheet indicating the Prime cost, Works cost, Production cost, Cost of sales and Sales value.

(b) In 1999, the factory receives an order for a number of jobs. It is estimated that direct materials required will be ₹.1,20,000 and direct labour will cost ₹.75,000. What should be

the price for these jobs if factory intends to earn the same rate of profit on sales assuming that the selling and distribution overheads have gone up by 15%? The factory recovers factory overheads as a percentage of direct wages and administration and selling and distribution overheads as a percentage of works cost, based on cost rates prevailing in the previous year.

[Ans : (a) ₹.3,65,400 (Sales), (b) ₹.4,28,400 (Sales)

Q.6. The following costs were incurred for a job during the year ending 31-12-1997

	₹.		₹.
Direct Materials	5,000	Factory Overheads	3,000
Direct Wages	3,000	Administrative Overheads	4,000
Chargeable Expenses	2,000	Selling and Distribution Overheads	3,000

Selling price for the above Job was ₹.25,000. You are required to prepare a statement showing the profit earned for the year 1997 from the Job and an estimated price of a Job which is to be executed in the year 1998. Materials, wages and chargeable expenses will be ₹.8,000, ₹.10,000 and ₹.2,000 respectively for the Job. The various overheads will be recovered on the following basis while calculating the estimated price.

(a) Factory overheads as a percentage of direct wages.

(b) Administration and selling and distribution overheads a percentage of factory cost.

[Ans: ₹.57,692]

Q.7. In respect of a factory, the following particulars have been extracted for the year 1995;

	₹.
Cost of materials	6,00,000
Wages	5,00,000
Factory overheads	3,00,000
Administration charges	3,36,000
Selling charges	2,24,000
Distribution charges	1,40,000
Profit	4,20,000

A work order has to be executed in 1996 and the estimated expenses are : Materials ₹.8,000, Wages ₹.5,000.

Assuming that in 1996 the rate of factory overheads has gone up by 20%, distribution charges have gone down by 10% and selling and administration charges have gone up each by 15%, at what price should the product be sold so as to earn the same rate of profit on the selling price as in 1995?

Factory overheads are based on wages and administration, selling and distribution overheads on factory cost.

[Ans : ₹.30,875]

Q.8. ZAB Limited undertakes to supply 1,000 units of a component per month for the months of January, February and March. Every month a batch order is opened against which material and labour costs are booked at a actuals. Overheads are levied at a rate per labour hour. The selling price is contracted at ₹ per unit.

From the following data, present the profit per unit of each batch order and overall position of the order for the 3,000 units.

Month	*Batch Output (Numbers)*	*Material Cost ₹.*	*Labour Cost ₹.*
January	1,250	6,250	2,500
February	1,500	9,000	3,000
March	1,000	5,000	2,000

Labour is paid at the rate of ₹2 per hour. The other details are:

Month	*Overheads ₹.*	*Total Labour Hours.*
January	12,000	4,000
February	9,000	4,500
March	15,000	5,000

[Ans : Profit per unit is ₹.5 and total profit is ₹.15,000]

Q.9. A jobbing factory has undertaking to supply 200 pieces of a component per month for the ensuing six months. Every month a batch order is opened against which material and labour hours are booked at actuals. Overheads are levied at a rate per labour hour. The selling price contracted for is₹s.8 per piece. From the following data present the cost and profit per piece of each batch order and overall position of the order of 1,200 pieces.

Job and Batch Costing

Month	*Batch output units*	*Material cost ₹.*	*Direct wages₹.*	*Direct labour hours*
January	210	650	120	240
February	200	640	140	280
March	220	680	150	280
April	180	630	140	270
May	200	700	150	300
June	220	720	160	320

The other details are:

Month	*Overhead expenses ₹.*	*Direct labour hours*
January	12,000	4,800
February	10,560	4,400
March	12,000	5,000
April	10,580	4,600
May	13,000	5,000
June	12,000	4,800

[Ans :Total Profit on 1,200 units = ₹.792]

Q.10. As a cost accountant you find that the selling price of a product has been calculated as follows:

	₹	₹
Materials	.24.00	
Direct Wages : 20 hours at Re.1.00 per hour	20.00	
(Dept. 1 – 10 hrs. Dept.2–6 hrs. Dept.3 –4 hrs.)		
Prime Cost	44.00	
Plus 50% on the prime cost	22.00	66.00

An analysis of the previous year's profit and loss account shows the following:

Materials	.35,000	*Factory overheads*	.
Direct Wages:		Dept. I	5,000
Dept. I	5,000	Dept. II	3,000
Dept.II	6,000	Dept. III	3,000
Dept. III	4,000	Selling & Distribution Overheads	12,200

You are required to (a) draw up a job cost sheet; (b) calculate and enter the revised cost using the previous year's figures as a basis; and (c) add to the total job cost 10% for profit and given the final selling price.

PROBLEM AND SOLUTION

Q.No 1 A shop floor supervisor of a factory presented the following cost for Job No 421 to determine selling price.

	₹
Material	5,600
Direct wages (180 hours @ ₹ 20 per hour --- Deptt X 80 hrs.Deptt. Y 60 hrs. Deptt. Z 40 yrs)	3.600
Chargeable expenses (special stores Items)	400
	9,600
Add: 331/3 % for expenses	3,200
Total Cost	12,800

Analysis of the profit and Loss Account for the previous year shows the following

		₹		₹
Materials used		1,20,000	Sales (Less returns)	20,00,000
Direct wages :				
Deptt. X	80,000			
Deptt. Y	96,000			
Deptt. Z	64,000	2,40,000		
Special stores items		32,000		
Overheads :				
Deptt. X	40,000			
Deptt. Y	72,000			
Deptt. Z	16,000	1,28,000		
Gross profit c/d		4,00,000		
		20,00,000		20,00,000
Selling expenses		1,60,000	Gross profit b/d	4,00,000
Net profit		2,40,000		
		4,00,000		4,00,000

It is also noted that average hourly rates for the three departments X ,Y and Z are similar .You are required to calculate and enter revised cost of Job No 421 using the actual figures for the previous year as the basis .Add 20% to the total cost to determine the selling price .Give necessary notes .

Soultion :-

Job Cost sheet of Job No 421

Cost Detail	₹	₹
Materials		5,600
Direct wages :		
Deptt. X 80 hrs. @ ₹20	1,600	
Deptt. Y 60 hrs. @ ₹20	1,200	
Deptt. Z 40 hrs. @ ₹20	800	3,600
Chargeable Expenses		400
Overheads : :		
Deptt. X 80 hrs. @ ₹10	800	
Deptt. Y 60 hrs. @ ₹15	900	
Deptt. Z 40 hrs. @ ₹5	200	1,900
		11,500

Work cost		1,150
Selling overheads (10% × ₹11,500)		12,650
Total Cost		2,530
Profit (20% on Total cost =12,650×20%)		15,180
Selling price		

Working Notes

1. Hours of department =Department wages ÷hourly wages rate :
   Deptt. X ₹80,000/20=4,000 hrs.
   Deptt. Y ₹96,000/20=4,800 hrs.
   Deptt. Z ₹64,000/20=3,200 hrs.
2. Departmental overheads on the basis of previous year's figures =Overheads ÷Labour hrs.
   Deptt. X ₹40,000/4,000 = ₹ 10
   Deptt. Y ₹72,000/4,800 = ₹15
   Deptt. Z ₹40,000/4,000 = ₹ 10
3. Seling overheads as a percenntage of works cost =Overheads ÷works cost
   1,60,000/₹ 16,0,000 =10%

Q.No 2 :- The normal expenses attributable to machine No III and the normal hours for which the machine is expected to be utilised in the year 2000 are indicated below :

	₹	₹
Fixed expenses		2,000
Variable		
Powers	1,500	
Repairs	900	
Lubricants	600	3,000
Total		5,000
Predetermined normal hours of working		
To make ready	200 hours	
Running on jobs	800 hours	
Total	1,000 hours	

	₹
From the data furnished below ,compute the cost of Job No 8237:	50
Material consumed : 10 units at ₹5 per unit	
Machine hour:	
To make ready : 2 hours at ₹ 1 per hour	2
Running on jobs : 8 hours at ₹1 per hour	8
	60

Note :- Whenever a job is to be put on the machine ,the machine is cleaned ,any tools or jigs already on the machine are removed and new tools ,etc suitable for the particular job are fixed before commissioning the machine for the job and the time involved is to be charged to the job as " make ready " time .Hence fixed expenses are absorbed on the basis of total normal working hours & variable expenses are absorbed on the basis of running working hours .

Solution:-

Cost sheet of Job no 8237

	₹	₹
Materials : 10 units @ ₹5 each		50
Wages : 2 hours @ 1 per hour (to make ready)	2	
8 hours @ 1 per hour (runing)	8	10
Prime cost		60
Factory expenses		
2 hours to make ready at ₹ 2 per hour	4	
: 8 hours (Running) @ ₹5.75 per hour	46	50
Total cost		110

Working Notes : Machine hour rate

(i) Computation of fixed expenses per hour	
Total no. of hours	1,000
Total fixed expenses	₹2,000
Fixed expenses per hour (2,000+1000)	₹2
(ii) Computation of variable expenses per hour	
Total no. of running hours	800
Total variable expenses	₹3,000
Variable expenses per hour (3,000+800)	₹3.75

Fixed expenses per hour are used for the time the machine is being made ready .The aggregate of fixed and variable expenses ,ie. ₹2+3.75 =₹5.75 per hour is the rate for runing time .

Q.No 3 A firm used job costing and recovers overheads on direct labour .there jobs were worked on during a period the details of which are as folows :

	Job 1 ₹	Job 2 ₹	Job 1 ₹
Opening work in progress	8,500	0	46,000
Material in period	17,150	29,025	0
Labour for period	12,500	23,000	4,500

The overheads for the period were exactly as budgeted ₹1,40,000 Job 1 and 2 are the olnly incomplete jobs .

You are required to compute the value of closing work in progress .

Soultion :- Total labour cost = ₹12,500+₹23,0000 +₹4,500=₹40,000

Overheads absorption rate =1,40,000×100%=350% of direct labour cost
₹40,000

Closing work in progress valuation

	Job 1 ₹	Job 2 ₹	Job 1 ₹
Costs given in question	38,150	52,025	90,175
Overheads absorbed	73,750	80,500	1,12,250
			2,14,425

Q.No 4 A company manufactures widgets to order and has the following budgted overheads for the year based on normal activity levels .

	Budgeted overheads	Budgeted Activity

	₹	(Total Labour Hours)
Department	6,000	1,500 labour hours
Welding	10,000	1,000 labour hours
Assembly		

Selling and administrative overheads are 20% of factory cost .An order for 250 weighted type X 128,made as Batch 5997 ,incurred the following costs

Materials ₹12,000

Labour 100 hours welding shop at ₹8 hour

₹500 were paid for the hire of special X –ray equipment for testing the welds

Required : calculate the cost per unit for Batch 5997.

Solution : The first step is to calculate the overheads obsrption rate for the production depatments

Welding = ₹6,000 / 1,500 = ₹4 per labour hour

Assembly = ₹10,000 / 1,00 = ₹10 per labour hour

Total cost –Batch No 5997

	₹	₹
Direct material		12,000
Direct expenses		500
Direct labour 100×10.00=	1,000	
200×8.00 =	1,600	2,600
		15,100
Prime cost		
Overheads 100×4 =	400	
200×10=	2000	2,400
Factory cost		17,500
Selling & Adminstrative cost (20% of factory cost)		3,500
Total cost		21,000

Cost per unit = ₹21,000 / 250 = 84.00

Q.No 5 in the current quarter ,a compnay has undertaken two jobs .the data relating to these jobs are as under :

	Job 1102	Job 1108
Selling price	₹1,07,325	₹1,57,920
Profit as percentage on cost	8%	12%
Direct materials	₹37,500	₹54,000
Direct wages	₹30,000	₹42,000

it is the policy of the company to charge Factory overheads as percentage on direct wages and selling and Adminstrative overheads as percentage on Factory cost .

the company has received a new order for manufacturing of a similar job .The estimate of direct materials and direct wages relating to the new order are ₹64,000 and ₹50,000 respectively .You are required to compute .

(i) the rates of factory overheads and selling and Adminstration overheads to be charged .

(ii) The selling price of the new order

Solution (i) Computation of factory overhead rates and selling & Distribution overehead rates

Let the factory overhead recovery rate be X and selling and distribution Overheads recovery rates by Y

Particulars	Job No 1102 ₹	Job No 1108 ₹
Direct materials	37,500	54,000
Direct wages	30,000	42,000
Prime cost	67,500	96,000
Add: Factory Overhead		
Factory expenses	30,000X	42,000X
Factory cost	67,500+30,000X	96,000+42,000X
Add: Selling & Administrative Expenses	(97,500+30,000X)Y	(96,000+42,000X)Y
Total cost	(67,500+30,000X)(1+Y)	(96,000+42,000X)(1+Y)

Computation of Total cost of job No 1102 & 1108

Job 1102

Total cost when profit is 8% on cost = 1,07,325/108×100

= ₹ 99,375

Job 1108

Total cost when profit is 12% on cost = 1,57,920/100×112

= ₹ 1,14,000

Job 1102

67,500+30,000X+67,500Y+30,000XY = ₹99,375

Or 42,000X+42,000XY+67,500Y = ₹31,875……(i)

Job 1108

96,000+42,000X+96,000Y+42,000XY = ₹1,41,000

Or 42,000X+42,000XY+96,000Y = ₹45,000……(ii)

Multiplying equation (i) by 4.2 and equation (ii) by 3 we get

1,26,000X+1,26,000XY+2,83,500Y = 1,33,875 …….(iii)

1,26,000X+1,26,000XY+2,88,000Y = 1,35,000 …….(iv)

Solving equation (iii) & (iv) ,we get

4,500 Y = 1,125

Y = 1,125/4,500

= 0.25

Putting the value of Y in equation no (1) we get

30,000X+

30,000X×0.25+67,500×0.25 = ₹31,875

30,000X+7,500X+16,875 = ₹31,875

37,500X = 15,000

X = 15,000/37,500

= 0.4

Hence ,Factory overhead Recovery Rate on direct wages = 40%

Selling and Adminstrative Overheads Recovery Rate on Factory cost = 25%

(ii) Computation of selling price of the new order

Particulars	Amount
Direct materials	64,000
Direct wages	50,000
Prime cost	1,14,000
Add: Factory Overhead (40% × ₹50,000)	20,000
Factory cost	1,34,000
Add: Selling & Administrative overhead (25% × ₹1,34,000)	33,500
Total cost	1,67,500
Add: Profit (1,67,500/80×20)	41,875
Selling price	2,09,375

NON INTEGRATED AND INTEGRATED ACCOUNTS

Q.1. **The balance in the cost ledger of manufacturing company on January 1st, 2008 was :**

	Rs.
Stores Ledger Control Account	**7,000**
Work in Progress Ledger Control Account	**12,800**
Finished Goods Ledger Control Account	**2,000**
General Ledger Adjustment Account	**21,800**

You are given the following information for the year 2008 :

Purchase of Material	**40,000**
Direct Factory Wages	**60,000**
Manufacturing Expenses	**34,600**
Selling and Distribution Expenses	**5,400**
Material Issued to Production	**37,200**
Manufacturing Expenses Recovered	**34,440**
Selling and Distribution Expenses Recovered	**5,320**
Sales	**1,50,000**
Stock of Finished Goods at December 31st, 2008	**4,700**
Work in progress at December 31st, 2008	**14,700**

You are required to show the account in the cost ledger for the above year 2008, to prepare the Costing Profit & Loss Account for the year and extract the Trial Balance.

Q.2. **The following balances are shown in the Cost Ledger as at January 1, 2008**

	Dr. (Rs.)	*Cr. (Rs.)*
Finished Goods Control Account	**2,000**	
Work-in-progress Control Account	**4,000**	
Store Ledger Control Account	**10,000**	
Cost Ledger Control Account	**---**	**16,000**
	16,000	**16,000**

Transaction for the year ended December 31, 2008 were :

Purchase of Material		**59,000**
Purchase of Material directly by factory		**3,600**
Return to Suppliers Stores		**400**
Wages/Salary Paid :		
Direct	**41,000**	
Factory Indirect	**9,000**	
Administrative Staff	**7,800**	
Selling & Distribution	**4,800**	**62,600**
Expenses (Direct)		**4,400**
Production Expenses		**10,200**
Administration Expenses		**8,200**
Selling & Distribution Expenses		**5,200**
Material Issued to Production		**61,000**
Material Lost by fire in the Store		**800**
Stores issued to Maintenance account		**2,600**
Production Overhead recovered		**22,000**
Administration Overhead recovered from Finished Goods		**15,600**

Selling and Distribution overhead recovered from cost of sales at 6.5% on Sales Value	
Finished Goods Produced	**1,32,000**
Cost of Goods Sold	**1,40,000**
Sales	**1,60,000**

Write up the necessary accounts in the Cost Ledger to record the above transactions and prepare a Trial Balance on 31:12:2008.

Q.3. **At the beginning of a month, the opening balances in cost ledger were :**

			Rs. (in lakhs)
Stores Ledger Control Account			**80**
Work-in-Progress Control Account			**20**
Finished Goods Control Account			**430**
Building Construction Account			**10**
Cost Ledger Control Account			**540**
During the month, the following transactions took place :			
Materials	**-**	**Purchased**	**40**
		Issued to production	**50**
		Issued to general maintenance	**6**
		Issued to building construction	**4**
Wages	**-**	**Gross wages paid**	**150**
		Indirect wages	**40**
		For building construction	**10**
Works Overheads	**-**	**Actual amount incurred (excluding items shown above)**	**160**
		Absorbed in building construction	**20**
		Under absorbed	**8**
Royalty paid			**5**
Selling, distribution and administration overheads			**25**

Sales	**450**

At the end of the month, the stock of raw material and work-in-progress was Rs.55 lakhs and Rs.25 lakhs respectively. The loss arising in the raw material account is treated as factory overheads. The building under construction was completed during the month. Company's gross profit margin is 20% on sales.

Prepare the relevant control accounts to record the above transactions in the cost ledger of the company.

Q.4. **A company operates separate cost accounting and financial accounting systems. The following is the list of Opening balance as on 1.04.2001 in the Cost Ledger:**

	Debit Rs.	Credit Rs.
Stores Ledger Control Account	**53,375**	**–**
WIP Control Account	**1,04,595**	**–**
Finished Goods Control Account	**30,780**	**–**
General Ledger Adjustment Account	**–**	**1,88,750**

Transactions for the quarter ended 30.06.2001 are as under:

	Rs.
Materials purchased	**26,700**
Materials issued to production	**40,000**
Materials issued for factory repairs	**900**
Factory wages paid (including indirect wages Rs.23,000)	**77,500**
Production overheads incurred	**95,200**
Production overheads under-absorbed and written-off	**3,200**
Sales	**2,56,000**

The Company's gross profit is 25% on Total Cost. At the end of the quarter, WIP stocks increased by Rs.7,500. Prepare the relevant Control Accounts, Costing Profit & Loss Account and General Ledger Adjustment Account to record the above transactions for the quarter ended 30.06.2001.

Q.5. **A fire destroyed some accounting records of a company. You have been able to collect the following from the spoilt papers/records and as a result of consultation with accounting staff in respect of January, 2004 :**

(i) Incomplete ledger Entries :

Raw-Materials A/C

	Rs.		Rs.
Beginning Inventory	**32,000**		

Work-in-Progress A/C

	Rs.		Rs.
Beginning Inventory	**9,200**	**Finished Stock**	**1,51,000**

Creditors A/C

	Rs.		Rs.
Closing Balance	**19,200**	**Opening Balance**	**16,400**

Manufacturing Overheads A/C

	Rs.		Rs.
Amount Spent	**29,600**		

Finished Goods A/c

	Rs.		Rs.
Opening Inventory	**24,000**	**Closing Inventory**	**30,000**

(ii) Additional Information :

(1) The cash-book showed that Rs.89,200 have been paid to creditors for raw-material.

(2) Ending inventory of work-in-progress included material Rs.5,000 on which 300 direct labour hours have been booked against wages and overheads.

(3) The job cards showed that workers have worked for 7,000 hours. The wage rate is Rs.10 per labour hour.

(4) Overhead recovery rate was Rs.4 per direct labour hour.

You are required to complete the above accounts in the cost ledger of the company.

Q.6. **From the following information write up Control Accounts in the Ledger of a Factory where the Cost and Financial Accounts are integrated and prepare a Trial balance as on 31st March, 2005.**

	Rs.
Ledger Balance as on 1st April, 2004 :	
Share Capital	**1,00,000**
Reserves	**25,000**

Sundry Debtor	**20,000**
Plant & Machinery	**1,25,000**
Sundry Creditors	**30,000**
Bank Overdraft	**40,000**
Raw Material	**50,000**
Transactions during the year:	
Raw Material Purchased	**80,000**
Raw Material issued to production	**1,00,000**
Raw Material on hand 31:03:2005	**26,000**
Total Wages – Paid	**95,000**
–- Direct	**93,000**
Manufacturing Expenses – Incurred	**87,500**
- Charged to production	**93,000**
Selling & Distribution Expenses	**10,000**
Finished Stock - Production (at Cost)	**1,91,000**
- Sales (at Selling Price)	**2,86,000**
- Closing Stock	**NIL**
Payments to Creditors	**85,000**
Receipt from Debtors	**3,00,000**

Q.7. [C.A. (PE-II) Nov., 2003]

BPR Limited keeps books on integrated accounting system. The following balances appear in the books as on April 1, 2004:

	Dr. (Rs.)	Cr. (Rs.)
Stores Control A/c	**40,950**	**-**
Work-in-progress A/c	**38,675**	**-**
Finished Goods A/c	**52,325**	**-**
Bank A/c	**-**	**22,750**

Creditors A/c		**-**	**18,200**	
Fixed Assets A/c		**1,47,875**	**-**	
Debtors A/c		**27,300**	**-**	
Share Capital A/c		**-**	**1,82,000**	
Accumulated Depreciation A/c			**-**	**11,375**
Provision for Doubtful Debts A/c			**-**	**3,725**
Factory Overheads Outstanding A/c		**-**	**6,250**	
Pre-Paid Administration Overheads A/c		**9,975**		**-**
Profit & Loss A/c		**-**	**72,800**	
		3,17,100	**3,17,100**	

The transactions for the year ended on March 31, 2005 were as given below :

	Rs.	Rs.
Direct Wages	1,97,925	-
Indirect Wages	11,375	2,09,300
Purchase of materials (on credit)		2,27,500
Materials issued to production		2,50,250
Materials issued for repairs		4,550
Goods finished during the year (at cost)		4,89,125
Credit Sales		6,82,500
Cost of Goods sold		5,00,500
Production overheads absorbed		1,09,200
Production overheads paid during the year		91,000
Production overheads outstanding at the end of year		7,775
Administration overheads paid during the year		27,300
Selling overheads incurred		31,850
Payment to Creditors		2,29,775
Payment received from Debtors		6,59,750
Depreciation of Machinery		14,789
Administration overheads outstanding at the end of year		2,225
Provision for doubtful debts at the end of the year		4,590

Write up accounts in the integrated ledger of BPR Limited and prepare Trial Balance.

Q.8. **The following discrepancies have been observed between book stock and physical stock in the course of annual stock taking.**

Items	*Bin Card/Stock Card (Units)*	*Stores Ledger (Units)*	*Physical Count (Units)*	*Cost Per Unit (Rs.)*

A	**800**	**800**	**770**	**30**
B	**560**	**560**	**570**	**20**
C	**950**	**970**	**930**	**10**

Pass necessary journal entries to record the above situation under different circumstances.

Q.9. The following figures have been extracted from the cost records of a manufacturing company;

Stores;	Rs.	Work-In-Progress:	Rs.
Opening Balance	63,000	Opening Balance	1,26,000
Purchase of Material	3,36,000	Direct wages Appiled	1,26,000
Transfer from WIP	1,68,000	Overheads Appiled	5,04,000
Issues to WIP	3,36,000	Closing Balance of WIP	84,000
Issues to Repairs	42,000		
Deficiencies found in stock	12,600		

Finshed Products: Entire output is sold at a profit of 10% on Actual Cost from WIP.

Others: Wages incurred Rs 1,47,000, Overhead incurred Rs 5,25,000.

Income from investments Rs. 21,000. Loss on sale of Fixed Assets Rs.42,000

Prepare; (a) Stores Control Account (b) WIP Control Account (c) Costing Profit and Loss Account (d) Profit and Loss Account

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Chapter - 3

LABOUR COSTIN

Introduction

Labour constitutes the second important major element of cost, but equally important is the cost of raw materials. As far as the material is concerned, rigid policies of control can be laid down. At the same time, so much degree of control cannot be exercised on labour, rather, it is not possible to expect it to be controlled. Moreover, materials can be easily stored to be used as and when required but labour is a perishable commodity, which should be used. A person may sell his labour and a buyer will purchase it. Such labour should be used immediately, and, if not used, it is a waste and ultimately the cost of production will be increased. Labour, once appointed, cannot easily be removed. Therefore, the right man at the job must be appointed. Labour cost may be more because of inefficient labour, abnormal idle time, unwarranted overtime, increase of waste, spoilage etc.

We have already studied, in the earlier chapter, that labour cost can be divided into two types –

1. Direct Labor and
2. Indirect Labor.

Idle Time

When workers spend their whole time at different jobs, then the time booked for jobs must agree with the gate time. Ordinarily, the time booked for jobs does not agree with the gate time. It so happens, because of reasons like, waiting for materials, machine breakdown, waiting for instruction, power failure etc. Reconciliation of gate time with time booked is facilitated by preparing an idle time card. The idle time card shows the time which has been lost and the reasons thereof.

Idle item is that for which the employer pays without any benefit to him. Idle time is of two types – normal idle an abnormal idle time. Normal idle time or the time wasted by a worker cannot be avoided. This must be borne by the employer. For example, time taken to reach the department from the gate, break for tea, time for tool setting, time wasted in completing one job and starting the next job etc. Abnormal idle time is the wasted time, which

can be avoided. For example, machine breakdown, waiting for work, waiting for instruction, power failure, shortage of materials, strikes, lockout etc.

Normal Idle Time

The cost of labour of normal idle time can be treated in two ways. For example,

(a) A worker has to work for 8 hours a day; but he actually puts in only 7½ hours on jobs and half an hour is wasted. The labour cost of the normal idle time (here half an hour), may be charged to factory on cost and 7½ hours to the job concerned.

(b) The hourly rate may be raised and the cost of complete labour (i.e., hours in the above example) may be charged to the job concerned. This is preferred.

Abnormal Idle Time

Abnormal idle time expenses or cost should not be included in cost. Such labour cost on account of abnormal nature may be debited to costing profit and loss account.

Overtime

When a worker works above his normal working hours, he is said to be working overtime. And according to Factories Act, 1948, overtime has to be paid at double the normal rate. If a worker works more than 9 hours on any day or 48 hours in a week, the worker is entitled for overtime payment. A worker is asked to do overtime, when he finishes his normal hours. The extra payable to a worker over and above the normal rate is an overtime premium. The Factories Act says that a worker is said to be paid twice his ordinary rate. If the Factory Act does not apply, Establishment Act will apply. This Act follows 1½ times his ordinary rates.

Labour Turnover

Labour turnover may be defined as the rate of change in the labour force, i.e. it denotes the percentage of change in the labour force of an organization. In other words, it is a term used to describe the movement of shifting into and out of an organization by the employees. The methods of measurement are:

(a) Separation Method:

Under this method, labour turnover for any period is measured by dividing the total number of separations by the average number of workers on the roll, then multiply by 100. Thus,

$$\text{Labour Turnover} = \frac{\text{Number of separation during a period}}{\text{Avg. no. of workers during the period}} \times 100$$

(b) Replacement Method:

Under this method only the actual replacement of labour during a period is taken into account irrespective of the number of workers leaving. Thus

$$\text{Labour Turnover} = \frac{\text{Number of replacements in a period}}{\text{Avg. no. of workers during the period}} \times 100$$

When new recruitment is there for expansion purposes, they should be excluded from the number of replacements.

(c) Flux Method:

Labour Turnover is obtained by dividing the total number of separation and replacements by the average number of workers. Thus,

$$\text{Labour Turnover} = \frac{\text{No. of additions + No. of separations}}{\text{Avg. no. of workers during the period}} \times 100$$

Q.1. What is Labour cost ? What is the objective of study of labour cost?

Ans. Meaning : Labour Costs are "Costs incurred in relation to human resources of an enterprise." For example, wages paid to production workers, salary of mangers and officers, cost of training office staff etc. are considered as Labour Costs.

Objectives : The objectives of the study of labour cost are:

(a) To keep the total amount of wages paid to workers at reasonable levels based on industry standards.

(b) To motivate workers and harness their energies to increase output, thereby optimizing cost per unit.

(c) To contribute to overall organizational profitability and employee-welfare.

Q.2. Define Direct and Indirect Labour cost

Ans. Direct Labour Cost : It is the "cost of labour expended in altering the construction, composition or condition of a product." It is directly attributable and easily identified and allocated to the cost unit or cost centre. For example, all wages of labourers directly engaged in production and wages paid to workers engaged in construction site and direct wages.

Indirect Labour Cost: It is the "cost of labour not directly engaged in production." It is not directly attributable to the cost unit or cost centre. For example, wages and salaries to employees in Purchasing Department, Stores, Office and Time-Keeping Department, Foreman and Supervisors, Maintenance Personnel etc. are indirect labour cost.

Q.3. (CA PE-II May, 2003) How will you deal with idle time cost in cost accounts ? How can you control such costs ?

Ans. *Idle Time :* When workers are paid on time basis, some difference is likely to arise between the time for which they are paid and the time they actually spend upon production. Idle time may be defined as that time for which wages are paid but no production is obtained.

Treatment of Idle Time Cost : From the point of view of treatment in cost accounts, idle time can be classified into normal and abnormal idle time.

Normal Idle Time : It refers to that loss of time which is generally unavoidable and is bound to arise. For example, time spent in setting the machines, adjusting the tools, moving from one job to another, tea breaks (if necessary), personal needs, etc. It will be seen that this wastage of times is of such a nature that it cannot be avoided and its cost is therefore, an expenses which the employer must bear.

Cost of normal idle time is directly charged to factory overhead account.

Abnormal Idle Time : Where, due to some causes in no way connected with the usual routine of manufacture, time is lost for which employer must pay, the time wasted represents abnormal idle time. It is mostly avoidable particularly when it is attributable to inefficiency of defective planning. Cost of abnormal idle time should be collected separately and written off to Costing Profit & Loss Account. It cannot be regarded as a cost of production.

Control of Idle Time : For control purposes, idle time should be divided into three categories :

i) *Idle time beyond the controllable by foreman, e.g.,* waiting for instructions, waiting for tools, faulty toll setting, interrupted flow of work, etc.
ii) *Idle time beyond the control of foreman but controllable from the stand-point of factory, e.g.,* shortage of raw material, power failure (where own power generator is used), frequent machine breakdown, defective raw material, tools and equipment.
iii) *Idle time essentially beyond control, e.g.,* unforeseen accidents, shortage of work due to economic conditions, failure of power supply, work stoppage due to strike, etc.

The different causes which lead to idle time should be properly analysed and responsibility should be fixed on appropriate persons to control it. Standards or estimates should be laid down for normal or unavoidable time such as lunch breaks, time from the factory gate to department and back. The actual idle time should be compared with estimates and the difference should be investigated and corrective action taken. A chart showing the normal idle time and actual idle time should be prepared.

Q.4. (CA PE-II May, 2006) Distinguish between Idle Time and Idle Facilities. How are they treated in Cost Accounts?

Ans. Idle Facilities : The term facilities has a wider scope. It may include fixed assets such as building space, plant/equipment capacity, etc., services such as production services, personnel services and production capacity as well. If firm is not able to make full use of all these facilities, then it is termed as idle facilities. Thus, idle facilities refer to that part of total production facilities which remain un-utilised due to any reason such as non-availability of raw material, lower demand, accumulation of stock, etc.

*Treatment of Idle Facilities :*Idle facilities cost, which are normal and arise due to unavoidable reason, should be treated as part of works overhead. On the other hand, abnormal idle facilities cost, which arise due to plants or machines/facilities remaining idle on account to trade depression, strike, lockout, etc. should not be absorbed in production and be written off to Costing Profit and Loss Account.

Q.No 5 (CA PE-II Nov. 2004) :- Discuss the Gantt task and bonus system as a system of wage payment and incentives .

Ans :- This system is a combination of time and piecework system .Accroding to this system a high standard or task is set and payment is made at time rate to worker for production below the set standard .wages payable to workers under the plan are calculated as under :

Output	Payment
1. Output below standard	Guaranteed time rate
2. Output at standard	Time rate plus bonus of 20% (usually) of time rate
3. Output over standard	

	High place rate on worker's output (it is so fixed ,so as to include a bonus of 20% of time rate)

Q.No 6 (CA PE-II May. 2007) :-.

What do you understand by Labour Turnover? How is it measured ? What are its causes? what are the remedial steps you would suggest to minimise its occurrence ?

Ans. Labour Turnover : It is a normal feature in every business organisation that some workers leave their jobs and some new workers take their place. This mobility or change in the labour force is known as labour turnover.

Labour turnover may be defined as the number of workers left during the period in relation to the average number of workers employed during the period. In other words, it is rate of displacement of labour employed in an organization.

There are three different methods of measurement of labour turnover which may be given as follows :

1. *Separation Rate Method* : This is the most commonly used method. Under this method, measurement is made by dividing the total number of separations during a period by the average number of workers on the roll during that period.

$$\text{Labour Turnover} = \frac{\text{No. of separation in a period}}{\text{Average number of workers in the period}} \times 100$$

2. *Replacement Rate Method* : This method takes into consideration only the actual replacement of labour irrespective how many workers have left during the period.

$$\text{Labour Turnover} = \frac{\text{No. of replacement in a period}}{\text{Average number of workers in the period}} \times 100$$

3. *Flux Rate Method* : This method takes into consideration both the number of workers left as well as number of new workers who have joined.

$$\text{Labour Turnover} = \frac{\text{No. of separation} + \text{No. of replacement}}{\text{Average number of workers}} \times 100$$

Causes of Labour Turnover :

The causes of high labour turnover may be classified in two categories : (i) avoidable, and (ii) unavoidable.

Avoidable Causes :

1. Dissatisfaction with the job, remuneration, contraction in the market or lack of proper planning.
2. Strained relationship with supervisors or fellow workers.
3. Lack of proper amenities like medical and other facilities, recreational centres.

Unavoidable Causes :

a) Change of service for personal betterment.
b) Retirement due to old age and ill health.
c) Death.
d) In case of female employees, domestic responsibilities, pregnancy or marriage.

Control of Excessive Labour Turnover :

The following steps should be taken for minimising the labour turnover :

1. An adequate and satisfactory wage system.
2. A sound personnel policy for recruitment, induction and training of labour.
3. A satisfactory level of amenities and welfare measures like canteen facilities, medical services, recreation, etc.
4. A satisfactory security scheme like family pension provident fund, accident compensation, etc.
5. A satisfactory policy for transfers and promotions.

Q.7. (CA PE-II Nov. 2007) :- What do you understand by Time and Motion Study ? In what way it is connected with remuneration of labour ?

Ans. *Time Study :* It may be defined as "*the art of observing and recording the time required to do each detailed element of an industrial operation".* Its main object is to determine the standard time required to carry out a job most efficiently. Time study is the most important and well-known technique of Work Measurement.

Motion Study : This study deals with one aspect of methods study, i.e. to eliminate unnecessary movements of men and material. "*Motion Study is the science of eliminating wastefulness resulting from using unnecessary, ill-directed and inefficient motions."* Motion Study is means to increase production.

Time and Motion Study and Remuneration of Labour : When labour is remunerated on piece basis or by some incentive scheme, it is essential to determine the standard time required to complete a job. For this purpose, the Time and Motion Study is the most scientific and accurate method. With this study, each job is split into small motions and each motion is thoroughly studied to cut out any wasteful and unnecessary movements and to arrange the motions in a proper sequence to improve performance. The time allowed for each movement

is determined and the aggregate of these gives this standard time required to perform the job or operation.

Q.8. Distinguish between job evaluation and merit rating.

Ans. *Job Evaluation :* Job evaluation may be defined as the rating of various jobs according to the responsibility and skill required for term. The basic object of job evaluation is to ascertain the relative worth of each job through an objective evaluation so that relative remuneration can be fixed for different jobs. The important principle behind job evaluation is that jobs which are of the same relative worth should the same amount of wages or salaries.

The main factors commonly considered for job evaluation are as follows :

1. Knowledge and education required for the job.
2. Skill and experience required.
3. Training needed.
4. Responsibility for equipment handled.
5. Work conditions of the job.

Merit Rating : Just as job evaluation determines the relative worth of jobs, merit rating determines the relative worth of each worker. Merit rating is a systematic evaluation of the personality and performance of each employed by his supervision or some other qualified persons. It is a system by which the performance of an employee is objectively evaluated and compared with that of others in his work group. The various qualities taken into consideration while rating the workers include the following :

(a) Ability to do the work.
(b) Knowledge of the job.
(c) Work habits and personal characteristics.
(d) Initiative and responsibility.
(e) Supervisory abilities.

Q.9. What are the merits and demerits of time rate and the piece rate systems of wage payment ? State the situations in which each system is effective and useful.

Ans. *Time Rate System :* In this system time is made the basis of payment. Labour is paid for the time worked irrespective of the volume of production during that time. The formula for calculating wages under this system is :

Wages = Hours worked × Rate per hour.

Advantage of Time Rate-System : The main advantages of time system are :

1. The system is simple and calculation of wages is easily understood by the workers.
2. The worker avoids over-speeding and trends to concentrate on quality.
3. The remuneration under this system is certain and workers have a feeling of security.

Disadvantages of Time Rate-System : The main disadvantages are :

1. It offers no positive inducement to workers to improve performance.
2. It does not distinguish between efficient and inefficient workers.
3. It trends to increase labour cost per unit because of low productivity.

Suitability of Time Rate-System : Time Wage System is suitable for the following type of situations :

i) where quality of work is more important than quality, e.g. high class tailoring.
ii) Where output cannot be measured in quantitative terms.
iii) Where output is beyond the control of worker.
iv) Where work is being done in a small scale so that close supervision is possible.

Price Rate System : Under the price rate system, a worker is paid a fixed amount per unit produced without any regard to the time taken. A rate per unit of output is fixed and earnings are calculated as under :

Wage = Number of units produced $\times$ rate per unit.

Advantages of Piece Rate System :

1. It acts as an incentive to workers to produce more as the remuneration is in direct proportion to worker's effort.
2. Because of high production, overhead per unit is also reduced.
3. It simplifies costing because labour cost per unit is easily known in advance.
4. The method is simple and easily understood by workers.

Disadvantages of Piece Rate System :

1. To maximize earnings, sometimes substandard quality of goods are produced by workers.
2. In their efforts to maximize output, workers may cause excessive wastage of materials, mishandle and damage machinery and tools.
3. The system is usually opposed by trade as it creates greed and unhealthy rivalries.

Suitability : The piece are system is suitable :

a) Where the output of individual workers can be easily measured.
b) Where work is of standardised and repetitive in nature.
c) where there is an urgent need to increase the volume of production.

Q.10. What do you understand by "*Incentive to workmen*" ? What are the principles of a good incentive scheme ? Discuss the advantages of incentive scheme.

Ans. An incentive may be monetary, i.e. cash benefit, or non-monetary. It may either be individual to every worker or collective to a group of workers. The primary purpose of incentive wage plan is to induce the worker to produce more, and by producing more to secure a higher wage while saying in production cost per unit. Any incentive scheme should encourage the workers put in their best on their jobs.

Principles of a good incentive scheme : A good incentive scheme should have the following principles :

1. the scheme should be simple and easily understandable by workers so that a worker should be avail to calculate his own wage easily.
2. The scheme should be fair to both employer and employee.
3. The cost of operating the scheme should be reasonably low.
4. The standard of performance should be scientifically set and should be within the reasonable reach of an average workers.
5. The scheme should have the approval of workers and the union.
6. No worker should suffer a reduction of earnings for factory beyond his control such as machine breakdown, power failure, etc.
7. The scheme must be relatively permanent and should not be allowed to change every now and then.

Advantages :

(1) It leads to an increase in production, which results in cost reduction.
(2) It is beneficial to employers, employees and customers.
(3) It helps to reduce labour turnover.

Disadvantages :

1) It need careful consideration in fixing standards and setting rates which involve extra work, time and expenditure.
2) It is difficult to withdraw a scheme once it is introduce if it is uneconomic and weak from the point of view of management.
3) As the scheme needs the approval of a union for its success, some times it becomes a source of friction which may lead to strikes and affect morale in the organisation.

Q.11. Write short notes on -

a) Profit sharing and co-partnership.
b) Non-monetary incentives.

Ans. a) *Profit Sharing and Co-partnership :*

Profit-sharing : Profit-sharing schemes are those where there is an agreement between the employer and his workers whereby the employer agrees to pay to workers in addition to their wages, a share of profit at an agreed rate. This scheme is based upon the principle that every worker contributes something towards output and profit.

Co-partnership : This means that workers shall own the business jointly with the shareholders. In other words, workers are given the opportunity to have share in the capital of business and to receive the profits accruing to their share.

Profit sharing and co-partnership based on the premise that workers contribute towards the profit of the organization served by him and allowing him to participate in the profit or the capital of the undertaking so that, they take keen interest in the business activities and improve industrial relations.

b) *Non-monetary Incentives :* These incentives are given in the form of better inanities or facilities. They are related more to the conditions of employment than to job. These incentives do not form part of workers' pay packets but the provision of which by the employer serves as stimulants to workers to improve their performance. The objective of such incentive is to make conditions of employment more attractive and beneficial to the employee. Explains of such incentives are :

Q.12. (CA PCC Nov. 2008) :- Describe briefly ,how wages may be calculated under the following system .

(i) Gantt task and bonus system
(ii) Emersion's efficiency system
(iii) Rowan system
(iv) Halsey system
(v) Barth system

Ans :-

(i) Gantt task and bonus system :- As per this system a higher standard is set and payment is made at time rate to a worker for production below the standard .if the standards are achieved or exceeded the payment is mode at a higher piece rate .The price rate fixed also includes an element of bonus to the extent of 20% .Bonus I calculated over the time rate .

(ii) Emersion's efficiency system :- Under this system wages may be calculated as below :

Performance	Wages
Below 66 2/3 % efficiency	Time rate without any bonus
66 2/3% -100% efficiency	Bonus varies between 1% to 20%
Above 100% efficiency	Bonus of 20% of basic wages plus 1% for every 1% increase in efficiency .

*At 100% efficiency the bonus percentage will be 20%

(iii) Rowan system :- As per this system standard time allowance fixed for the performance of a job and bonus is paid if time is saved

Wages under Rowan System =(Time taken ×rate per unit of time) +$\frac{\text{Time saved}}{\text{Time allowed}}$

× time taken ×rate per unit of time

(iv) Halsey system :- Under this system standard time is fixed for each job . if there is no saving on this standard time allowance , the worker is paid only his day rate .

Wages under Halsey System = Time taken × time rate+50% of time saved ×time rate)

(v) Barth system :

Earnings under Brath system =Hourly rate × $\sqrt{s\tan dardhours \times Hoursworkad}$

This is particularly suitable for trainees and beginning and also for unskilled workers .

Q.13. What is group bonus ? What are its objectives?

Ans. Meaning : Group Bonus refers to the bonus paid for the collective efforts made by a group of workers. Such a scheme is introduced generally when individual efficiency cannot be established/measured for the payment of bonus. The quantum of bonus is determined on the basis of productivity/ output of the tam as a whole. Bonus is shared by the individual workers in specified proportions e.g. on proportions of time based wages.

Objectives of Group Bonus Schemes : The objectives of a group bonus scheme are :

(a) To create collective interest and team spirit among workers.

(b) To create interest among supervisors to improve performance.

(b) To reduce wastage in materials and idle time.
(c) To achieve optimum output at minimum cost.
(d) To encourage individual members of a team, where only the output of the team as a whole can be measured.

Q.14. What are the principles of good remuneration system?

Ans. The following are accepted principles of remunerating workers :

(a) It should be on par with the industry standards and in conformity with the general wage-levels prevailing in the locality.

(b) It should be same for work or jobs involving similar efforts and skill. [i.e. equal pay for equal work]

(c) It should be related to the degree of skill, effort, initiative and responsibility of the employee.

(d) It should be reasonable to workers and guarantee them a minimum wage, regardless of their efficiency.

(e) It should enable workers to maintain a reasonable standard of living.

(f) It should enable the workers to increase their earnings by making extra effort and by increasing output. As far as possible, there should be no maximum limit for his earnings.

Q.15. Define casual worker and out worker.

Ans. Casual Workers are those workers who are not on the list of regular employees but are engaged casually whenever there is extra workload in the factory or whenever the regular worker is absent from the job for a temporary period because of illness or any other reason.

Outworkers are those workers who work outside the factory premises.

These workers may be –

(1) Those who are not in regular employment. They are supplied material for execution of work at their own premises.

(2) Those who are in regular employment. They are sent to perform some specific duties at customer's premises or at any other place as per the directions.

CONCEPT NO 1 :- QUESTIONS BASED ON FORMULA ORIANTED BONUS SCHEME

Taylor Differential Rate System

F.W. Taylor, the father of scientific management, introduced this system. According to this system:

(a) There are two pieces rate systems – one is lower and the other is higher.

(b) Lower piece rate is for the output below the standard and higher piece of rate is for the output above the standard.

(c) For each job, standard time is stipulated.

Differential piece rate to be applied

1. 80% of piece rate for below standard performance
2. 120% of piece rate for performance at or above the standard.

This system penalizes the slow worker by having low rate, because of low production and rewards an efficient worker by giving him high rate because of higher production. Indirectly, this system gives no place to inefficient work. In other words, if the output of a worker is less than the standard output, he gets low rate and vice – versa.

Q.1

On the basis of the following information, calculate the earnings of X and Y under the Straight Piece Rate System and Taylor's Differential Piece Rate System:

Standard production : 10 units per hour
Normal time rate : Rs.5 per hour

Differential piece rate to be applied:
80% of piece rate for below standard performance
120% of piece rate for performance at or above the standard.

Actual Performance:
X produced 80 units in a day of 10 hours
Y produced 120 units in a day of 10 hours.

Similar Q No 58, 59

The Merrick Differential Piece Rate (Multiple Piece Rate System)

It is modification of Taylor system, in order to reduce the penalisation of slow workers. Thus, these persons are encouraged. Therefore, he introduced three rates, in place for two. They are:

	Efficiency	*Piece Rate Applicable*
1.	Upto 83%	Basic Rate (Normal rate)
2.	From 83% to 100%	110% of basic piece rate
3.	Above 100%	120% of basic piece rate.

Workers, who are efficient and experienced, whose performance is more than 100% can earn wages at 120% of the ordinary piece rate. This scheme does not guarantee day wages.

The workers who are below standard performance are not penalized. At the same time, efficiency above 100% is rewarded. This system is beneficial to trainees and beginners.

Q.2

On the basis of the following information, calculate the earnings of A, B, C and D under Merrick Differential Piece Rate System.

Standard production per hour	:	12 units
Normal rate per unit	:	Rs. 0.60

In a 8-hour day

A produced	64 units
B produced	96 units
C produced	84 units
D produced	100 units

Similar Q No 60, 61

3. Gantt Task and Bonus Scheme

This is a system combined with time, piece rate and bonus. Tie wages are guaranteed to workers, who fail to reach the standard. The main features are:

1. Standards are set and bonus is paid, if a worker completes the work within the standard time.
2. Day wages are guaranteed.
3. A worker who could not complete the work within the standard time is paid on time wages.
4. The remuneration is payable.

	Output	Remuneration
(A)	Output below standard	Time rate (guaranteed).
(B)	Output at standard level	Bonus of 20% of the time rate.
(C)	Output above standard	High piece rate on worker's output or Straight piece rate + 20% Bonus

Q.3

The following are the particulars applicable to a work process. Time rate: Rs.5 per hour.

High Task	:	40 units per week
Piece rate above high task	:	Rs.6.50 per unit.

In a 40 – hour week each of the following workers produced:

A	35 units
B	40 units
C	41 units
D	52 units

Similar Q No 62

Calculate the wages of the workers under Gantt's Task Bonus Plan.

The Halsey Premium Plan:

This system is also known as Split Bonus Plan or Fifty – Fifty Plan. The plan was introduced by F.A. Halsey, an American engineer. In the plan, the task (standard) time, is decided on the basis of past experience, and scientific studies are set. Under this plan, a standard time is fixed for the performance of each job, and the worker is paid the agreed rate per hour for the time spent thereon plus a fixed percentage (may be 50%) of the time, he save on the standard.

Main Features:

1. Standard time for each job is fixed.
2. Time rate is guaranteed.
3. 50% of the time saved plus normal earnings go to worker.

Total earnings = Guaranteed wages + Bonus (50% of time saved)

Q. 4

Calculate the earnings of a worker under Halsey Premium Plan.

Time allowed = 48 hours

Time taken = 40 hours
Rate per hour = Rs. 10

The Halsey – Weir Scheme:

Here the workers gets a bonus of 30% of the time saved, against 50% in the Halsey plan. Except for this point, Halsey plan and Halsey – Weir scheme are similar.

Rowan Scheme

This scheme was introduced in the year 1901 by David Rowan of Glasgow. The guidelines of Halsey Plan have been followed. It is similar to that Halsey Plan except in regard to the determination of bonus (calculation). Under this plan, the bonus is that proportion of the wages of the time taken which the time save bears to the standard time allowed. Thus,

$$\text{Bonus} = \frac{TS}{ST} \times TT \times HR$$

(or)

$$= \frac{\text{Time saved}}{\text{Standard time}} \times \text{Time taken} \times \text{Hourly Rate}$$

Total Earnings = Time Wages + Bonus

Time Wages = Time taken x Hourly Rate

TT = Time taken
HR = Hourly Rate
TS = Time Saved (i.e. Time Allowed – Time taken)
ST = Standard Time

Q.5

Calculate the total earnings and the rate earned per hour of three workmen under the Halsey and Rowan plans; the bonus under Halsey plan is 50% of the time saved.

Standard time 20 hours;
Hourly rate of wages Rs.4.
Time taken by A – 16 hours, B – 10 hours; C – 8 hours.

Q.6

Standard time allotted for a job is 20 hours and the rate per hour is Rs.2 plus a dearness allowance @ 50 paise per hour worked.

The actual time taken by a worker is 15 hours. Calculate the earnings under:

(a) Time system;
(b) Piece Wage system;
(c) Halsey Plan;
(d) Rowan Scheme.

Q.7

For a certain work order, the standard time is 20 hours, wages, Rs.5 per hour, the actual time taken is 13 hours and the factory overhead charges are 80% of standard time.
Set out a comparative statement showing the effect on paying wages on

(a) The Halsey Plan;
(b) The Rowan incentive Bonus systems.

Barth Scheme

Under this plan, wages are not guaranteed. This system is suitable to beginners and learners. The earnings is computed by multiplying the rate per hour by the geometric mean of standard hours and actual hours worked. Thus,

Q.8

Calculate wages according to Barth System. Standard time 10 hours; Actual time taken 8 hours; Rate per hour is Rs.5.00.

Bedaux Premium System

It is a combination of time and bonus scheme. Standard time for a job is determined by time study. Standard production per hour is determined and the unit of measurement is minute. An hour is taken as sixty minutes. Each minute of standard time or allowed time is

called a point – Bedaux point. The number of points is being determined in respect of each job. If actual time is more than the standard time, the worker is paid on hourly basis. excess production is counted in points, for which a bonus 75% is allowed to the worker and remaining 25% goes to the employer. Thus, hourly rate plus 75% of the points saved, multiplied by one – sixtieth of hourly rate is the earnings of a worker.

Total wages = Time taken x Hourly rate + 75% Time saved x Hourly rate

Q.9

Standard output during a day of 8 hours = 80 units
Actual output during a day of 8 hours = 100 units
Rate per hour is Rs. 2.50.

Emerson plan

Level of efficiency	Specific % for bonus
Up to $66\frac{2}{3}$%	Nil
More than $66\frac{2}{3}$% up to 100%	Bonus varies from 1 to 20%
More than 100%	20% + 1% addition for each 1% additional efficiency.

Similar Q No 63

Q.No 10

(CA PCC May 2008)

Standard output in 10 hours is 240 units; actual output in 10 hours is 264 units. Wages rate is Re. 10 per hour. Calculate the amount of bonus and total wages under Emerson Plan.

CONCEPT NO 2 :- QUESTIONS BASED ON SITUATION ORIANTED BONUS SCHEME

Q.11

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

Assume that normal rate payment is `5 per hour.

Q.12

From the following data calculate total monthly remuneration of 3 workers X Y and Z

- Standard production per month per worker is 1000 units
- Actual production during a months
  X = 800 units, X = 800 units, Y = 700 units , Z = 900 units
- Piece work rate per unit of actual production 15 paise
- D.A. ` 40 per month (fixed)
- House rent allowance `20 per month (fixed)
- Additional production bonus @ `5 for each percentage of actual production exceeding 75% of standard

Q.13

A company employs its workers for a single sift of 8 hours per days for 25 days in a month. The standard output is 40 units per day. The basic wages rate is ` 3 per unit subject of `80 per day . Dearness allowance is ` 40 per day. If the level of efficiency is more than 100% bonus of `50 for every 1% increase above 80% is payable
The details of performance of 2 workers for a particular month are as follows:-

Worker	Days worked	Output (units)
A	25	820

B	18	400

Compute total earnings of both the workers for the months.

Q.14

The standard hours of Job X is 100 hours. The job has been completed by A in 60 hours, B in 70 hours, and C in 95 hours. The bonus applicable to the job is as follows: -

Percentage of time saved to time allowed	Bonus
Saving upto 10%	10% of time saved
From 11% to 20%	15% of time saved
From 21% to 40%	20% of time saved
From 31% to 100%	25% of time saved

The rate of pay is Rs.1 per hour. Calculate the total earnings of each worker and also the rate of earning per hour.

Q.15

.

Bonus is paid on following lines –

Times Saved	*Bonus*
Upto 25% of time allowed	10% of time saved
Next 10% of time allowed	20% of time saved
Balance	30% of time saved

Calculate the earnings of a worker who takes 50 hours to complete a job where the standard time allowed is 100 hours. The wage rate per hour is Rs.1.20. [Ans.: Rs.70.80]

CONCEPT NO 3 QUESTIONS BASED ON MIX SITUATION

Q.16

Calculate the earnings of a worker under:

(i) Halsey Plan and (ii) Rowan Plan from the following particulars:

(1) Hourly rate of wages guaranteed 0.50 paise per hour.
(2) Standard time for producing one dozen articles – 3 hours.
Actual time taken by the worker to produce 20 dozen articles–48 hours. Similar Q No 44
(3)

Q.17

A worker produced 200 units in a week time. The guaranteed weekly wages payment for 45 hours is Rs.81. The expected time to produce one unit is 15 minutes which is raised further by 20% under the incentive scheme. What will be the earnings per hour of that worker under Halsey (50% sharing) & Rowan Scheme?

Q.18

(May 2004) Z ltd. is working by employing 50 skilled workers. It is considering the introduction of some incentive scheme – either Halsey scheme (with 50% bonus) or Rowan scheme of wage payment for increasing the labour productivity to cope up the increasing demand for the product by 40%. It is believed that proposed incentive scheme could bring about an average 20% increase over the present earning of the workers, it could act as sufficient incentive for them to produce more.

As a result of this scheme, the increase in productivity has been observed as revealed by the following figures for the month of April, 2004.

Hour the rate wages (guaranteed)	Rs.30
Average time for producing 1 unit by one worker	1.975 hours

at the previous performance

(This may be taken as time allowed)

No. of working hours per day of each worker	8
No. of working days in a month	24
Actual production during the month	6,120 units.

You are required to calculate: -

(i) Effective rate of earnings per hour under Halsey & Rowan scheme.
(ii) Saving to the Z Ltd. in terms of direct labour cost per piece.
(iii) Advice Z Ltd. about the selection of the scheme to fulfill his assurance.

Similar Q No 49

Q.19
:

A skilled worker in XYZ Ltd. is paid a guaranteed wage rate of Rs.30 per hour. The standard time per unit for a particular product is 4 hours. P, a machine man has been paid wages under the Rowan Incentive Plan and he had earned an effectively hourly rate of Rs.37.50 on the manufacture of that particular product. What could have been his total earnings and effective hourly rate, had he been put on Halsey Incentive Scheme (50%).

Q.20

Two workman, X & Y, produce the same product using the same material. Their normal wages rate is also the same. X is paid bonus as per the Rowan system, while Y is paid bonus as per Halsey system. The time allowed to make the product is 100 hours. X takes 60 hours while Y takes 80 hours to complete the product. The factory overhead rate is Rs.10 per men hour actually worked. The factory cost for the product for X is Rs.7,280 and for Y it is Rs.7,600.

i. Find the normal rate of wages.
ii. Find the cost of material.
iii. Prepare a statement comparing the factory cost of the products as made by the two workers.

Q.21

A job can be executed either through workman A or B. A takes 32 hours to complete the job while B finishes it in 30 hours. The standard time to finish the job is 40 hours.

The hourly wage rate is same for both the workers. In addition workman A is entitled to receive bonus according to Halsey plan (50% sharing) while B is paid bonus as per Rowan plan. The works overheads are absorbed on the job at Rs.7.50 per labour hour worked. The factory cost of the job comes to Rs.7.50 per labour hour worked. The factory cost of the job comes to Rs.2,600 irrespective of the workman engaged.

Find out the hourly wage rate and cost of raw materials input. Also show cost against each element of cost included in factory cost.

Solution:

Let hourly wage rate Rs. X

Let Cost of raw material Rs. Y

Cost Sheet

	A	B
Cost of Raw Material	Y	Y
Normal wages	32X	30X
Bonus		
A = (1/2 x 8 x X)	4X	
B = (10 x 3/4 x X)		7.5 X
Factory Overheads		
(7.5 x 32)	240	
(7.5 x 30)		225
Factory Cost	2600	2600

Y + 36X + 240 = 2,600 ……. (1)

Y + 37.5 X + 225 = 2,600 ……. (2)

Y = 2,360 – 36X

By Putting Y's value in equation (2)

2,360 – 36X + 37.5 X + 225 = 2,600

1.5 X = 15

X = 10

Y = 2,360 – 36 x 10

Y = Rs. 2,000

Cost Sheet

	A	B
Cost of Raw Material	2,000	2,000
Normal wages	320	300
Bonus		
A = (1/2 x 8 x 10)	40	
B = (10 x 3/4 x 10)		75
Factory Overheads		
(7.5 x 32)	240	
(7.5 x 30)		225
Factory Cost	2600	2600

Q.22

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

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

Q.23

Ten men work as a group. When the weekly production of the group exceeds standard (400 pieces per hour) each men is paid a bonus for the excess production in addition to his wages at hourly rates. The bonus is computed as under:

The percentage of production in excess of the standard amount is found and half of this percentage is considered as the workers share. Each man in the group is paid as a bonus this percentage of an average wage rate of Rs.480/- per hour. There is no relationship between the individual worker's hourly rate and the bonus rate. The following is one week's record:

Labour hours worked Production (pieces)

Monday	90	44,200
Tuesday	88	45,200
Wednesday	90	48,400
Thursday	84	40,200
Friday	88	40,800
Saturday	40	20,240
	480	2,39,040

(i) Compute the amount of bonus for the week and the average rate at which each workman is to be paid the same.

(ii) Compute the total pay of R who worked for 41-½ hours and was paid Rs.4 per hour and T who worked 44-½ hours and was paid Rs.5 per hour.

Q. 24

The finishing shop of a company employs 60 direct workers. Each worker is paid Rs.400 as wages per week of 40 hours. When necessary, overtime is worked upto a maximum of 15 hours per week per worker at time rate plus one-half as premium. The current output on an average is 6 units per man hour which may be regarded as standard output. If bonus scheme is introduced, it is expected that the output will increase to 8 units per man hour. The workers will, if necessary, continue to work overtime upto the specified limit although no premium on incentives will be paid.

The company is considering introduction of either Halsey scheme or Rowan Scheme of wage incentive system. The budgeted weekly output is 19,200 units. The selling price is Rs.11 per unit and the direct material cost is Rs.8 per unit. The variable overheads amount to Rs.0.50 per direct labour hour and the fixed overhead is Rs.9,000 per week.

Prepare a statement to show the effect on the Company's weekly profit of the proposal to introduce

(a) Halsey Scheme and

(b) Rowan Scheme.

Q. 25

A Company is undecided as to what kind of wage scheme should be introduced. The following particulars have been compiled in respect of three systems, which are under consideration of the management:

	Workers		
Actual hours worked in a week	38	40	34
Hourly rate of wages	Rs. 6	5	7.20
Production in units			
Product P	21	----	60
Product Q	36	----	135
Product R	46	25	----

Standard time allowed per unit of each product is:	P	Q	R
Minutes	12	18	30

For the purpose of piece rate, each minute is valued at Rs. 0.10.

You are required to calculate the wages of each worker under:

(a) Guaranteed hourly rates basis.
(b) Piece work earning basis, but guaranteed at 75% of basic pay (guaranteed hourly rates) if his earnings are less than 50% of basic pay.
(c) Premium bonus basis where the worker receives bonus based on Rowan Scheme.

Q.26

In a factory's bonus hours are credited to employee in the proportion to time which time saved bears to time allowed. Jobs are carried forward from one week to another. No overtime is worked and payment is paid in full for all units worked on, including those subsequently rejected.

Calculate for each employee: -

(i) the bonus hours and the amount of bonus earned.
(ii) The total wages cost, and
(iii) The wages cost of each 100 good units produced.

Employees	A	B	C
Basic wages rate per hour (Rs.)	3.00	2.00	3.60
Units produced	2,500	2,200	3,600
Time allowed per 100 units	2 hrs. 36mts	3hrs	1hr30mts
Time taken (hrs.)	52	75	48
Rejects (units)	100	40	400

Similar Q No 54

Q.27

An article passes through five hand operations as follows:

Operation No.	Time per article	Grade of worker	Wage rate per hour
1	15 minutes	A	Re.0.65
2	25 minutes	B	Re.0.50
3	10 minutes	C	Re.0.40
4	30 minutes	D	Re.0.35
5	20 minutes	E	Re.0.30

The factory works 40 hours a week and the production target is 600 dozens per week. Prepare a statement showing for each operation and in total the number of operators required, the labour cost per dozen and the total labour cost per week to produce the total targeted output.

Q.28

During the accounts of G Company, your assistant found errors in the calculation of the wages of factory workers and he wants you to verify his work.

He has extracted the following information:

(i) The contract provides that the minimum wage for a worker is his base rate. It is also paid for downtimes i.e. the machine is under repair or the worker is without work. The standard work sheet is 40 hours. For overtime production, workers are paid 150% of base rates.

(ii) Straight Piece work: - The worker is paid at the rate of 20 paise per piece.

(iii) Percentage bonus Plan: - Standard quantities of production per hour are established by the engineering department. The worker's average hourly production, determined from his total hours worked and his production, is divided by the standard quantity of production to determine his efficiency ratio. The efficiency ratio is then applied to his base rate to determine his hourly earnings for the period.

(iv) Emerson Efficiency plan: - A minimum wages is paid for production upto 66.66% of standard output or efficiency. When the workers production exceeds 66.66% of the standard output, he is said bonus as per the following table:

Efficiency Level	Bonus
Upto 66.66%	Nil
Above 66.66% to 79%	10%
80% - 99%	20%
100% – 125%	45%

Your assistant has produced the following schedule pertaining to certain workers of a weekly pay roll:

Workers	Wage Incentive Plan	Total Hours	Down Time	Unit Produced	Standard Units	Base Rate Rs.	Gross Wages as per Book
Rajesh	Straight piece work	40	5	400	----	1.80	85
Mohan*	Straight piece work	46	---	455	----	1.80	95

John	Straight piece work	44	---	425	----	1.80	85
Harish	Percentage Bonus Plan	40	4	250	200	2.20	120
Mahesh	Emerson	40	---	240	300	2.10	93
Anil	Emerson	40	---	600	500	2.00	126
	(40 hours production)						

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* Total hours of Mohan include 6 overtime hours.

Prepare a schedule showing whether the above computation of worker's wages are correct or not. Give details.

CONCEPT NO 4 :- QUESTIONS BASED ON LABOUR TURNOVER

Q.29

The management of a company are worried about their increasing labour turnover in the factory and before analyzing causes and taking remedial action, they want to have an idea of the profit forgone as a result of labour turnover in the last year.

Last year sales amounts to Rs.83,03,300/- and the P/V ratio was 20%. The total number of actual hours worked by the direct labour force was 4.45 lakhs. As a result of delays by personal department in filling the vacancies due to labour turnover, 1,00,000 potentially productive hours were lost. The actual direct labour hours included 30,000 hours attributable to new recruits, out of which half of the hours were unproductive.

The other costs are as follows:	Rs.
Settlement cost due to leaving	43,820
Recruitment costs	26,740
Selection costs	12,750
Training costs	30,490

	1,13,800

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

Q. 30

From the following data calculate the labour turnover by applying

(i) Separation Method,
(ii) Replacement Method,
(iii) Flux Method.

No. of workers on the payroll:

At the beginning of the month	900
At the end of the month	1,100

During the month 10 workers left, 40 persons were discharged and 150 workers were recruited. Of these, 25 workers are recruited in the vacancies of those leaving, while the rest were engaged for an expansion scheme.

Q.31

The cost accountant of Y Ltd. has computed labour turnover rates for the quarter ended 31st March, 1997 as 10%, 5% and 3% respectively under 'Flux Method'. 'Replacement method' and 'Separation method'.

If the number of workers replaced during that quarter is 30, find out the number of:

1. Workers recruited and joined and
2. Worker left and discharged.

Q.32

(CA-PE-II-November-2005) The existing incentive scheme of ISHA ltd. is as under:

Normal working week	5 days of 8 hours each plus 3 late shifts of 3 hours each

Rate of payment	day work: ` 160 per hour
	Late shift: ` 225 per hour
Average output per operator for	
49 hours week i.e. including 3 late shifts:	120 articles

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

Time rate (as usual)	` 160 per hour
Basic time allowed for 15 articles	5 hour
Piece-work rate	add 20% to basic piece rate
As per premium bonus	add 50% to time

Required: prepare a statement showing hours worked, weekly earnings, number of articles produced and labour cost per article for one operator under the following systems:

(1) Existing time rate
(2) Straight piece work
(3) Rowan system
(4) Halsey premium system.

Assume that 135 articles are produced in a 40 hour week under straight piece work, rowan premium system, and Halsey premium system above and worker earns half the time saved under Halsey premium system.

Q.33

(CA-PE-II-May -2008) Calculate the total wages earned by a workman for a working day of 8 hours Halsey and Rowan plans :

- Standard production per hour 20 units
- Actual production of the day 200 units
- Wages rate per hour Rs. 30 **ANS. H:-`270, R;-288**

Q.34

(CA-PE-II-Nov. -2008) The following information is collected from the personnel department of ST limited for the year ended 31st March 2008

Number of workers at the beginning of the year	8,000
Number of workers at the end of the year	9,600
Number of workers left the company during the year	500
Number of workers discharged during the year	100
Number of workers replaced due to left and discharges	700
Additional workers employed for expansion during the year	1,500

You are required to calculate labour turnover rate by using separation method replacement method and fixed method. . **ANS** **S=6.83%, R= 7.95%. F = 14.77%**

SAME AS QUESTIONS NO 30

Q.35

(CA PCC June 2009) Two workmen, A and B, produce the same product using the same material. A is paid bonus according to Halsey plan, while B is paid bonus according to Rowan plan. The time allowed to manufacture the product is 100 hours. A has taken 60 hours and B has taken 80 hours to complete the product. The normal hourly rate of wages of workman A is ` 24 per hour. The total earnings of both the workers are same. Calculate normal hourly rate of wages of workman B.

ANS. HOURLY RATE OF B = `20

SAME AS QUESTIONS NO 20

Q. 36

(CA PE-II June 2009) :- The Standard Time for a job is 50 hours. The hourly rate of guaranteed wages is ` Rs. 9 .. Because of the saving in time a worker X gets an hourly wages of ` Rs. 10.80 . under Roman premium bonus system for the same saving in time .calculate the hourly rate of wages a worker Y will get under Halsey premium bonus system assuring 50percent Bonus to worker

.ANS.= Effective hourly rate of wages = `10.125 **SAME AS QUESTIONS NO 19**

Q.37

(CA-PE-II-November-2005) 2 hours allowed to a worker to produce 5 units and wages has been paid @ Rs. 25 per hour in a 48 hours week the worker produced 170 units .

You are required to cal;culate the total earnings and effective hourly rate of a earnings of the worker under the following incentive wages system

1. Halsey 50 percent system .
2. Rowan system
3. Emerson's efficiency system
4. Barth system

Q.38

(CA IPCC May 2011) You are given the following information of a worker:

(1) Name of worker	:	'X'
(2) Ticket no.	:	002
(3) Work started	:	1-4-11 at 8 a.m.
(4) Work finished	:	5-4-11 at 12 noon
(5) Work allotted	:	production of 2,160 units
(6) Work done and approved	:	2,000 units

(7) Time and units allowed : 40 units per hour
(8) wage rate : ` 25 per hour
(9) Bonus : 40% of time saved
(10) Worker X worked 9 hours a day.
You are required to calculate the remuneration of the worker on the following basis:
(1) Halsey plan and
(2) Rowan plan.

PROBLEMS AND SOLUTION

CONCEPT NO 5 :- QUESTIONS BASED ON LABOUR COST STATEMENT

Q. 39

Calculate the labour hour rate of worker X from the following data :

Basic pay	Rs. 1,000 p.m.
D.A	Rs. 300 p.m
Fringe benefits	Rs. 100 p.m.

Number of working days in a year 300. 20 days are availed off as holidays on full pay in a year. Assume a day of 8 hours.

Solution:

Computation of Labour hour rate of Worker X

Basic Pay (Rs. 1,000 x 12)	12,000
D.A. (Rs. 300 x 12)	3,600
Fringe benefits (Rs. 100 x 12)	1,200
Total	16,800
Hourly rate	16,800 / (280x8) = Rs. 7.5 per hour

Q .40

From the following particulars, calculate the labor cost per man day of 8 hours:

(1) Basic salary	` 2 per day
(2) Dearness allowance	25 paisa for every point over 100 cost of living index for working class – current cost of living index is 700 points.

(3) Leave salary	10% of (1) & (2)
(4) Employer's contribution to P.F.	8% of (1), (2) & (3)
(5) Employer's contribution to E.S.I	2.5% of (1), (2) & (3)
(6) Expenditure on amenities to labor	Rs. 20 per head per month
(7) Number of working days in a month	25 days of 8 hours each.

Solution:

Statement showing computation of Labour Cost Per man Day

Particulars	Monthly cost
(a) Basic Salary (25 x 2)	50
(b) Dearness Allowance (0.25 x 600) (a) + (b)	150 200
(c) Leave Salary (10% of 200) (a) + (b) + (c)	20 220
(d) Employers contribution to Provident fund 8% of 220	17.6
(e) Employers Contribution to ESI	5.5
(f) Expenditure on amenities to Labour	20
Total Monthly wages No. of working days Labour cost per Man Day	263.1 25 Rs. 10.52

Q.41

Calculate the earning of A and B from the following particulars for a month and allocate the labour cost to each job X, Y and Z :

		A	B
I	Basic wages	Rs. 100	Rs. 100
II	Dearness Allowance	50 %	50%
III	Contribution to PF (on basic wages)	8%	8%
IV	Contribution to ESI (,, ,, ,,)	2%	2%

V	Overtime	Hours 10	-
VI	Idle Time and Leave	–	16 hours

The normal working hrs. for the month are 200. Overtime is paid at double the total of normal wages and dearness allowance. Employers contribution to state insurance and provident fund are at equal rates with employees contribution. The two workers were employed on jobs X, Y and Z in the following proportions:

Jobs	***X***	***Y***	***Z***
Workers A	40%	30%	30%
Workers B	50%	20%	30%

Overtime was done on job Y

Solution:

Statement showing Earnings of Workers A and B

Workers:	A Rs.	B Rs.
Basic wages	100	160
Dearness allowance (50% of basic wages)	50	80
Overtime wages (Refer to working note 1)	15	--
Add: - Provident fund – 8% of basic wages		
- ESI – 2% of basic wages	10	16
Gross wages earned	175	256
Less: - Provident fund-8% of basic wages (employer and employee)		
- ESI -2% of basic wage (employer and employee)	(20)	(32)
Net wages paid	155	224

Statement of Labour cost:	Rs.	Rs.
Gross wages (excluding overtime)	150	240
Employer's contribution to P.F. and E.S.I.	10	16
Ordinary wages	160	256

Labour rate per hour	0.80	1.28

Statement showing allocation of wages to job.

Particulars	X	Y	Z	Total
Worker A : Ordinary Wages	64	48	48	160
Overtime Wages		15		15
Worker B : Ordinary Wages	128	51.20	76.80	256
	192	114.20	124.80	431

Q. 42

From the following particulars, find out the amount required for payment of wages in a factory for a particular month:

	Rs.
(a) Wages for normal hours worked	30,500
(b) Wages for overtime	2,200
(c) Leave wages	1,700
(d) Deduction of employees' contribution to state insurance	500
(e) Employees contribution to provident fund	1,600

(f) House rent is to be recovered from 30 employees at the rate of Rs. 10 per month.

Solution:

Statement showing computation of amount required for payment of wages

	Rs.
Wages for normal hours worked	30,500
Add: Overtime wages	2,200
Add: Leave Wages	1,700
Less: Deduction of employee's contribution to E.S.I.	(500)

Less: Deduction of Employees to Provident Fund	(1,600)
Less: House rent recovered	(300)
Monthly payment of wages	32,000

Q.43

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

Days	Hours worked
Monday	8
Tuesday	10
Wednesday	9
Thursday	11
Friday	9
Saturday	4

Normal working hours: - 8 hours per day.
Normal rate: - Rs.0.50 per hour.

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

Solution:

Days	Hrs. worked	Wages Payable	
Monday	8	(8x5)	= 40
Tuesday	10	(9x5) + (1x10)	= 55
Wednesday	9	(9x5)	= 45
Thursday	11	(9x5) + (2x10)	= 65
Friday	9	(9x5)	= 45
Saturday	4	(4x5)	= 20
	51		270

Scheme II = (48 hrs. x 5) + (3 hrs. x 10) = 270

Wages Payable = Rs. 270

Q. 44

calculate the total wages earned by a workman for a working day of 8 hours under Halsey and Rowan plans .

Standard production per hour	20 units
Actual production of the day	200 units
Wages rate per hour	Rs. 30

(CA-PE-II May 2008)

Solution:

(i) Standard time = 200/20 = 10 hours

(ii) Total wages of workman in Halsey scheme:

Total wages = (Actual time x wages rate) + 50% (Standard Time – Actual time) x wage rate = 8 x 30 + 50/100 (10-8) x 30

= Rs. 270

(iii) Total wages in Rowan plan:

Total wages = (Actual time x wages rate) + (Standard time – Actual time / standard time) x Actual time x wages rate

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

= Rs. 288

Q. 45

An operator is engaged in machining certain components receives an ordinary day rate of Rs. 1.60 per day of 8 hours. The standard output for machining the components has been fixed at 80 pieces per hour (time as fixed for premium bonus). On a certain day, the output of the worker on this machine is 800 pieces. Find the labour cost per 100 pieces and the wages that would have been actually earned by the workmen under the following:

(1) If a bonus of Rs. 0.23 is paid per 100 pieces of the extra output.

(2) If paid for on straight piece work basis at the standard rate.

(3) If Halsey plan is adopted.

Solution

(a) Standard Output = 640 units (80 units x 8 hrs.)

Actual Output = 800 units

Extra Output = 160 units

Total Wages = Normal wages + Bonus

= 1.60 + (0.23/100 x 160) = Rs. 1.97

Labour Cost per 100 pieces = Rs. 1.97 / 800 units x 100 units = Rs. 0.246

(b) Normal / Standard piece rate = Rs. 1.60/640 pieces = Rs. 0.0025 per pieces

Wages payable under straight piece work = (Rs. 0.0025 x 800 pieces) = Rs. 2

Labour Cost Per 100 pieces = Rs. 2/800 x 100 = Rs. 0.25

(c) Normal Wages per day = Rs. 1.60

Wage rate per hour = Rs. 1.60 / 8 hrs. = Rs. 0.2 per hr.

Time allowed = Total units produced / Per hour production

= 800/80 = 10 hrs.

Time taken = 8 hrs.

Time saved = 2 hrs.

Total Wages = Normal Wages + Bonus

= (T.T x wage rate) + (1/2 x T.S. x wage rate)

= 1.60 + (1/2 x 2 x 0.2)

= Rs. 1.80 per day

Labour cost per 100 pieces = Rs. 1.80 / 800 = Rs. 0.225

Q.46

Two workers, A and B, produce the same product using the same material. The normal wage is also same .'A' is paid bonus according to Rowan scheme while B is paid bonus according to Halsey scheme . The time allowed to make product is 50 hours .'A' takes 30 hours while 'B' takes 40 hours to complete the product. The factory overhead rate is Rs. 5 per person-hour actually worked .The factory cost of product manufactured by 'A' is Rs. 3,490 and for product manufactured by 'B' is Rs. 3,600 .

Required :

(i) Compute the normal rate of wages
(ii) Compute the material cost
(iii) Prepare a statement comparing the factory cost of the product as made by two workers ,

(CA PE-II Nov. 2007)

Solution:

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

	Worker A	Worker B
	Rs.	Rs.
Material cost	x	x
Labour wages	30 y	40 y
Bonus	Rowan system Time saved x Time taken / Time allowed x rate = 20 x 30/50 x y = 12y	Halsey system Hours saved x 50% x rate = 10 x 1/2 x y = 5y
Overheads	30 x 5 = 150	40 x 5 = 200
Factory cost	x + 42 y + 150 = 3,490	x + 45y + 200 = 3,600
	Therefore, x + 42y = 3,340 – (1)	Therefore, x + 45y = 3,400 – (2)

Solving (1) and (2) we get

X = 2,500 and y = 20

(i) Normal rate of wages is Rs. 20 per hour

(ii) Cost of materials = Rs. 2,500

(iii) Comparative Statement of factory cost

	Worker A	**Worker B**
Material cost	2,500	2,500
Wages	30x20 = 600	40 x 20 = 800
Bonus	(20/50 x 30 x 20) = 240	(10 x 1/2 x 20) = 100
Overheads	30 x 5 = 150	40 x 5 = 200
Factory cost	3,490	3,600

Q.47

Standard time for a job is 90 hours .The hourly rate of guaranteed wages a is Rs.50. Because of the saving in time a worker a gets an effective hourly rate of wages of Rs.60 under Rowan Premium bonus system . for the same saving in time , calculate the hourly rate of wages a worker B will get under Halsey premium bonus system assuring 40 % to worker .

Solution

Increase in Hourly Rate of Wages (Rowan Plan) is (Rs. 60 – Rs. 50) = Rs. 10

This is Equal to

Time Saved / Standard Time x Hourly rate

Or 10 = Time Saved / Standard Time x 50

Or Time Saved / 90 x 50 = 10

Time Saved = 900 / 50 = 18 Hours

Time Taken = (90 – 18) = 72 Hours

Effective Hourly Rate under Halsey System

Time Saved	= 18 Hours
Bonus @ 40% = 18 x 40% x 50	= Rs. 360
Total Wages = (50 x 72 + 360)	= 3,960
Effective Hourly Rate	= 3,960 / 72 Hours = Rs. 55

Q.48

The Standard time for a job is 50 hours .The hourly rate of guaranteed wages is Rs.9. Because of the saving in time a worker X gets an effective hourly wages of Rs.10.80 under Rowan Premium bonus system . for the same saving in time , calculate the hourly rate of wages a worker Y will get under Halsey premium bonus system assuring 50 percent bonus to worker .

Solution

Let x = Time taken to complete the Job

Time saved = Time allowed – Time taken

= (50 – x) hours

Wages under Rowan premium plan

= Time taken x Wage Rate + Time Taken / Time Allowed x Time Saved x Wage Rate

= Rs. 9 x x + x / 50 x (50 – x) x Rs. 9 = Rs. 10.80 x x

= $9x + 450x – 9x^2 / 50 = 10.8x$

= 450 – 9x = 1.8 x 50

x = 40 hours

Time saved = 50 – 40 = 10 hrs.

Under Halsey Premium Plan 50% bonus to worker Y = 50% x 10 x 9 = Rs. 45

Total earnings of worker Y: Wages + Bonus = 40 x Rs. 9 + 45 = Rs. 360 + 45 = Rs. 405

Hourly rate of wages of worker Y under Halsey plan = Total Earnings / Actual Hours = 405 / 40 = Rs. 10.125

Q.49

Mr. A is working by employing 10 skilled workers. He is considering the introduction of some incentive scheme - either Halsey Scheme (with 50% bonus) or Rowan Scheme - of wage payment for increasing the labour productivity to cope with the increased demand for the product by 25%. He feels that if the proposed incentive scheme could bring about an average 20% increase over the present earnings of the workers, it could act as sufficient incentive for them to produce more and he has accordingly given this assurance to the workers.

As a result of the assurance, the increase in productivity has been observed as revealed by the following figures for the current month:

Hourly rate of wages (guaranteed)	Rs. 2.00
Average time for producing 1 piece by one worker at the previous performance (This may be taken as time allowed)	2 hours
No. of working days in the month	25
No. of working hours per day for each worker	8
Actual production during the month	1,250 units.

Required :

1. Calculate effective rate of earnings per hour under Halsey Scheme and Rowan Scheme.
2. Calculate the savings to Mr. A in terms of direct labour cost per piece under the schemes.
3. Advise Mr. A about the selection of the scheme to fulfil his assurance.

Solution:

Wage Rate per hour	= Rs. 2/- per hour
Time Allowed per piece	= 2 Hours
Monthly Production	= 1250 units
Standard Time allowed for producing 1250 units	= 1250 units x 2 Hours
	= 2500 Hours
Actual Time Taken to produce 1250 units	= 25 Days x 8 Hours x 10 workers
	= 2000 Hrs.
Time saved	= Time Allowed – Time saved
	= 2500 – 2000 = 500 Hrs

1. Effective Rate of Earning:

Under Halsey Scheme:

Normal Wages	(Time Taken x Time Rate) = (2000 Hrs x Rs. 2)	= 4,000
Add: Bonus:	(50% x Time saved x Time Rate) =	
	50% x 500 x 2	= 500
	Total Wages	4,500

Effective Rate of Earnings / Hr. = Total Wages / Actual Hours Worked

= 4500 / 2000 Hrs.

= Rs. 2.25 / Hours

Under Rowan Scheme:

Normal Wages	(Time Taken x Time Rate) = 2000 Hrs x Rs. 2	= 4,000
Add: Bonus:	Time Saved x Time Taken / Time Allowed x Time Rate	
	= 500 Hrs. x 2000 Hrs. / 2500 Hrs.	= 800
	Total Wages	4,800

Effective Rate of Earnings/Hours

= Total Wages / Actual Hrs Worked

4800 / 2000 Hrs.

= Rs. 2.40 per hour

2. Saving to Mr. 'A' in terms of Direct Labour Cost/Piece:

Wages Payable under the Previous Scheme (i.e., before introduction of Halsey/Rowan Plan):

Wages were earlier payable under Guaranteed Piece Rate Plan i.e., higher of wages under Piece Rate and Time Rate Basis

Wages Payable under Time Rate basis = Actual Hours Worked x Time Rate

= 2,000 Hours x Rs. 2 = Rs. 4,000

Wages Payable under Piece Rate Basis = Units of Production x Price Rate per unit*

= 1,250 units x Rs. 4 = Rs. 5,000

Wages under Guaranteed Piece Rt. System = Rs. 5,000, being higher than wages under time rate systems.

Savings under Halsey Plan: Rs.

Wages under earlier systems Rs. 5,000

Per unit wages Cost under earlier system = 5000 / 1250 units = Rs. 4.00

Per unit wages Cost under Halsey scheme = 4 – 3.60 = Rs. 0.40 per unit

Savings under Rowan Plan:

Per unit Wages Cost under Rowan Scheme

= 4800 / 1250 units = Rs. 3.84

Per unit Savings under Rowan Scheme = Rs. 4 – 3.84 = Rs. 0.16 per unit

3. Scheme Selection:

While selecting a scheme Mr. 'A' has to fulfill his assurance to the workers of an average 20% increase in the present earnings of the workers.

% increase in earnings under Halsey

= Effective earnings / Hour under Halsey – Wage Rate / Hour / Wage rate/Hour x 100

= 2.25 – 2 / 2 x 100 = 12.5%

% Increase in earnings under Rowan Scheme:

= Effective Rate of Earnings under Rowan – Wage Rate / Hour / Wage Rate / Hour x 100

= 2.40 – 2 / 2 x 100 = 20%

Hence, Mr. 'A' should select the Rowan Scheme of payment of wages as it fulfils his assurance to the workers of 20% increase in their earnings.

* Piece Rate per unit = Standard Time for producing / unit x Standard Rate per hour

= 2 Hours x Rs. 2 = Rs. 4 per unit.

Q.50

Management of a manufacturing unit is considering extensive modernization of the factory through progressive mechanization, which would result in improved productivity and reduced strength. Through negotiations with the union, it was agreed that for every 1% increase in productivity,

workers would be paid 0.5% incentive wages. It was also agreed that through voluntary retirement the staff strength would be reduced to 300 from the present level of 400. The following further comparative data are available before and after the proposed mechanization.

Particulars	Before mechanization	After mechanization
Number of articles produced per month	50,000	48,000
Fringe benefits	50% of wages	
Wages paid per month	Rs. 4,00,000	
Sales value per month	Rs. 24,00,000	
PV ration 25%		

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

Solution:

	Before Mechanisation	After Mechanisation
No. of articles produced p.m.	50,000	48,000
No. of Employees	400	300
No. of articles produced p.m. per employee	125	160

Improved Productivity = 160 – 125 / 125 x 100 = 28%

	Before Mechanisation	After Mechanisation
Wages p.a. (4,00,000 x 12) (4,00,000 / 400 x 300 x 12)	48,00,000	36,00,000
(+) Fringe Benefits (50% of wages)	24,00,000	18,00,000
(+) Incentive / Bonus (28% x 50% x 3,60,000)	--	5,04,000
Annual Total Wages	72,00,000	59,04,000

Annual Saving in Labour Cost (A) = 12,96,000

S.P. p.u. (24,00,000 / 50,000 units) P/V Ratio	Rs. 48 25%
Contribution p.u. Reduction in Sales Quantity p.a. (50,000 units – 48,000 units) x 12	Rs. 12 24,000
Loss of Contribution (B)	Rs. 2,88,000
Net Gain (A – B)	10,08,000

CONCEPT NO 6 :- QUESTIONS BASED ON GROUP SYSTEM OF WAGE PAYMENT

Q.51

A, B, and C were engaged on a group task for which a payment of Rs. 725 was to be made. A's time basis wages are Rs. 8 per day, B's Rs. 6 per day and C's Rs. 5 per day. A worked for 25 days; B worked for 30 days; and C for 40 days. Distribute the amount of Rs. 725 among the three workers.

Solution: Computation of Group Bonus

Basic Wages	A (25 x 8)	= 200
	B (30 x 6)	= 180
	C (40 x 5)	= 200
	Total Wages	580
Actual Group Wages		725
Group Bonus		145
	(145 / 580 x 100)	= 25% of Direct wages
So, total wages for	A (200 x 125%) = 250	
	B (180 x 125%) = 225	
	C (200 x 125%) = 25	

Q.52 (CMA STUDY MATERIAL)

Two fitters, a labourer and a boy undertake a job on piece rate basis for `1,290. The time spent by each of them is 220 ordinary working hours. The rates of pay on time rate basis, are `15 per hour for each of the two fitters, `10 per hour for the labourer and `5 per hour for the boy.

The amount of piece-work premium and the share of each worker, when the piece -work premium is divided proportionately to the wages paid.

Compute the selling price of the above job on the basis of the following additional data:-

Cost of the direct material `2,010; works overhead at 20% of prime cost; selling overhead at 10% of works cost and profit at 25% on cost of sales.

Solution:

Calculation of time Wages:

2 fitters at Rs. 15 per hour for 220 hours each = 2 x 15 x 220	6,600	
1 labourer at Rs. 10 per hour for 220 hours = 10 x 220	2,200	
1 boy at Rs. 5 per hour for 220 hours = 5 x 220	1,100	
Total Time Wage	9,900	
Piece-work Premium: Wages on piece-rate basis-Wages on time basis = 12,900 – 9,900		3,000

Amount of premium is paid to workers in the ratio of 6,600: 2,200: 1,100 i.e., (6:2:1), as follows:

Share of premium to 2 Fitters 3,000 x 6/9	Rs. 2,000
Share of premium to 1 Labourer 3,000 x 2/9	667
Share of premium to 1 Boy 3,000 x 1/9	33
	3,000

Cost Sheet for the Job

Direct material	Rs. 20,100	
Direct wages		12,900
Prime cost	33,000	

Work overheads at 20% on prime cost = 33,000 x 20/100	6,600
Works cost	39,600
Selling expenses at 10% of works cost = 39,600 x 10/100	3,960
Cost of sales	43,560
Add: Profit at 25% on Cost of Sales = 43,560 x 25/100	10,890
Selling Price	54,450

Q.53

XYZ Ltd. Employs its workers for a single shift of 8 hours for 25 days in a month. The Company has recently fixed the standard output for a mass production item and introduced an incentive scheme to boost output. Details of wages payable to the workers are as follows :

(i) Basic wages/piece work wages @ Rs.2 per unit subject to a guaranteed minimum wages of Rs.60 per day.

(ii) Dearness allowance at Rs.40 per day.

(iii) Incentive bonus :

Standard output per day per worker	:	40 units ;
Incentive bonus up to 80% efficiency	:	Nil ;
Incentive bonus for efficiency above 80%	:	Rs.50 for every 1% increase above 80%

The details of performance of four workers for the month of April 1998 are as follows :

Worker	No. of days worked	Output (units)
A	25	820
B	18	500
C	25	910
D	24	780

Calculate the total earnings of each of the workers

Solution:

Statement of Total Earnings of each worker in the April 1998

Workers (i)	Days worked (ii)	Output in units (iii)	Basic wages (iv) = (iii) x Rs. 2	D.A. (v) = (ii) x Rs. 40	Incentive (vi)	Total Earnings (vii) = (iv) + (v)
A	25	820	1,640	1,000	100	2,740
B	18	500	1,080	720	---	1,800
C	25	910	1,820	1,000	550	3,370
D	24	780	1,560	960	62.5	2,582.5

Working Notes: (i) The worker B has been given guaranteed minimum wages @ Rs. 60 per day for 18 days, since his piece work wage is only 500 x Rs. 2 = Rs. 1,000: In case of A, C and D their piece wage is higher than guaranteed wage.

Computation of incentive

Workers	Efficiency	Incentive @ Rs. 50 for each 1% Increase in efficiency above 80%
A	820/25x40 = 82%	2 x Rs. 50 = Rs. 100
B	500/18x40 = 69.44%	No Incentive
C	910/25x40 = 91%	11 x Rs. 50 = Rs. 550
D	780/24x40 = 81.25%	1.25 x Rs. 50 = Rs. 62.5

It is assumed that the workers do not get incentive payment for a fraction of 1% efficiency improvement

Q.54

In a factory bonus system, bonus hours are credited to the employee in the proportion of time taken which time saved bears to time allowed. Jobs are carried forward from week to another. No overtime is worked and payment is made in full for all units worked on, including those subsequently rejected.

From the following information you are required to calculate for each employee:

(a) the bonus hours and amount of bonus earned.
(b) The total wages, cost and
(c) The wages cost of each good unit produced.

	A	B	C
Basic wage per hour	Rs.2.50	Rs.4.00	Rs.3.00
Units produced	2,500	2,200	3,600
Time allowed per 100 units	2 hrs 36min	3 hrs.	1hr 30min
Time taken	52 hours	75 hours	48 hours
Rejected	100 units	40 units	400 units

Solution:

		A	**B**	**C**
(i)	Units Produced	2,500	2,200	3,600
(ii)	Units Rejected	100	40	400
(iii)	Units accepted = (i) – (ii)	2,400	2,160	3,200
(iv)	Time Allowed (Hours) for total units produced	65	66	54
(v)	Time Taken (Hours)	52	75	48
(vi)	Time Saved = (iv) – (v)	13	Nil	6
		Rs.	Rs.	Rs.
Amount of time wages				
A 52 x Rs. 250: B 75 x Rs. 400: C 48 x Rs. 300		13,000	30,000	14,400
Amount of Bonus:				
A = 13/65 x 52 x Rs. 250: B Nil: C 6/54 x 48 x Rs. 3.00		2,600	Nil	1,600
Total wages		15,600	30,000	16,000

Wage Cost of each good unit	Rs. 6.50	Rs. 13.89	Rs. 5
	(15,600/2,400)	(30,000/2,160)	(16,000/3,200)

Q.55

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

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

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

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

Average labor efficiency: 60%

Standard time required to manufacture one part: 2 hours

Overhead rate: Rs.10 per clock hour

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

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

Required:

[a] Compute the amount of award payable to the employee who has given the suggestion.

[b] Prepare a statement showing the annual cost of production before and after the implementation of the suggestion to use the Jig and indicate the annual saving.

[c] State the assumptions on which your calculations are based

Solution:

(i) Amount of Award payable to the employee

Wage rate per hour (Rs. 40/8)	= Rs. 5 per hour
Standard time for one part	= 2 hours
Standard time for 30,000 parts	= 60,000 hrs.
Average labour efficiency	= 60%
Actual time	= 60,000/60% = 1,00,000 hrs.

Actual labour cost (1,00,000 hrs. x Rs. 5)	= Rs. 5,00,000
Standard time for one part	= 2 hours
Less: Saving in standard time	= 12 minutes
Revised standard time	= 1 hrs. 48 min or 1.8 hrs.
Adjusted to 60% efficiency	= 1.8 hrs. / 60% = 3 hrs.
Revised actual time for 30,000 parts	= 3 hrs. x 30,000 = 90,000 hrs.
Revised wages = 90,000 hrs. x Rs. 5	= Rs. 4,50,000
Annual saving in wage (Rs. 5,00,000 – 4,50,000)	= Rs. 50,000
Award to the employee (Rs. 50,000 x 3/12)	= Rs. 12,500

(ii) Statement showing the cost of production for 30,000 parts before and after implementation of the suggestion

	Before implementation	After Implementation
Raw Materials cost @ Rs. 20	Rs. 6,00,000	Rs. 6,00,000
Wages	5,00,000	4,50,000
Prime Cost	11,00,000	10,50,000
Overheads @ Rs. 10 per hr. (actual)	10,00,000	9,00,000
Award to employee	-	12,500
Material handling expenses	12,000	12,000
Cost of Jig	-	3,000
Total	21,12,000	19,77,500
Annual savings		Rs. 1,34,500

(iii) It is assumed that labour efficiency of 60% holds goods even after implementation of the suggestion and the capacity saved is utilized for other jobs.

Q.56

A work measurement study was carried out in a firm for 10 hours and the following information was generated.

Units produced	: 350
Idle time	: 15%
Performance rating	: 120%
Allowance time	: 10% of standard time.

What is the standard time for task?

Solution:

Calculation of standard time for task

Total time	= 10 x 60 = 600 minutes
(-) Down time or Idle time @ 15%	= 90 minutes
Actual time	= 510 minutes
Normal Time	= 510 x 120% = 612 minutes
(+) Relaxation allowance	
(10% or 1/10 on standard time	
i.e. 1/9 on normal time)	= 68 minutes
Standard time for job	= 680 minutes
Standard time for each unit	= 680/350 = 1.943 minutes

Q.57

In a factory bonus to workman is paid according to Rowan Plan. Time allotted for a job is 40 hours and the normal rate of wages is ` 1.25 per hour. The factory overhead charges are 50 paise per hour for the hours taken.

The factory cost of a work order, executed by a worker is ` 161.875. The cost of material in each case is `100.

Calculate the hours of time taken by the workman to complete the work order.

Solution:

Let 'T' be the time taken by worker.

Earnings = 1.25 T + [(40-T) / 40] x [1.25 T]

= 1.25 T + [(50T – 1.25 T2) / 40]

= [50T + 50 T – 1.25T2] / 40

= [100 T – 1.25T2] / 40

Materials + Wages + Factory Overheads = Factory Cost

⇒ 100 + [100 T – 1.25T2] / 40 + 0.5 T = 161.875

⇒ 4000 + 100 T – 1.25T2 + 20T = 6475

⇒ 1.25T2 – 120 T + 2475 = 0

⇒ 5T2 – 480 T + 9900 = 0

⇒ T2 – 96T + 1980 = 0

T = 2 7920 9216 96 − ±

T = 2 36 96 ±

T = 66 (or) 30

T = 30 hours (because actual time should not be more than standard time).

QUESTION BASED ON TAYLOR'S DIFFERENCIAL RATE SYSTEM

Q.58

Using Taylor's differential piece rate system; find the earnings of the Amar Akber Anthoney from the following particulars:

Standard time per piece		20 minutes
Normal rate per hour (in a 8 hours day)		Rs. 9.00
In a 8 hour day		
Amar produced	:	23 units
Akabar produced	:	24 units
Anthony produced	:	30 units

Solution:

Std. Output per day = Time worked per day (in hours) / Std. Time per piece in minutes x 60 minutes

= 8 x 60 / 20

= 24 units

	Amar	**Akbar**	**Anthony**
Efficiency level	23/24 x 100	24/24 x 100	30/24 x 100
	= 95.83%	= 100%	= 125%
Piece rate	(83% x 3)	(125% x 3)	(125% x 3)

	= 2.49	= 3.75	= 3.75
Wages	57.27	90.00	112.50
	(23 x 2.49)	(24 x 3.75)	(30 x 3.75)

Q.59

Using Taylor's differential piece rate system; find the earning of A from the following particulars:

Standard time per piece	12 minutes
Normal rate per hour (in a 8 hours day)	Rs. 20
A produced	37 Units **(CA PCC MAY 2007)**

Solution:

(i) Standard output per day (8 x 60 / 12) = 40 units

Actual output = 37 units

Efficiency percentage 37/40 x 100 = 92.5%

Under this method lower rate is 83% of the normal piece rate and is applicable if efficiency of worker is below 100%.

Earning rate per unit = 83% of 20/5* or 3.32 per unit

Earning = 37 x 3.32 = Rs. 122.84

* In one hour, production will be = 60 minutes / Standard time pr piece, i.e. 12 minutes = 5 units

QUESTION BASED ON MERRICK'S DIFFERENCIAL RATE SYSTEM

Q.60

Using Merrick's differential piece rate system; find the earning of the Amar Akber Anthoney from the following particulars:

Standard time per piece	20 minutes
Normal rate per hour (in a 8 hours day)	Rs. 9.00

In a 8 hour day

Amar produced	:	23 units
Akabar produced	:	24 units
Anthony produced	:	30 units

Solution

Std. Output = Actual output / Std. output

= 8 x 60 / 20

= 24 units

	Amar	**Akbar**	**Anthony**
Efficiency level	23/24 x 100	24/24 x 100	30/24 x 100
	= 95.83%	= 100%	= 125%
Piece rate	(110% x 3)	(110% x 3)	(120% x 3)
			Or
			(130% x 3)
	= 3.30	= 3.30	= 3.60 or 3.90
Wages	75.90	79.20	108 or 117
	(23 x 3.30)	(24 x 3.30)	(30 x 3.60 or 30 x 3.90)

Q.61

Calculate the earnings of workers A, B & C under Straight Piece Rate System & Merrick's Multiple Piece Rate System from the following particulars:

Normal Rate per Hour	Rs.5.40
Standard Time per Unit	1 minute

Output per day is as follows:

Worker A – 390 units

Worker B – 450 units

Worker C – 600 units, Working hours per day are 8.

. **Solution:**

Normal Rate per hour = Rs. 5.40

Standard Time per unit = 1 Minute

Standard Hourly Production = 1 unit/minute x 60 minutes

= 60 units

Standard Piece Rate per unit = Standard Hourly Rate / Standard Hourly production

= 5.40 / 60 units = 0.09 per unit

Earnings under Straight piece Rate System = Output x Standard Piece Rate/unit.

For worker A = 390 units x 0.09 = Rs. 35.10

For worker B = 450 units x 0.09 = Rs. 40.50

For worker C = 600 units x 0.09 = Rs. 54.00

Merrick's Multiple Piece Rate System:

Statement of wages under Merrick's Multiple Piece Rate System

Particulars	Workers		
	A	B	C
Actual Output per day (in units)	390	450	600
Standard Output per day (in units) [60 units x 8 hrs.]	480	480	480
Percentage efficiency (%) [A/B x 100]	81.25%	93.75%	12.5%
Applicable Piece Rates/Unit:			
For 'A' = 0.90 x 100% = 0.09	0.09		
For 'B' = 0.09 x 110% = 0.099		0.099	

For 'C' = 0.09 x 120% = 0.108			0.108
Wages as per Merricks Differencial Piece	35.10	44.55	64.80
Rate [AxD] (Rs.)			

QUESTION BASED ON GANTT SYSTEM

Q.62

In a factory standard time allowed for completing a given task (50 units) is 8 hours. The guaranteed time wages are Rs. 20 per hour .If a task completed in less than the standard time the high rate of Rs. 4 per unit is payable .Calculate the wages of a worker ,under the Gantt system, if he completes the task in (i) 10 hours ; (ii) 8 hours and (iii) in 6 hours .Also ascertain the comparative rate of earnings per hour under the three situations .

Solution:

Efficiency level = Time Allowed / Time taken

	(i)	**(ii)**	**(iii)**
Efficiency level	8/10	8/8	8/6
	80%	100%	133.33%
Wage rate	Rs. 20 per hour	Rs. 20 x 120% =	Rs. 4 per hour
		Rs. 24 per hour	
Total wages	10 x 20	8 x 24	50 x 4
	= 200	= 192	= 200
Wages per hour	200/10 = Rs. 20	192/8 = Rs. 24	200/6 = Rs. 33.33

QUESTION BASED ON EMERSION SYSTEM

Q.63

From the following information you are required to calculate the bonus and earnings under Emersion Efficiency System .The relevant information is as under :

Standard working hours	:	8 hours a day
Standard output per hour in units	:	5
Daily wages rate	:	Rs. 50

Actual Output in units

Worker A – 25 units

Worker B – 40 units

Worker C – 45 unit

Solution

Efficiency Level = Actual output / Std. output x 100

	A	**B**	**C**
Efficiency Level	25/40 x 100	40/40 x 100	45/40 x 100
	= 62.5%	= 100%	= 112.5%
Basic Wages	Rs. 50	Rs. 50	Rs. 50
Bonus	----	50 x 20%	32.5% x 50
	Nil	= Rs. 10	Rs. 16.25
Total	50	60	66.25

MARGINAL COSTING

Marginal Costing is not a method of cost ascertainment like job costing or contract costing. Marginal costing is a technique of costing, which may be used with other methods of costing, viz., job or process. For decision – making, it is more helpful to the management. The other names for marginal costing are direct costing, differential costing, incremental costing and comparative costing.

In marginal costing, only variable items of costs are taken into account. These variable costs will change in direct relation to the change in the volume of production or change in the production by one unit. As such, variable costs are called product costs and are charged to production. Fixed costs are not allocated to cost unit; and these are charged directly to profit and loss account during the period and are called as period costs or capacity costs.

Definition of marginal cost and marginal costing

Marginal cost means the same thing as variable cost. The term is not a new one. The accountants' concept of marginal cost differs from economists' of producing one additional unit. This shall include an element of fixed cost also. Moreover, the economists' marginal cost per unit cannot be uniform with the additional production since the law of diminishing or increasing returns is applicable; whereas the accountants' marginal cost shall be constant per unit of output with the additional production.

The Institute of Cost and Works Accountants of India defined marginal cost as, "the amount at any given volume of output by which aggregate costs are changed, if the volume of output is increased or decreased by one unit." Here, a unit may be a single article, a batch of articles, an order, a stage of production capacity, a process or a department. To ascertain the marginal cost, we need the following elements of cost:

(a) Direct materials
(b) Direct labour
(c) Other direct expenses, and
(d) Total variable overheads.

That is, Marginal Cost = Prime Cost + Total variable overheads.

OR

Marginal Cost = Total Cost – Fixed Cost

Marginal costing is defined by the ICWA as, "the ascertainment by differentiating between fixed costs, and variable costs of marginal costs and of the effect on profit of changes in volume or type of output." According to Dr. Joseph, "Marginal costing is a technique of determining the amount of change in the aggregate costs due to an increase of one unit over the existing level of production. As such, it arises from the production of additional increments of output.

Batty defines Marginal Costing as "a technique of cost accounting which pays special attention to the behaviour of costs with changes in the volume of output."

Example:

	Rs.
Variable cost 8,000 @ Rs.55	40,000
Fixed cost	10,000

Total cost	50,000

If the production is increased by one unit, the following expenditure will be necessary:

	Rs.
Variable cost 8,002 x Rs.5	40,005
Fixed costs	10,000

Total cost	50,005
Less: Total cost of 8,000 units	50,000

Marginal cost of one unit:	5

$$\text{Marginal cost} = \frac{\text{Increase in total cost}}{\text{Increase in total units}}$$

It may be remembered that marginal cost takes into account only variable cost and exclude the fixed cost.

The following example will clarify the above point:

Unit	Total cost	Fixed cost	Variable cost	Marginal cost
1	400	200	200	200
2	600	200		200
3	800	200		200

In the above example, marginal cost is Rs.200 per unit. (Total cost – fixed cost = Variable cost). The marginal cost of 3 units is Rs.600 (Rs.200 x 3). It is added to fixed cost, Rs.200. Then the total cost is Rs.800.

The definition of fixed cost given by the I.C.M.A. London, is "a cost which accrues in relation to the passage of time and which, within certain output or turnover limits, tends to be unaffected by fluctuations in volume of output or turnover. Examples are rent, insurance and executive and salaries."

Fixed cost is one which tends to be unaffected by variation in volume of output. Fixed cost does not change with the increase or decrease in production with a certain range. Period cost is another name for fixed cost, as it is related to periods.

Variable cost is one which tends to vary directly with the volume of output. Variable cost changes with the increase or decrease in production. In direct costing variable cost is known as direct.

Main Features of Marginal Costing

1. Marginal costing is a technique or working of costing, which is used in conjunction with other methods of costing (process or job).
2. Fixed and variable costs are kept separate at every stage. Semi – variable costs are also separated into fixed and variable.
3. As fixed costs are period costs, they are excluded from product cost or cost of production of cost of sales. Only variable costs are considered as the cost of the product.
4. When evaluation of finished goods and work-in-progress are taken into account, they will be only variable costs.
5. As fixed costs are period costs, they are charged to profit and loss account during the period in which they are incurred. They are not carried forward to the next year's income.
6. Marginal income or marginal contribution is known as the income or the profit.
7. The difference between the contribution and fixed costs is the net profit or loss.
8. Fixed costs remain constant irrespective of level of activity.
9. Sales price and variable cost per unit remain the same.
10. Cost volume profit relationship is fully employed to reveal the state of profitability at various levels of activity.

Advantages:

1. **Constant in nature.** Variable cost fluctuate from time to time, but in the long run, marginal costs are stable. Marginal costs remain the same, irrespective of the volume of production.
2. **Effective cost control.** It divides cost into fixed and variable. Fixed cost is excluded from product. As such, management can control marginal cost effectively.
3. **Treatment of overheads simplified.** It reduces the degree of over or under – recovery of overheads due to the separation of fixed overheads from production cost.
4. **Uniform and realistic valuation.** As the fixed overhead costs are excluded from product cost, the valuation of work – in – progress and finished goods becomes more realistic.
5. **Helpful to management.** It enables the management to start a new line of production which is advantageous. It is helpful in determining which is profitable whether to buy or manufacture a product. The management can take decision regarding pricing and tendering.
6. **Helps in production planning.** It shows the amount of profit at every level of output with the help of cost volume profit relationship. Here the break-even chart is made use of.
7. **Better results.** When used with standard costing, it gives better results.
8. **Fixation of selling price.** The differentiation between fixed costs and variable costs is very helpful in determining the selling price of the products or services.

Sometimes, different prices are charged for the same article in different markets to meet varying degree of competition.

9. **Helpful in budgetary control.** The classification of expenses is very helpful in budgeting and flexible budget for various levels of activities.
10. **Preparing tenders.** Many business enterprises have to compete in the market in quoting the lowest price. Total variable cost, when separately calculated, becomes the 'floor price'. Any price above this floor price may be quoted to increase the total contribution.
11. **"Make or Buy" decision.** Sometimes a decision has to be made whether to manufacture a component or a product or to buy if ready made from the market. The decision to purchase it would be taken if the price is paid recovers some of the fixed expenses.
12. **Better presentation.** The statements and graphs prepared under marginal costing are better understood by management executives. The break-even analysis presents the behaviour of cost, sales, contribution etc. in terms of charts and graphs. And, thus the results can easily be grasped.

Disadvantages

1. **Difficulty to analyse overhead.** Separation of costs into fixed and variable is a difficult problem. In marginal costing, semi-variable or semi-fixed costs are not considered.
2. **Time element ignored.** Fixed costs and variable costs are different in the short run; but in the long run, all costs are variable. In the long run all costs change at varying levels of operation. When new plants and equipments are introduced, fixed costs and variable costs will vary.
3. **Unrealistic assumption.** Assumption of sale price will remain the same at different levels of operation. In real life, they may change and give unrealistic results.
4. **Difficulty in the fixation of price.** Under marginal costing, selling price is fixed on the basis of contribution. In case of cost plus contract, it is very difficult to fix price.
5. **Complete information not given.** It does not explain the reason for increase in production or sales.
6. **Significance lost.** In capital-intensive industries, fixed costs occupy major portions in the total cost. But marginal costs cover only variable costs. As such, it loses its significance in capital maintenance.
7. **Problem of variable overheads.** Marginal costing overcome the problem of over and under-absorption of fixed overheads. Yet there is the problem in the case of variable overheads.
8. **Sales–oriented.** Successful business has to go in a balanced way in respect of selling production functions. But marginal costing is criticized on account of its attaching over-importance to selling function. Thus it is said to be sales – oriented. Production function is given less importance.
9. **Unreliable stock valuation.** Under marginal costing stock of work-in-progress and finished stock is valued at variable cost only. No portion of fixed cost is

added to the value of stocks. Profit determined, under this method, is depressed.

10. **Claim for loss of stock.** Insurance claim for loss or damage of stock on the basis of such a valuation will be unfavourable to business.
11. **Automation.** Now-a-days increasing automation is leading to increase in fixed costs. If such increasing fixed costs are ignored, the costing system cannot be effective and dependable.

Marginal costing, if applied alone, will not be much use, unless it is combined with other techniques like standard costing and budgetary control.

Absorption costing and Marginal Costing

Absorption costing is the practice of charging all costs, both fixed and variable to operations, process or products. In marginal costing, only variable costs are charged to productions.

The Institute of Cost and Management Accountants (U.K.) defines it as, "the practice of charging all costs, both variable and fixed to operations, process or products." This explains why this technique is also called full costing. Administrative, selling and distribution overheads as much form part of total cost as prime cost and factory burden.

The following sample illustrates the difference between the two techniques.

PROFIT VOLUME RATIO

Profit Volume Ratio

Profit volume ratio, which is popularly known as P/V Ratio, expresses the relationship of contribution – sales ratio or marginal – income ratio or variable profit ratio. The ratio, expressed as a percentage, indicates the relative profitability of different products.

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

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} \text{ (or) } \frac{C}{S}$$

$$\text{Or} = \frac{\text{Fixed cost + Profit}}{\text{Sales}} \text{ (or) } \frac{F + P}{S}$$

$$\text{Or} = \frac{\text{Sales – Variable cost}}{\text{Sales}} \text{ (or) } \frac{S - V}{S}$$

The profit of a business can be increased by improving P/V ratio. As such management will make efforts to improve the ratio. A higher ratio means a greater profitability and vice versa. So management will increase the P/V ratio:

(a) by increasing sales price per unit.
(b) By decreasing variable costs.
(c) By increasing the production of products which is having a high P/V ratio and vice versa.

Q 1

Marginal cost Rs.2,400

Selling price Rs.3,000

Calculate P/V ratio.

Q 2

The sales turnover and profits during two periods are as under:

Period I : Sales Rs.20 lakhs; Profit Rs.2 lakhs

Period II : Sales Rs.30 lakhs; Profit Rs.4 lakhs

Calculate P/V ratio.

BREAK EVEN EBIT UNITS & REVENUE

Break Even Analysis

The break-even analysis point and break even chart are two by – products of break even analysis. In a narrow sense, it is concerned with the break – even point in a broad sense, it is concerned with break – even chart. Break – even analysis is also known as cost volume profit analysis. The analysis is a tool of financial analysis whereby the impact on profit of the changes in volume, price and costs and mix can be estimated with reasonable accuracy. Break – even point is equilibrium point or balancing point of no – profit no loss. This is a profit at which loss ceases and profit begins. This is a point where income is exactly equal to expenditure.

Break – Even Point

Break – even point is a point where the total sales are equal to total cost. In this point there is no profit or loss in the volume of sales. The formula to calculate break – even point is:

$$\text{B.E.P. (in units)} = \frac{\text{Total fixed cost}}{\text{Contribution per unit}}$$

$$= \frac{\text{Fixed cost}}{\text{Selling price per unit} - \text{Variable cost per unit}}$$

B.E.P. can be calculated, by using the formula:

$$\text{B.E.P. (Sales volume)} = \frac{\text{Fixed cost}}{\text{P/V ratio}} \text{ (or) } \frac{F}{\text{P/V ratio}}$$

2. Fixed cost = B.E.P. x P/V ratio.

Q 3

From the following particulars calculate the break – even point:

Variable cost per unit	Rs.12
Fixed expenses	Rs.60,000
Selling price per unit	Rs.18

Q 4

From the following particulars, find out the selling price per unit of B.E.P. is to be brought down to 9,000 units.

Variable cost per unit Rs.75

Fixed expenses Rs.2,70,000.

Selling price per unit Rs.100

Q 5.

The following data are obtained from the records of a company:

	First year	Second year
	Rs.	Rs.
Sales	80,000	90,000
Profit	10,000	14,000

Calculate the break – even point.

SALES FOR DESIRED PROFIT

Q 6.

Sales 10,000 units @ Rs.25 per unit

Variable cost Rs.15 per unit.

Fixed costs Rs.1,00,000.

Find out the sales for earning a profit of Rs.50,000.

MARGINE OF SAFETY

Margin of Safety is an important concept in Marginal Costing approach. Total sales minus the sales at break – even point is known as the Margin of Safety (M/S). That is, Margin of Safety is the excess of normal or actual sales over sales at break – even point. In other words, sales over and above break even sales are known as Margin of Safety. The margin of safety refers to the amount by which sales revenue can fall before a loss is incurred. That is, it is the difference between the actual sales and sales at the break – even point. Break – even point can be compared to a Red Signal Point. If the Margin of Safety is large, it is a sign of soundness of the business and vice versa. The margin of safety serves as a guide, is a reliable indicator of the business strength and soundness. Margin of safety can be expressed in absolute sales amount or in percentage.

High margin of safety indicates the soundness of a business because even with substantial fall in sale or fall in production, some profit shall be made. Small margin of safety on the other hand is an indicator of the weak position of the business and even a small reduction in sale or purchase will adversely affect the profit position of the business.

Margin of safety can be increased by:

(a) Decreasing the fixed cost;
(b) Decreasing the variable cost;
(c) Increasing the selling price;
(d) Increasing output and sales;
(e) Changing to a product mix that improves P/V Ratio.

Margin of Safety : Actual Sales – Sales at BEP

(OR) = $\frac{\text{Profit}}{\text{P/V Ratio}}$

(OR) = $\frac{\text{Profit}}{\text{Contribution}}$

$$\text{As a percentage} = \frac{\text{Margin of Safety}}{\text{Total Sales}} \times 100$$

Q 7

From the following details find out

(a) profit volume ratio,
(b) B.E.P.,
(c) Margin of Safety

	Rs.
Sales	1,00,000
Total costs	80,000
Fixed costs	20,000
Net profit	20,000

Q 8

The following information was obtained from a Company in a certain year:

Sales	Rs.1,00,000
Variable costs	Rs. 60,000
Fixed costs	Rs. 30,000

Find the P/V Ratio, break – even point and margin of safety.

COMPOSITE BREAK EVEN POINT

Q. 9

Raj Ltd. manufactures three products X, Y and Z. The unit selling prices of these products are Rs.100, Rs.160 and Rs.75 respectively. The corresponding unit variable costs are Rs.50, Rs.80 and Rs.30. The proportions (quantity wise) in which these products are manufactured and sold are 20%, 30% and 50% respectively. The total fixed costs are Rs.14,80,000.

Calculate overall break – even quantity and the product wise break up of such quantity.

MISLANIUS QUESTIONS BASED ON COST VOLUME PROFIT ANALYSIS

Q 10

A company earned a profit of Rs.30,000 during the year 2006-07. If the marginal cost and selling price of a product are Rs.8 and Rs.10 per unit respectively, find out the amount of 'margin of safety'.

Q 11:

X Ltd. has earned contribution of Rs.2,00,000 and net profit of Rs.1,50,000 on sales of Rs.8,00,000. What is its margin of safety?

Q 12:

If margin of safety is Rs.2,40,000 (40% of sales) and P/V ratio is 30% of AB Ltd., calculate its:

(1) Break – even sales

(2) Amount of profit on sales of Rs.9,00,000.

Q 13:

The ratio of variable cost to sales is 70%. The break – even point occurs at 60% of the capacity sales. Find the capacity sales when fixed costs are Rs.90,000. Also compute profit at 75% of the capacity sales.

Q 14:

The profit volume ratio of X Ltd. is 50% and the margin of safety is 40%.

You are required to calculate the net profit if the sales volume is Rs.1,00,000.

Q 15:

(i) Ascertain profit, when

Sales	= Rs.2,00,000
Fixed cost	= Rs.40,000
BEP	= Rs.1,60,000

(ii) Ascertain sales, when

Fixed cost	= Rs.20,000
Profit	= Rs.10,000
BEP	= Rs.40,000

Q 16:

A Company sells its product at Rs.15 p.u. In a period if it produces and sells 8,000 units, it incurs a loss of Rs.5 p.u. If the volume is raised to 20,000 units it earns a profit of Rs.4 p.u.

Calculate break – even point both in terms of rupees as well as in units.

Q 17:

Two firms A & Co. and B & Co. sell the same type of product in the same market. Their budgeted Profit and Loss Account for the year ending 31st March, 2007 are as follows:

(Rs.)

	A & Co.		B & Co.	
Sales		5,00,000		6,00,000
Variable costs	4,00,000		4,00,000	
Fixed costs	30,000	4,30,000	70,000	4,70,000
Net Profit		70,000		1,30,000

Required:

(1) Calculate at which sales volume of both the firms will earn equal profit.

(2) State which firm is likely to earn greater profits in condition of:

(i) Heavy demand for the product;
(ii) Low demand for the product. Give reasons.

Q 18:

A company has three factories situated in North, East and South with its Head Office in Mumbai. The Management has received the following summary report on the operations of each factory for a period.

(Rs.'000)

	Sales		Profit	
	Actual	Over/ (under) Budget	Actual	Over/ (Under) Budget
North	1,100	(400)	135	(180)
East	1,450	150	210	90
South	1,200	(200)	330	(110)

Calculate for each factory and for the company as a whole for the period:

(i) fixed costs,
(ii) break – even sales.

Q 19:

A, B and C are three similar plants under the same management who want them to be merged for better operation. The details are as under:

(Rs. lakhs)

Plant	A	B	C
Capacity operated	100%	70%	50%
Turnover	300	280	150
Variable Cost	200	210	75
Fixed cost	70	50	62

Find out:

(i) The capacity of the merged plant for break – even.
(ii) The profit at 75% capacity of the merged plant.
(iii) The turnover from the merged plant to give a profit of Rs.28 lakhs.

Q 20:

The comparative profit statement of two quarters of a firm is as under:

(Rs.)

	Quarter I	Quarter II
Units sold	2,500	3,750
Direct materials	87,500	?
Direct wages	62,500	?
Fixed and variable factory overheads	75,000	95,000
Sales	2,75,000	?
Profit	50,000	66,250

In the second quarter, the direct material price has increased by 20%. There was a saving of Rs.5,000 in fixed overheads in the second quarter. The other costs and selling price remained the same.

Determine the quantity that should have been sold in the second quarter to maintain the same amount of profit per unit as in the first quarter.

Q 21:

A company had incurred fixed expenses of Rs.4,50,000 with sales of Rs.15,00,000 and earned a profit of Rs.3,00,000 during the first half year. In the second half, it suffered a loss of Rs.1,50,000.

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.
(iii) The break – even point and margin of safety for the whole year.

Q 22:

PQR Ltd. has furnished the following data for the two year:

Particulars	2007	2008
Sales	Rs.8,00,000	?
Profit/Volume ratio (P/V ratio)	50%	37.5%
Margin of safety sales as % of Total sales	40%	21.875%

There has been substantial savings in the fixed cost in the year 2008 due to the restructuring process. The company could maintain its sales quantity level of 2007 in 2008 by reducing selling price.

You are required to calculate the following:

(i) Sale for 2008 in Rs.
(ii) Fixed cost for 2008.
(iii) Break-even sales for 2008 in Rs.

Q 23:

A single product company sells its products at Rs.60 per unit. In 2007, the company operated at a margin of safety of 40%. The fixed costs amounted to Rs.3,60,000 and the variable cost ratio to sales was 80%.

In 2008, it is estimated that the variable cost will go up 10% and the fixed costs will increase by 5%. Find the selling price required to be fixed in 2008 to earn the same P/V ratio as in 2007.

Assuming the same selling price of Rs.60 per unit in 2008, find the number of units required to be produced and sold to earn the same profit as in 2007.

Q 24:

An Automobile manufacturing company produces different models of cars. The budget in respect of model 118 for the month of September, 2007 is as under:

		(Rs. lakhs)
Budgeted output	40,000 units	
Variable costs:		
Materials	264	
Labour	52	
Direct expenses	124	440.00
Fixed costs:		
Specific fixed costs	90.00	
Allocated fixed costs	112.50	202.50
Total costs		642.50
Add: Profit		57.50
Sales		700.00

Calculate:

(i) Profit with 10% increase in selling price with a 10% reduction in sales volume.

(ii) Volume to be achieved to maintain the original profit after a 10% rise in material costs, at the originally budgeted selling price per unit.

Q 25:

A company manufactures a single product with a capacity of 1,50,000 units per annum. The summarized profitability statement for the year is as under:

		(Rs. lakhs)
Sales: 1,00,000 units @ Rs.15 p.u.		15,00,000
Cost of sales:		
Direct materials	3,00,000	
Direct labour	2,00,000	
Production overhead: Variable	60,000	
Fixed	3,00,000	
Administrative overheads (fixed)	1,50,000	
Selling and distribution overheads:		
Variable	90,000	
Fixed	1,50,000	12,50,000
		2,50,000

You are required to evaluate the following options:

(i) What will be the amount the sales required to earn to target profit of 25% on sales, if the packing is improved at a cost of Re.1 per unit?

(ii) There is an offer from a large retailer for purchasing 30,000 per annum, subject to providing a packing with a different brand name at a cost of Rs.2 per unit. However, in this case there will be no selling and distribution expenses. Also this will not, in any way, affect the company's existing business. What will be the break – even price for this additional offer ?

(iii) If an expenditure of Rs.3,00,000 is made on advertising, the sales would increase from the present level of 1,00,000 units to 1,20,000 units at a price of Rs.18 per unit. Will that expenditure be justified ?

(iv) If the selling price is reduced by Rs.2 per unit, there will be100% capacity utilization. Will the reduction in selling price be justified?

Q 26:

A company has prepared the following budget of sales:

Product	Sales (Rs.)	PV ratio (%)
A	6,00,000	40
B	9,00,000	30
C	10,00,000	25

The fixed costs amount to Rs.80,000.

You are required to revise the sales mix to ensure a profit of Rs.10,000 in such a way that not more than Rs.8,00,000 of sales of Product A is possible and that the present total value of sales should be altered.

Q 27:

A Company, which manufactures and sells three products, furnished the following retails for a month:

Products		A	B	C
No. of units budgeted		1,00,000	38,000	46,000
Selling price per unit	(Rs.)	50	80	60
Variable costs per unit	(Rs.)	34	52	24

It has been proposed that an intensive advertisement campaign involving an expenditure of Rs.1,20,000 per month and reduction of selling prices will increase the sales of Product C as under:

(i) If the selling price is reduced to Rs.55 per unit, the sales will increase to 59,000 units per month.
(ii) If the selling price is reduced to Rs.51 per unit, the sales will increase to 65,000 units per month.

The fixed costs of the company amount to Rs.34,20,000 per month.

Required:

(i) Calculate the current monthly break – even sales value of the company.
(ii) Evaluate the two proposals and advise which of the proposals should be implemented.
(iii) Calculate the sales units required per month of Product C to justify the expenditure on advertisement in respect of your decision in (ii) above.

Q 28

A Company produces single product which sells for Rs. 20 per unit. Variable cost is Rs. 15 per unit and fixed overhead for the year is Rs. 6, 30,000.

Required:

(a) Calculate sales value needed to earn a profit of 10% on sales.

(b) Calculate sales price per unit to bring BEP down to 1, 20,000 units.

(c) Calculate margin of safety sales if profit is Rs. 60,000.

Ans :- Rs. 42,00,000 ; Rs. 20.25; 25%

Q 29:

A Company has fixed cost of Rs. 90,000, Sales Rs. 3, 00,000 and Profit of Rs. 60,000.

Required:

(1) Sales volume if in the next period, the company suffered a loss of Rs. 30,000.
(2) What is the margin of safety for a profit of Rs. 90,000? (MAY 2008)

Ans: P/V Ratio = 50%. (1) 1, 20,000 (2) 1, 80,000.

Q 30:

PQ Ltd. reports the following cost structure at two capacity levels:

(100% capacity)

	2,000 units'	1,500 units
Production overhead I	Rs. 3 per unit	Rs. 4 per unit
Production overhead II	Rs. 2 per unit	Rs. 2 per unit

If the selling price, reduced by direct material and labour is Rs. 8 per unit, what would be its break-even point?

Ans: 1,000units.

Q 31:

Maximum product capicity of JK Ltd. is 5,20,000 units per annum Details of estimated cost of production are as follows :

- Direct material Rs. 15 per unit .
- Direct wages Rs. 9 per unit (subject to a minimum of Rs. 2,50,000 per month
- Fixed overheads Rs. 9,60,000 per annum .
- Variable overheads Rs. 8 per unit
- Semi variable overheads are Rs. 5,60,000 per annum up to 50 percent capicity and additional Rs. 1,50,000 per annum for every 25 percent increase in capicity or part of it .
- JK Ltd. worked at 60 percent capicity for the first three months during the year 2008 but it is excepcted to work at 90 percent capicity for the remaining nine months .
- The selling price per unit was Rs. 44 during the first three months .

You are required :

What selling price per unit should be fixed for the remaining nine months to yield a total profit of Rs. 15,62,500 for the whole year .

Ans :- Rs. 39 per unit .

Q 32:

Following information is available for the first and second quarter of the year 2008-09 of ABC Limited:

	Production (in units)	Semi-variable cost (Rs.)
Quarter I	36,000	2, 80,000
Quarter II	42,000	3, 10,000

You are required to segregate the semi-variable cost and calculate:

(a) Variable cost per unit; and

(b) Total fixed cost.

Ans: variable cost p.u: 5, fixed cost: 1, 00,000.

Q 33:

Product Z has a profit volume ratio of 28% .Fixed operating costs directly attributable to product Z during the quarter II of the financial year 2009 -2010 will be Rs. 2,80,000 .

Calculate the sales revenue required to achieve a quarterly profit of Rs. 70,000.

Ans :- 12,50,000.

Q 34:

The following information is available

	1st April ,2008 to 30th June 2008	**1st July ,2008 to 31st March 2009**
Output	10,000 units	35,000 units
Total overheads	Rs. 40,000	Rs. 1,35,000

You are required to calculate the amount of variable overhead per unit and amount of total fixed overheads for whole the year 2008-09

Q 35:

Following informations are available for the year 2008 and 2009 of PIX 3 Limited :

Year	2008	2009
Sales	Rs. 32,00,000	Rs. 57,00,000
Profit / (Loss)	(Rs. 3,00,000)	Rs. 7,00,000

Calculate – (1) P/V ratio, (2) Total fixed cost, and (3) Sales required to earn a Profit of Rs. 12,00,000.

Ans :- 40% , Rs. 15,80,000

Q 36:

MNP ltd. Sold 2, 75,000 units of its product at Rs. 37.50 per unit. Variable costs are Rs. 17.50 per unit. (Manufacturing cost of Rs. 14 and selling cost of Rs. 3.50 per unit).fixed cost are incurred uniformly throughout the year and amount to Rs. 35, 00,000 (including depreciation of Rs. 15, 00,000). There are no beginning and ending inventories.

Required:

(1) Estimate break even sales level quantity and cash break even sales level quantity.
(2) Estimate the P/V ratio.
(3) Estimate the number of units that must be sold to earn an income (EBIT) of Rs. 2, 50,000.
(4) Estimate the sales level to achieve an after tax income (PAT) of Rs. 2, 50,000. Assume 40% corporate income tax rate.

Ans: (1) 1, 75,000 units. 1, 00,000 units. (2) 53.33%. (3) 1, 87,500 units. (4) 73, 44,210.

-

APPLICATION OF MARGINAL COSTING

1. Profit planning

There are four ways in which profit performance of a business can be improved:

(a) by increasing volume;

(b) by increasing selling price;

(c) by decreasing variable costs; and

(d) by decreasing fixed costs.

Profit planning is the planning of future operations to attain maximum profit or to maintain a specified level of profit. The contribution ratio (which is the ratio of marginal contribution to sales) indicates the relative profitability of the different sectors of the business whenever there is a change in selling price, variable costs or product mix. Due to the merging together of fixed and variable costs, absorption costs fail to bring out correctly the effect of any such change on the profit of the concern.

Q 37:

A toy manufacturer earns an average net profit of Rs. 2.50 per piece on a selling price of Rs. 14.30 by producting and selling 60,000 pieces at 60% of the potential capacity. His cost of sale is :

Direct Material	Rs. 3.50
Direct wages	Rs. 1.25
Works overhead	Rs. 6.25 (50% fixed)
Sales overhead	Rs. 0.80 (25% variable)

During the current year, he anticipates that his fixed charges will go up by 10% while rates of direct material and direct labour will increase by 6%. And 8% respectively .But he has no option of increasing the selling price .

Under this sititution he obtains an offer for an order equal to 20% of his capicity .The concerned customer is a special customer .

What minimum price will you recommend for accepting to ensure the manufacturer an overall profit of Rs. 1,67,300 ?

Ans :- Rs. 11.297

Q 38:

The following data relate to a manufacturing company :

Plant capacity : 4,00,000 units per annum

Present utilization : 40%

Actuals for the year were :

Selling Price	Rs.50 per unit
Materials Cost	Rs.20 per unit
Variable Manufacturing Cost	Rs.15 per unit
Fixed Costs	Rs.27 lakhs

In order to improve capacity utilization the following proposals are considered :

Reduce Selling Price by 10%

Spend additionally Rs.3 lakhs on Sales Promotion

How many units should be made and sold to earn a profit of Rs.5 lakhs per year in both the proposals.

[Ans. 3,50,000 units

2. Evaluation of Performance

The various section of a concern such as a department, a product line, or a particular market or sales division, have different revenue earning potentialities. A company always concentrates on the departments or product lines which yield more contribution than others. The performance of each such sector can be brought out by means of cost volume-profit analysis or the contribution approach. The analysis will help the company to take decision that will maximise the profits.

Q 39:

A business produces three prodcuts A,B and C for which the standard variable costs and budgeted selling price are as follows :

	A	B	C
	Rs.	Rs.	Rs.
Direct materials	3	6	8
Direct wages	4	4	10
Variable overheads	3	5	7
Selling price	18	25	48

In two successive periods sales are as follows :

	A	B	C
	Units	Units	Units
Period 1	10,000	10,000	10,000
Period 2	20,000	13,000	5,000

The budgeted fixed overheads amounted to Rs. 1,35,000 for each period .in spite of increased sales the profit for the second period has fallen below that of the 1st period .

Present figures to management to show why this fall in profit should ,or should not have occurred .

Make or Buy Decisions

When the management is confronted with the problem whether it would be economical to purchase a component or a product from outside sources, or to manufacture it internally, marginal cost analysis renders useful assistance in the matter. Under such circumstances, a misleading decision would be taken on the basis of the total cost analysis. In case the proposal is to buy from outside then, what is already being made, and the price quoted by the outsider should be lower than the marginal cost. If the proposal is to make something what is being purchased outside, the cost of making should include all additional costs like depreciation on new plant, interest on capital involved and that cost should be compared with the purchase price.

Q 40:

A T.V. manufacturing co. finds that while it costs Rs. 6.25 to make component R-518, the same is available in the market at Rs. 5.75 each, with an assurance of continued supply. The break-down of the cost is:

	Rs.
Materials	2.75 each
Labour	1.75 each
Other variables	0.50 each
Depreciation and other fixed costs	1.25 each
	6.25 .

(a) Should you make or buy? [Ans. Make]
(b) What would be your decision, if the supplier offered the component at Rs. 4.85 each? [Ans. Buy]

Closure of a Department or Discontinuance of a Product

As discussed earlier, marginal costing technique helps in deciding the profitability of a product. It provides the information in a manner that tells us how much each product contributes towards fixed cost and profit; the product or department that gives least contribution should be discarded except for a short period. If the management is to choose some product out of the given ones, then the products giving the highest contribution should be chosen and those giving the least should be discontinued.

Maintaining a Desired Level of Profit

A company has to cut prices of its products from time to time because of competition, Government regulations and other compelling reasons. The contribution per unit on account of such cutting is reduced while the industry is interested in maintaining a minimum level of its profits. In case the demand for the company's product is elastic, the maximum level of profits can be maintained by pushing up the sales. The volume of such sales can be found out by marginal costing techniques.

Q 41:

S.Ltd. manufactures and markets a single product. The following information is available

	Rs. Per unit
Materials	8.00
Conversion costs (variable)	6.00
Dealer's margin	2.00
Selling Price	20.00

Fixed Cost : Rs.2,50,000

Present sales 80,000 units

Capacity utilization : 60 per cent

There is acute competition. Extra efforts are necessary to sell. Suggestions have been made for increasing sales :

(a) By reducing selling price by 5 per cent.
(b) By increasing dealer's margin by 25 per cent over the existing rate.

Which of the two suggestions you would recommend if the company desires to maintain the present profit ? Give reasons.

[Ans.: (a) 1,16,111 units; (b) 1,02,857 units]

Offering Quotations

One of the best ways for sales promotion is to offer quotations at low rates. A company is producing 80,000 units (80% of capacity) and making a profit of `2,40,000. Suppose the Punjab Government has given a tender notice for 20,000 units. It is expected that the units taken by the Government will not affect the sale of 80,000 units which the company is already selling and the company also wishes to submit the lowest possible quotation. The company may quote any amount above marginal cost, because it will give an additional marginal contribution and hence profit.

Accepting an Offer or Exporting below Normal Price

Sometimes the volume of output and sales may be increased by reducing the normal prices of additional sale. In this case the concern should be cautious enough to see that the sale below

normal price in additional markets should not affect the normal market. To be on the safe side the product may be sold under the label of a different brand. If there is additional sale because of export orders, goods may be sold at a price below the normal.

Q 42:

The cost of manufacturing company for the product is :

	Rs.
Materials	12.00
Labour	9.00
Variables expenses	6.00
Fixed expenses	18.00
Total	45.00

The unit of product is sold for Rs. 51.00

The company 's normal capicity is 1,00,000 units .The figures given above are for 80,000 units .The company has received an offer for Rs 20,000 units @ Rs. 36 per unit from a foreign customer .

Advise the manufacturer on whether the order should be accepted .Also give you advice if the order if from a local merchant .

Alternative Use of Production Facilities

Problem of Key Factor

The product giving the greatest contribution will be the most profitable. To maximise profit, resources should be mobilised towards that product which gives the maximum contribution. But contribution is not the only criterion for deciding profitability. In real life, there may be several factors which may put a limit on the number of units to be produced even if the products give a high contribution. These factors are equally important for arriving at managerial decisions because these factors limit the volume of output at a particular point of time or over a period. these are called key factors, scarce factors, limiting factors, principal budget factors or governing factors. The limiting factors may be sale, raw material, labour, plant capacity and availability of capital e.g., for a concern established in a relatively new town, labour may be a key factor or the concern may find it difficult to acquire an unlimited quantity of raw material because of scarcity or the quota system, etc. In the later case material will be the key factor. The extent of influence of these factors should be carefully examined before arriving at a particular decision. Contribution

per unit of key factor should be considered and that course of action should be adopted which gives the highest contribution per unit of key factor.

Q 43:

You are given the folowing information in respect of products X and Y of Beecee Co. Ltd.

	Product X	Product Y
Selling price	Rs. 42	Rs. 33
Direct material	Rs. 15	Rs. 15
Labour hours (50 paise per hour)	18 hours	9 hours
Variable overheads	50% of Direct wages	

Show ehich product is more profitable during labour shortage .

Ans :- X= 0.75 Y= 1.25

Q 44:

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
Sales		2,500	5,000
Material cost	(Rs.50 per kg)	500	1,250
Direct labour	(Rs.30 per hr)	750	1,500
Variable overhead		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 kgs. and maximum sales potential of each product is 1,000 units, find the product mix to yield maximum profits.

Selection of a Suitable Product Mix

A concern, which manufactures more than one product, may have to decide in what proportion should these products be produced or sold. The technique of marginal costing helps to a great extent in the determination of most profitable product or sales mix. The best product mix is that which yields the maximum contribution. In the absence of key factor, contribution under various mix will be found out and the mix which gives the highest contribution will be selected for production

Q 45:

A company engaged in plantation activities has 200 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 price per kg,. are as under .

	Yield (Kgs.)	Selling price (Rs. Per Kg.
Tea	2,000	20
Coffee	500	40
Cardamom	100	250

The relevant cost data are given below :

(a) variable cost per KG.

	Tea (Rs.)	Coffee (Rs.)	Cardamom (Rs.)

Labour charges	8	10	120
Packing materials	2	2	10
Other costs	4	1	20
Total costs	14	13	150

	Rs.
Cultivation and growing cost	10,00,000
Administrative cost	2,00,000
Land revenues	50,000
Repairs and maintenance	2,50,0000
Other costs	3,00,000
Total cost	18,00,000

The policy of the company is to produce and sell all the three kinds of prodcuts and the maximum and minimum are to be cultivated per product is as follows :

	Maximum Area (hectares)	Minimum Area Hectares
Tea	160	120
Coffee	50	30
Cardamom	30	10

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

Ans :- Rs. 6,55,00

MARGINAL AND ABSORPTION COSTING

Q 46:

ABC Ltd. can produce 4,00,000 units of a product per annum at 100% capacity. The variable production costs are Rs. 40 per unit and the variable selling expenses are Rs. 12 per sold unit.

The budgeted fixed production expenses were Rs. 24,00,000 per annum and the fixed selling expenses were Rs. 16,00,000. During the year ended 31st March, 2008, the company worked at 80% of its capacity. The operating data for the year are as follows:

Production 3,20,000 units

Sales @ Rs. 80 per unit 3,10,000 units

Opening stock of finished goods 40,000 units

Fixed production expenses are absorbed on the basis of capacity and fixed selling expenses are recovered on the basis of period.

You are required to prepare Statements of Cost and Profit for the year ending 31st March,2008:

(i) On the basis of marginal costing

(ii) On the basis of absorption costing.

Ans :- 47,40,00

Q 47:

Mega Company has just completed its first year of operations. The unit costs on a normal costing basis are as under:

		Rs.
Direct material 4 kg @ Rs.4 =		16.00
Direct labour 3 hrs @ Rs.18 =		54.00
Variable overhead 3 hrs @ Rs.4=	12.00	
Fixed overhead 3 hrs @ Rs.6 =	18.00	
		100.00

Selling and administrative costs:

Variable	Rs.20 per unit
Fixed	Rs.7,60,000

During the year the company has the following activity:

Units produced = 24,000

Units sold = 21,500

Unit selling price = Rs.168

Direct labour hours worked = 72,000

Actual fixed overhead was Rs.48,000 less than the budgeted fixed overhead. Budgeted variable overhead was Rs.20,000 less than the actual variable overhead. The company used an expected actual activity level of 72,000 direct labour hours to compute the predetermine overhead rates.

Required :

(i) Compute the unit cost and total income under:

(a) Absorption costing

(b) Marginal costing

(ii) Under or over absorption of overhead.

(iii) Reconcile the difference between the total income under absorption and marginal costing.

Ans :- (i) Rs. 2,55,000 ; (ii) Rs. 28,000 (iii) Rs. 45,000

PROBLEM ANS SOLUTION

Practical Problem

SOLVED QUESTIONS

Q.1

Product Z has a profit-volume ratio of 28%. Fixed operating costs directly attributable to product Z during the quarter II of the financial year 2009-10 will be Rs. 2, 80,000.

Calculate the sales revenue required to achieve a quarterly profit of Rs. 70.000.

Solution;

P/V ratio = 28%

Quarterly fixed Cost = Rs.2,80,000

Desired Profit = Rs.70,000

Sales revenue required to achieve desired profit

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

$$= \frac{2,80,000 + 70,000}{28\%} = \text{Rs.}12,50,000$$

Q.2. Quality Products Ltd. Manufactures and markets a single product. The following data are available:

	Rs. Per unit
Materials	16
Conversion costs (variable)	12
Dealer's margin (10% of sales)	4
Selling price	40
Fixed cost: Rs.5 lakhs	
Present sales: 90,000 units	
Capacity utilization: 60 percent.	

There is acute competition. Extra efforts are necessary to sell. Suggestions have been made for increasing sales:

a) By reducing selling price by 5 percent.
b) By increasing dealer's margin by 25 percent over the existing rate.

Which of these two suggestions you would recommend, if the company desires to maintain the present profit? Give reasons.

Solution:

Present variable cost per unit:	Rs.
Materials	16
Conversion costs	12
Dealer's margin	4

Total	32

Contribution per unit = Selling price – Variable cost

= Rs.40 - Rs.32

= Rs.8

Total Contribution = Rs.8 × 90,000 units = Rs.7,20,000

In both the suggestions, fixed costs remain unchanged. Therefore, the present profit of Rs.2,20,000 (i.e. Rs.7,20,000 - Rs.5,00,000) can be maintained by maintaining the total contribution at the present level i.e. Rs.7,20,000.

(a) Reducing selling price by 5%:

New sales price = (Rs.40 - Rs.2) or Rs.38

New dealer's margin = 10% of Rs.38 or Rs.3.80

New variable cost = Rs.16 + Rs.12 + Rs.3.80 = Rs.31.80

New contribution per unit = Rs.38 - Rs.31.80

= Rs.6.20

Sales (in units) required to maintain present level of profit:

$$= \frac{\text{Total Contribution}}{\text{Contribution per unit}}$$

$$= \frac{\text{Rs.7,20,000}}{\text{Rs.6.20}} \text{ or 1,16,129 units}$$

(b) Increasing dealer's margin by 25%

New margin will be (Rs.4 + 25% of Rs.4) i.e. Rs.5

New variable cost = Rs.16 + Rs.12 + Rs.5 or Rs.33

Contribution = Rs.40 - Rs.33 = Rs.7

Sales (in units) $= \frac{\text{Rs.7,20,000}}{7}$ or 1,02,857 units

The second proposal is recommended because the contribution per unit is higher; and the sales (in units) are lower. Lower sales efforts and less finance would be required in implementing (b) proposal. The company can earn higher profits by increasing its sales, as an alternative.

Q.3. The following data relate to a manufacturing company:

Plant capacity: 4,00,000 units per annum

Present utilization: 40%

Actuals for the year 1994 were:

Selling price	Rs.50 per unit
Materials Cost	Rs.20 per unit
Variable Manufacturing Cost	Rs.15 per unit
Fixed Costs	Rs.27 lakhs

In order to improve capacity utilization the following proposals are considered:

(i) Reduce Selling Price by 10%
(ii) Spend additionally Rs.3 lakhs on Sales Promotion.

How many units should be made and sold to earn a profit of Rs.5 lakhs per year.

Solution:

Revised Selling Price (Rs.50 less 10%)	Rs.45 per unit
Variable Cost	
Material Cost	Rs.20
Variable Manufacturing Cost	Rs.15
Total variable Cost	Rs.35 per unit
Contribution	Rs.10 per unit

(i) Sales (Units) = $\frac{\text{27 lakhs + 5 lakhs}}{10}$

= 3.2 lakhs

(ii) Fixed Cost = 27 lakhs + 3 lakhs = 30 lakhs

Sales (Units) = $\frac{\text{30 lakhs + 5 lakhs}}{50-35}$

= 35 lakhs

15

= 2,33,333 units

Determination of Sales Value and Margin of Safety

Q.4

A company has fixed cost of Rs. 90,000, Sales Rs.3, 00,000 and profit of Rs.60, 000

Required:

(i) Sales volume if in the next period, the company suffered a loss of Rs. 30,000

(ii) What is the margin of safety for a profit of Rs. 90,000?

Solution:

P/V ratio = Contribution × 100

Sales

= 1, 50,000 × 100 = 50%

3, 00,000

(i) If in the next period company suffered a loss of Rs.30, 000 then

Contribution = Fixed Cost ± Profit

= Rs.90, 000 - Rs.30, 000 (as it is a loss)

= Rs.60, 000.

Then Sales = Contribution or 60,000 = Rs.1,20,000.

P/V ratio .50

So, there will be loss of Rs.30,000 at sakes if Rs.1,20,000.

(ii) Margin of safety = Profit or 90,000 = Rs.1, 80,000

P/V ratio .50

Alternative solution of this part:

Break-even Sales = Fixed Cost = 90,000 = Rs.1,80,000

P/V ratio .5

Sales at profit of Rs.90,000 = $\frac{\text{Fixed Cost + Profit}}{\text{PV Ratio}}$

$= \frac{90,000 + 90,000}{.5}$

$= \frac{1,80,000}{.5}$

= Rs.3,60,000

Margin of Safety = Sales – Break- even Sales

= 3,60,000- 1,80,000

= Rs.1,80,000.

Determination of BEP and Margin of Safety

Q.5 From the following data, compute break-even sales and margin of safety:

Sales	Rs.10,00,000
Fixed cost	3,00,000
Profit	2,00,000

Solution:

Contribution = Fixed Cost + Profit = 5 lakhs

= P/V Ratio = 50%

= Break Even Sales = $\frac{\text{Fixed Cost}}{\text{P/V ratio}} = \frac{\text{3 lakhs}}{50\%}$

= 6 lakhs

Margin of safety = Actual Sales – Break Even Sales

= 10 lakhs – 6 lakhs = 4 lakhs

Determination of P/V Ratio, EBP, Net Profit, Sales Value and Margin of Safety

Determination of BEP and profit

Q.6 From the following data, calculate break-even point (BEP):

Selling price per unit	20
Variable cost per unit	15
Fixed overheads	20,000

If sales are 20% above BEP, determine the net profit.

Solution:

Break Even Point = $\frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{20,000}{5} = 4,000$ units

Sales Value (4800×20)	96,000
Less: Variable Cost (4800×15)	(72,000)
contribution	24,000
Less: Fixed Cost	(20,000)
Profit	4,000

Q.7 (i) Ascertain profit, when Sales = Rs. 2,00,000

Fixed Cost = Rs. 40,000

BEP = Rs. 1,60,000

(ii) Ascertain sales, when Fixed Cost = Rs. 20,000

Profit = Rs. 10,000

BEP = Rs. 40,000

Solution: (i) BEP (Rs.) = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}}$

Rs.1,60,000 = $\frac{\text{Rs.40,000}}{\text{P/V Ratio}}$

P/V Ratio = 25%

Sales	2,00,000
(-) VC (@ 75%)	1,50,000
Contribution	50,000
(-) FC	40,000
Profit	10,000

(ii) BEP (Rs.) = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}}$

Rs.40,000 = $\frac{\text{Rs.20,000}}{\text{P/V Ratio}}$

P/V Ratio = 50%

Sales = $\frac{\text{Fixed Cost + Profit}}{\text{P/V Ratio}}$ = $\frac{\text{20,000+10,000}}{\text{50\%}}$ = Rs.60,000

Determination of Net Profit

Q.8 The profit/volume ratio of X Ltd. Is 50% and the margin of safety is 40%. You are required to calculate the net profit if sale volume is Rs.1,00,000.

Solution: Sales = Rs.1,00,000

Margin of Safety = Rs.40,000

Break Even Sales = Rs.60,000

Break Even Sales = Fixed Cost/P/V ratio

Or Fixed Cost = Rs.30,000

If P/V ratio is 50%, variable cost ratio is 50% of sales.

Sales	Rs.1,00,000

Variable cost 50%	50,000
Contribution	50,000
Less Fixed Cost	30,000
Profit	20,000

Determination of Sales for Desired Profit

Q.9 Ray pens Ltd., manufacturer's only pens where the marginal cost of each pen is Rs.3. It has fixed costs of Rs.25,000 per annum. Present production and sales of pens is 50,000 units and selling price per pen is Rs.5. Any sale beyond 50,000 pens is possible only if the company reduces 20% of its current selling price.

However, the reduced price applies only to the additional units. The company wants a target profits of Rs.1,00,000. How many pens to company must produce and sell if the target profit is to be achieved?

Solution:

Additional units = X

Sales 4

(-) Variable Cost (3)

Contribution 1

Total contribution = (5 - 3) × 50,000 + 1 × X

(-) Fixed Cost = 25,000

Profit = 1, 00,000

1, 00,000 + X – 25,000 = 1, 00,000

X = 25,000 units

Total Production = 50,000 units + 25,000 units = 75,000 units

Q.10 A single product company sells its products at Rs.60 per unit. In 2006, the company operated at a margin of safety of 40%. The fixed costs amounted to Rs.3,60,000 and the variable cost ratio to sales was 80%.

In 2007, it is estimated that the variable cost will go up by 10% and the fixed costs will increase by 5%.

Find the selling price required to be fixed in 2007 to earn the same P/V ratio as in 2006.

Assuming the same selling price of Rs.60 per unit in 2007, find the number of units required to be produced and sold to earn the same profit as in 2006.

Solution:

Working notes

1. P/V Ratio in 2006:

$$\text{P/V Ratio} = \frac{\text{Selling price per unit} - \text{Variable per unit}}{\text{Selling Price per unit}} \times 100$$

$$= \frac{\text{Rs.60 - Rs.48}}{\text{Rs.60}} \times 100 = \frac{\text{Rs.12}}{\text{Rs.60}} \times 100 = 20\%$$

2. Number of units sold (in 2006)

$$\text{Break-even Point} = \frac{\text{Fixed cost}}{\text{Contribution per unit}} \quad \frac{\text{Rs.3,60,000}}{\text{Rs.12}} = 30{,}000$$

The margin of safety is 40%, hence break even point is at 60% of units sold.

$$\text{Or, No. of units sold} = \frac{\text{Break-even-point}}{60\%} = \frac{30{,}000 \text{ units}}{60} \times 100 = 50{,}000 \text{ units}$$

3. Profit earned in 2006

Profit = Units sold in 2006 × contribution per unit – Fixed costs

= 50,000 units × Rs.3, 60,000

= Rs.6, 00,000 - Rs.3, 60,000 = Rs.2, 40,000

Fixation of Selling Price in 2007

Variable Cost per unit in 2007 = Rs.48 + Rs.4.80 = Rs.52.80

Fixed Cost in 2007 = Rs.3, 60,000 + Rs.18, 000 = Rs.3, 78,000

P/V Ratio is 2006 = 20%

Since P/V Ratio is 20%

Hence, Variable Cost is 80%

$$\text{Hence, the required selling price} = \frac{\text{Rs.52.80}}{} = \text{Rs.66}$$

80%

Number of units to be produced and sold in 2007 to earn the same profit as in 2006

Profit in 2006 = Rs.2, 40,000

Fixed Cost in 2007 = Rs.3, 78,000

Desired contribution in 2007

(Rs.2,40,000 + Rs.3,78,000 = Rs.6,18,000

Contribution per unit in 2007 = Selling price per unit – Variable cost per unit

= Rs.60 - Rs.52.80 = Rs.7.20

Number of units to be produced

And sold in 2007 $= \frac{\text{Fixed cost in 2007}}{\text{Contribution per unit in 2007}}$

$= \frac{\text{Rs.6,18,000}}{\text{Rs.7.20}}$ = 85,833 units.

Q.11 If fixed costs are Rs.4,000, variable costs Rs.32,000 and break-even point Rs.20,000, find:

(1) Profit-volume ratio

(2) Sales

(3) Net profit

(4) Margin of safety.

Solution

(1) Profit volume ratio:

Since, Break-even point (Rs.) $= \frac{\text{Fixed costs}}{\text{P/V ratio}}$

Therefore, P/V ratio $= \frac{\text{Fixed cost}}{\text{Break-even point}} \times 100$

$= \frac{\text{Rs.4,000,}}{} \times 100$

Rs.20,000

= 20%

(2) Sales: If P/V ratio is 20%, the variable cost to sales would be 80%.

Therefore, sales $= \frac{\text{Variable cost}}{80} \times 100$

$= \frac{\text{Rs.32,000} \times 100}{80}$

= Rs.40,000

(3) Net profit = Sales – Variable cost – Fixed cost

= Rs.40,000 - Rs.32,000- Rs.4,000

= Rs.4,000

(4) Margin of safety = Sales – Break even point

= Rs.40, 000 - Rs.20, 000

= Rs.20, 000

Q.12 Solo Company produces a single article. Following cost data is given about its product:-

Selling price per unit	Rs.200
Marginal cost per unit	Rs.120
Fixed cost per annum	Rs.8,000

Calculate:

(a) P/V ratio, (b) Break-even sales,

(c) Sales to earn a profit of Rs. 10,000, (d) Profit at sales of Rs. 60,000

(e) New break-even sales, if sales price is reduced by 10%.

Solution:

(a) P/V Ratio = Contribution/ Sales × 100
= (200 - 120) / 200 × 100 = 80/200 × 100 =40%

(b) Break-even sales = Fixed Cost/ P/V Ratio
= (8,000 × 100)/ 40 = Rs.20,000 (or 100 units)

(c) Sales to earn a profit of Rs.10,000
Desired Contribution = 8,000 + 10,000

Desired Sales = Rs.18,000 × 100/40 = Rs.45,000 (or 225 units)

(d) Profit = Rs.60,000 × 40/100 - Rs.8,000 = 24,000 – 8,000 = Rs.16,000

(e) New Sales Price = Rs.200 - Rs.20 = Rs.180
Marginal cost Rs.120

Contribution Rs.60

P/V Ratio = Contribution/Sales

= 60/180 × 100 = 331/3 %

New Break-even sales = Rs.8,000/331/3 % = Rs.24,000.

Q.13 From the following data, find out (i) sales: and (ii) new break-even sales, if selling price is reduced by 10%

	Rs.
Fixed cost	4,000
Break-even sales	20,000
Profit	1,000
Selling price per unit	20

Solution:

$$\text{Break Even Sales} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}} \times \text{Sale Price per unit}$$

$$20{,}000 = \frac{4{,}000}{\text{Contribution per unit}} \times 20$$

Contribution = Rs.4

(i) Desired Sales = $\frac{\text{Fixed Cost + Profit}}{\text{Contribution per unit}} \times$ Sale Price per unit

$= \frac{4{,}000 + 1{,}000}{4} \times 20 = 25{,}000$

(ii) If Sale Price per unit is reduced by 10% = New Sales Price per unit = 18

New Contribution = 4 – (20 - 18)

= New Break Even Sales = $\frac{4{,}000}{2} \times 18$ = 36,000

Q.14 From the data given below find out:

(a) P/V Ratio,

(b) Sales, and

(c) Margin of Safety

Fixed cost	Rs.2,00,000
Profit	Rs.1,00,000
B.E. Pont	Rs.4,00,000

Solution:

(a) P/V Ratio = Fixed Cost / Break even sales
P/V Ratio = Rs.2,00,000/4,00,000 or 50

(b) Sales = Contribution/P/V Ratio

= (Rs.2,00,000 + Rs.1,00,000)/ 50%

= (3,00,000 × 100)/ 50 = Rs.6,00,000

(c) Margin of Safety = Sales – E.B. Sales

= Rs.6,00,000 - Rs.4,00,000 = Rs.2,00,000

Q.15 If fixed costs are Rs.24,000, margin of safety Rs.40,000 and break-even 80,000, find out:

(1) Sales

(2) Profit-volume ratio

(3) Net profit

(4) Variable cots

Solution:

(1) Sales

Sales: Break-even sales + Margin of safety

= Rs.80,000, + Rs.40,000

= Rs.1,20,000

(2) Profit-volume ratio

$$\text{P/V ratio:} \frac{\text{Fixed cost}}{\text{Break-even sales}} \times 100$$

$$= \frac{\text{Rs.24,000}}{\text{Rs.80,000}} \times 100$$

= 30%

(3) Net profit

Net profit: Contribution – Fixed costs

= (Rs.1,20,000 × 30%) - Rs.24,000

= Rs.12,000

(4) Variable costs

Variable costs: Sales – Contribution

= Rs.1,20,000 - Rs.36,000

= Rs.84,000

Q.16 Profit/ Volume ratio of a company is 50%, while its margin of safety is 40%. If sales value of the company is Rs.50 lakhs, find out its (i) break-even point and (ii) Net profit.

Solution:

Margin of Safety = Actual Sales – Break Even Sales

Actual Sales

40% = 50 Lakhs - BES

50 Lakhs

Break Even Sales = 30 Lakhs

Break Even Sales = Fined Cost

P/V Ratio

30 Lakhs = Fixed Cost

50%

Fixed Cost = 15 Lakhs

Sales	50L
(-) Variable Cost @ 50%	(25L)
Contribution	25L
(-) Fixed Cost	(15L)
Profit	10L

Q.17 A Ltd. Maintains a margin of safety of 37.5% with an overall contribution to sales ratio of 40%. Its fixed costs amount to Rs.5 lakhs.

Calculate the following:

(i) Break-even sales: (ii) Total sales:

(iii) Total variable cost: (iv) Current profit:

(v) New margin of safety" if the sales volume is increased by 7½%.

Solution:

(i) Break Even Sales = 5,00,000 = Rs.12,50,000

40%

(ii) Total sales

$$37.5 = \frac{\text{Actual sales} - 12,50,000}{\text{Actual sales}} \times 100$$

37.5 Actual sales = 100 Actual sales - 12, 50,000 × 100

12,50,000 × 100 = 62,50,000 Actual sales

$$\text{Actual sales} = \frac{125 \times 100}{625} = 20 \text{ lakhs}$$

(iii) Total Variable Cost = 60% of 20 lakhs = 12 lakhs

(iv) Current Profit = Contribution – Fixed Cost

8 lakhs – 5 lakhs = 3 lakhs

(v) New MOS if Actual Sales = 21.5 lakhs

NOS = 21.5 lakhs – 12.5 lakhs = 9 lakhs

Margin of Safety (% age) = 9 lakhs / 21.5 lakhs =41.86%

Q.18 The trading results of PJ Ltd. For the two years have been:

Year	Sales Rs.	Profits Rs.
2002	5,40,000	12,000
2003	6,00,000	30,000

Compute the following:

(i) P/V ratio;
(ii) Fixed costs;
(iii) Break-even sales;
(iv) Margin of safety at a profit of Rs.48,000;
(v) Variable costs during the two year.

Solution:

(i) P/V Ratio = 30% (18,000/60,000)
(ii) Variable Cost = 70%

Sales (2003)	6,00,000
(-) Profit	30,000 (given)
Total Cost	5,70,000

(-) Variable Cost 4,20,000

Fixed Cost 1,50,000

(iii) B.E.P. (Rs.) = 1,50,000 / 30% = 5,00,000

(iv) Margin of safety = 48,000 / 30% = 1,60,000

(v) Variable Cost = 70% of Sales

2002 = Rs.3,78,000

2003 = Rs.4,20,000

Q.19 Following figures relating to the performance of a company of the year 2006 and 2007 are available. Assuming that (i) The ratio of variable cost to sales and (ii) the fixed costs are the same for both the years, ascertain:

(i) The profit-volume ratio, (ii) the amount of the fixed costs, (iii) the Break-even Point, and (iv) the budgeted profit for the year 2008, if the budgeted sales for that year are Rs.1 crore .

	Total Sales (Rs. In '000)	**Total Costs (Rs. In '000)**
Year 2006	7,000	5,800
Year 2007	9,000	6,600

Solution:

(i) P/V Ratio = Change in Profit / Change in Sales × 100

= 24,00,000 – 12,00,000 / 20,00,000 × 100

= 60%

(ii) Sales 70,00,000
(-) Variable Cost (40%) (28, 00,000)

Contribution (60%)	42, 00,000
(-) Profit	(12, 00,000)
Fixed Cost	30, 00,000

(iii) BEP = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{30,00,000}{60\%} = 50,00,000$

(iv) Sales = 1,00,00,000 = Contribution @ 60% 60,00,000

(-) Fixed Cost	(30, 00,000)
Profit	30, 00,000

Q.20 Following information's are available for the year 2008 and 2009 of PIX Limited:

Year	2008	2009
Sales	Rs. 32, 00,000	Rs. 57,00,000
Profit/(Loss)	(Rs.3,00,000)	Rs. 7,00,000

Calculate – (a) P/V ratio, (b) Total fixed cost, and (c) Sales required to earn a Profit of Rs. 12,00,000.

Solution:

(a) P/V Ratio = $\frac{\text{Change in profit}}{\text{Change in sales}} \times 100$

$= \frac{7,00,000 + 3,00,000}{(57,00,000 - 32,00,000)} \times 100$

$= \frac{10,00,000}{25,00,000} \times 100$

= 40%

(b) Total fixed cost = Total contribution – Profit

= (Sales × P/V ratio) – Profit

= (Rs.57,00,000 × $\frac{40}{100}$) - Rs.7,00,000

= Rs.22,80,000 - Rs.7,00,000

= Rs.15,80,000

(b) Contribution required to earn a profit of Rs.12,00,000 = Total fixed cost + Profit Required

= Rs.15,80,000 + 12,00,000 = Rs.27,80,000

Required Sales = 27,80,000 = Rs.69,50,000

Q.21 From the following data, calculate

(i) P/V Ratio.

(ii) Profit when sales are Rs.20,000 and

(iii) New Break-even-point if selling price is reduced by 20%.

Fixed expenses Rs.4,000

Break-even point Rs. 10,000

Solution:

(i) Break-even Point = $\frac{\text{Fixed Expenses}}{\text{P/V Ratio}}$

P/V Ratio = $\frac{\text{Fixed Expenses}}{\text{Break-even point}}$

= $\frac{\text{Rs.4,000}}{\text{Rs.10,000}}$ or 40%

(ii) Profit when sales are Rs.20,000

Profit = Sales × P/V Ratio – Fixed Expenses

= Rs.20,000 ×40% - Rs.4,000

= Rs.8,000 - Rs.4,000

= Rs.4,000

(iii) New Break-even point if selling price is reduced by 20%:

If the selling price was Rs.100, now, it will be Rs.80.

Variable cost per unit is Rs.60 (i.e. 100 – 40% old P/V Ratio)

New P/V Ratio $= \frac{80 - 60}{80} = 25\%$

Break-even Point $= \frac{4,000}{25} \times 100 =$ Rs.16,000

Q.22 A company budgets for a production of 1,50,000 units. The variable cost per unit is Rs.14 and fixed cost is Rs.2 per unit. The company fixes its selling price to fetch a profit of 15% on cost.

a) What is the break-even point?
b) What is profit-volume ratio?
c) If it reduces its selling price by 5%, how does the revised selling price affect the break-even point and the profit-volume ratio?
d) If a profit increase of 10% is desired more than the budget, what should be the sale at the reduced prices?

Solution: Basic Data

Budgeted production (in units)	1,50,000
Variable cost (per unit)	Rs.14.00
Fixed Cost (per unit)	Rs.2.00
Selling price (per unit) (See Note 1)	Rs.18.40
Contribution (per unit)	Rs.4.40
Total fixed cost (1,50,000 units × Rs.2)	3,00,000

(a) Break-even point $= \frac{\text{Total fixed cost}}{\text{Contribution per unit}}$

$= \frac{\text{Rs.3,00,000}}{\text{Rs.4.40}} = 68,181.818$ or 68,182 (units)

(b) Profit-volume ratio $= \frac{\text{Contribution per unit}}{\text{Selling price per unit}} \times 100$

$= \text{Rs.4.40} \times 100 = 23.91\%$

Rs.18.40

(c) Break-Even point = Total fixed cost

Under revised selling Contribution per unit for

Price (See Note 2) revised selling price

= Rs.3,00,000 = 86,206.89 units or 86,207 units

Rs.3.48

(ii) Profit-Volume Ratio = Revised contribution per unit × 100

(Under revised selling price) Revised selling price

= Rs.3.48 × 100 = 19.90%

Rs.17.48

(d) Budgeted Profit:

1,50,000 units × Rs.2.40	Rs.3,60,000
10% increase in profit	Rs.36,000
Total Profit	Rs.3,96,000
Fixed Cost	Rs.3,00,000
Total contribution required	Rs.6,96,000
Contribution (per unit)	Rs.3.48
(Under revised selling price)	
No of units to be sold	
(Rs.6,96,000/ Rs.3.48)	2,00,000
Required Sales	Rs.34,96,000

Working Notes:

1. Total cost of producing a unit	Rs.16.00
Add: 15% of profit on Rs.16.00	Rs.2.40
Selling price per unit	Rs.18.40

2. Revised Selling price = (Original Selling price less by 5%)

= (Rs. 18.40 - Rs.0.92) = Rs.17.48

Contribution per unit

Under revised selling price = (Rs.17.48 - Rs.14.00) = Rs.3.48.

Determination of Capacity Sales

Q.23 The ratio of variable cost of sales is 70%. The break-even occurs at 60% of the capacity sales. Find the capacity sales when fixed costs are Rs.90,000. Also compute profit at 75% of the capacity sales.

Solution:

P/V Ratio = 100% - 70% = 30%

B.E.P. (in Rs.) $\frac{90,000}{30\%}$ = Rs.3,00,000

B.E.P. (in Rs.) (60% of the capacity sales) = Rs.3, 00,000

Capacity sales = Rs.3, 00,000/ 60% = 5, 00,000

75% of the capacity sales = Rs.3, 75,000

Profit = Rs.3, 75,000 × 30% - 90,000 = Rs.22, 500

Determination of Fixed Expenses and Variable Expenses

Q.24 The following figures are extracted from the books of a manufacturing concern for 2007-08:

Direct material	Rs.2,05,000
Direct labour	75,000
Fixed overheads	60,000
Variable overheads	1,00,000
Sales	5,00,000

Calculate the break-even point (B.EP.). What will the effect on B.E.P. of an increase of 10% be in: (i) fixed expenses: (ii) variable expenses?

Solution:

Break Even Point = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}}$

P/V Ratio = (Sales – Variable cost) /Sales = (Rs.5, 00,000 – 3, 80,000) /5, 00,000 = 24%

B.E.P. = Rs.60, 000/24% = Rs.2, 50,000

(i) 10% increase in fixed expenses
B.E.P. = 66,000 / 24% = 2, 75,000

(ii) 10% increase in variable expenses
Revised variable expenses = Rs.3, 80,000 + 38,000 = Rs.4, 18,000

Revised P/V Ratio = (Rs.5, 00,000 – 4, 18,000) / 5, 00,000 = 16.4%

Q.25. From the following data, calculate:

(i) Break-even point expressed in amount of sales in rupees;
(ii) Number of units that must be sold to earn a profit of Rs. 60,000 per year.
(iii) How many units must be sold to earn a net income of 10% of sales?

	Rs.
Sales price	20 per unit
Variable manufacturing costs	11 per unit
Variable selling costs	3 per unit
Fixed factory overheads	Rs. 5,40,000 per year
Fixed selling costs	Rs. 2,52,000 per year

Solution: (i) BEP $= \frac{7, 92,000}{6} \times 20$ = Rs. 26, 40,000

(ii) $\frac{7.92 \text{ lakhs} + 60,000}{6}$ = 1, 42,000 units

(iii) If sales X = profit = × / 10

$X = \frac{7, 92,000 \times X/10}{6} \times 20$

6X = 7, 92,000 × 20 + 2X

X = 39, 60,000

39.6 lakhs × $\frac{1}{20}$ = 1, 98,000 units

Q.26. Snowhite Company Ltd. A retail dealer in garments is currently selling 24,000 shirts annually. It supplies the following details for the year ended 31st March;

Selling price per shirt	Rs.400
Variable cost per shirt	250
Fixed cost:	
Staff salaries for the year	12,00,000
General office costs for the year	8,00,000
Advertising costs for the year	4,00,000

As a Cost Accounting 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 shirt 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. 30 per shirt, how many shirts would and to be sold in a year to earn a net income of Rs. 1,50,000
(iv) Assuming that for the year 1992 an additional staff salary of Rs. 3, 30,000 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?

Solution: (i) Break Even point (in units) = Fixed Costs ÷ Contribution per unit

B.E sales = 16,000 × Rs, 400 = Rs. 64, 00,000

Total sales = 24,000 × Rs. 400 = Rs. 96, 00,000

Margin of Safety = Sales – B.E. Sales = Rs. 96, 00,000 – 64,00,0000 = Rs. 32, 00,000

Margin of Safety (in units) = Rs. 32, 00,000 ÷ Rs. 400 = 8,000 shirts. \

(ii) Contribution per unit = Rs. 400 – 250 = Rs. 150

No. of shirts sold = 20,000 shirts

Total contribution = 20,000× Rs. 150 = 30, 00,000

Less Fixed cost 24, 00000

Net profit 6, 00,000

(iii) Sales commission of Rs. 30 per shirt is available cost and, therefore revised variable cost will be Rs. 280 per shirt.

Contribution per unit = Rs.400 – Rs.280 – Rs.120

Fixed Cost = Rs.24, 00,000

Desired profit = Rs.1, 50,000

Total contribution 25, 50,000

Required sales in units = Total Contribution ÷ Contribution per unit

= Rs.25, 50,000 ÷ Rs120 = 21,250 shirt

(iv) Revised Fixed Cost = Rs.24,00,000 + Rs.3,30,000 = Rs.27,30,000

Revised selling price = (R.400 + 15% of Rs.400) = Rs.460

Revised contribution = Rs.460 – 250 = Rs.210 per shirt.

B.E. point = Revised fixed costs ÷ Contribution per unit

= Rs.27,30,000 ÷ Rs.210 = 13,000 shirts

B.E. sales value = 13,000 × Rs.460 = Rs.59, 80,000

Q.27. Indian plastics male plastic buckets. An analysis of their accounting reveals:

Variable cost per bucket	Rs.20
Fixed cost	Rs.50,000 for the year
Capacity	2,000 buckets per year
Selling price per bucket	Rs. 70

Required:

(i) Find the break-even point.
(ii) Find the number of buckets to be sold to get a profit of Rs. 30,000
(iii) If the company can manufacture 600 buckets more per year with an additional fixed cost of Rs. 2,000, what should be the selling price to maintain the profit per bucket as at (ii) above?

Solution: Contribution per unit = Rs. 70 – Rs. 20 = Rs. 50

(i) Break Even point = Fixed Cost ÷ Contribution per unit = Rs. 50,000 ÷ Rs. 50 = 1,000

(ii) Desired profit Rs. 30,000

Fixed cost 50,000

Total contribution 80,000

Sales (quantity) = Total contribution ÷ Contribution per bucket

= Rs. 80,000 ÷ 50 = 1,600 buckets

(iii) Profit per bucket = RS. 30,000 ÷ 1,600 = Rs. 18.75

Revised sales = 2,000 buckets ÷ 600 buckets = 2,600 buckets

Revised fixed cost = Rs. 52,000

Revised profit = 48,750

(2,600 × 18.75)

Revised contribution 1, 00,750

Contribution per unit = Rs. 1, 00,750 ÷ 2,600 = Rs. 38.75

Sale – Variable cost = Contribution

S – 20 = 38.75 or S = Rs. 58.75

Revised Selling price = Rs. 58.75 per unit.

Q.28. Green Valley Hotel has annual fixed costs applicable to rooms of Rs. 15, 00,000 for a 300 room's hotel with average daily room rates of Rs. 400 and average variable costs of Rs. 60 for each room rented. The hotel operates 365 days per year. It is subject to an income tax rate of 30 per cent. You are required to:

(i) Calculate the number of rooms the Hotel must rent to earn a net income after taxes of Rs. 10,00,000 and

(ii) Compute the break-even point in terms of number of rooms rented.

Solution: (i) Suppose income before tax 100

Income tax 30

Income after tax 70

Income before tax corresponding to Rs.10, 00,000 income after tax = (100 ÷ 70) × 10, 00,000

= Rs. 14, 28,571

Fixed cost per annum	Rs. 15, 00,000
Income before tax	14, 28,571
Total desired contribution	29, 28,571

Daily contribution per room day Rs. 400 – 60 = Rs. 340

Total sales value = Total contribution ÷ P/V ratio

= Rs. 29,28,571 ÷ (340 / 400) = Rs. 34,45,378

No. of rooms days = Rs. 34,45,378 ÷ Rs. 400 = 8614 Approx.

The Hotel must rent out 23.6 rooms per day (8614 ÷365 days) to derive a total contribution Rs. 29,28,571, this will give the Hotel after – tax profit of Rs. 10,00,000

(ii) B.E. Sales = Fixed ÷ Daily contribution per room

= Rs. 15,00,000 ÷ Rs. 340 = 4,412 room days or 12.09 rooms per day

Q.29. Reprographics Ltd. Manufactures a document reproducing machine which has a variable cost structure as follows:

	Rs.
Material	40
Labour	10
Overhead	4

And a selling price of Rs. 90

Sales during the current year are expected to be Rs. 13, 50,000 and Fixed Overhead Rs. 1, 40,000. Under a wage agreement an increase of 10% is payable to all direct workers from the beginning of the forthcoming year, whilst Material Cost are expected to increase by Variable Overhead Cost by you are required to calculate:

(a) The new selling price if the Current Profit/Volume Ratio is to be maintained; and
(b) The quantity to be sold during the forthcoming year to yield the same amount of profit as the current year assuming the selling price to remain as Rs.90.

Solution: (a) New Selling Price

Type of cost	Variable Cost structure of current year	Cost increases	Variable Cost structure of forthcoming year

	Rs.	7½	Rs.
Material	40.00	10%	43.00
Labour	10.00	5%	11.00
Overhead	4.00		4.20
	54.00		58.00

Selling price (current year) = Rs.90.00

Contribution (current year) = Rs.36.00

P/V Ratio = $\frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Rs.36}}{\text{Rs.90}} \times 100 = 40\%$

The current year's marginal cost is 60% of the selling price, viz, Rs.90. To maintain the current Profit/Volume ratio of 40% in the forthcoming year, the new marginal cost should be equal to 60% of selling price.

Hence, the New Selling Price = $\frac{\text{Rs.58.20} \times 100}{60}$ = Rs.97.00

(b) Quantity to be sold during the forthcoming year at Rs.90 to yield the amount of profit as the current year.

Profit of current year:

	Rs.
Contribution (40% of Rs.13,50,000)	5,40,000
Less: Fixed Cost	1,40,000
Profit	4,00,000

Forthcoming year quantity:

	Rs.
Profit required (as per current year)	4,00,000

Fixed Overhead Cost 1,44,200

(Rs.1,40,000 + 3% × Rs.1,40,000) ————

Contribution required 5,44,200

Unit Contribution = Selling price – Variable Cost

= Rs.90 - Rs.58.20 = Rs.31.80

Sale quantity required = Contribution required / Unit Contribution

= Rs.5,44,200 / Rs.31.80

= 17,113.2

Q.30 The Laila Shoe Company sells five different styles of Ladies chappals with identical purchase cost and selling prices. The company is trying to find out the profitability of opening another store, which will have the following expenses and revenues:

	Per pair Rs.
Selling Price	30.00
Variable Purchase Cost	19.50
Salesmen's Commission	1.50
Total Variable Cost	21.00
Annual fixed expenses are	
	Rs.
Rent	60,000
Salaries	2,00,000
Advertising	80,000
Other Fixed Expenses	20,000

	3,60,000

Required:-

(a) Calculate the annual break-even point in units and in value. Also determine the profit or loss if 35,000 pairs of chappals are sold.
(b) The sales commissions are proposed to be discontinued, but instead on additional fixed amount of Rs.90,000 is to be incurred in fixed salaries. A reduction in selling price of 5% is also proposed. What will be the break-even point in units?
(c) It is proposed to pay the store manager 50 paise per pair as further commission. The selling price is also proposed to be increased by 5%. What would be the break-even point in units?
(d) Refer to the original data. If the store manager were to be paid 30 paise commission on each pair of chappal sold in excess of the break-even point, what would be the store's net profit if 50,000 pairs were sold?

Note: Consider each part of the question separately.

Solution:

(a) Break Even Point (in Units)
Contribution: (per pair of Chappal) = Rs.9

(Selling Price – Variable Cost = (Rs.30 - Rs.21)

$$\text{B.E.P.(in units)} = \frac{\text{Fixed cost}}{\text{Contribution per pair of Chappals}}$$

$$= \frac{\text{Rs.3,60,000}}{\text{Rs.9}} = 40{,}000 \text{ pair of chappals}$$

Break Even Point (in value) = 40,000 pairs × Rs.30 = Rs.12,00,000

Note: Break Even Point (in value) can also be calculated by using P/V ratio.

Profit (Loss) on the sale of 35,000 pairs of Chappals

	Rs.	Rs.
A: Total Sales Revenue (35,00 × Rs.30)		10,50,000
B: Total V.C. (35,000 × Rs.21)	7,35,000	
Total F.C	3,60,000	10,95,000
Loss: (B) - (A)		45,000

(b) Break Even Point (in Units)
(On the abolition of sales commission, reduction in S.P. p.u by

5% and increase in fixed salaries by Rs.90,000)

New Selling Price: Rs.28.50

New Variable Cost (per pair) Rs.19.50

Contribution (per pair) Rs.9

Total Fixed Cost: Rs.4,50,000

B.E.P. (in units) = Rs.4,50,000 = 50,000 pairs of chappals

Rs.9

(c) Break Even Point (in Units)
(When stores manager is paid 0.50p. per pair as commission and

Also S.P. of each pair of Chappal increased by 5%

		Rs.
S.P. (per pair)		31.50
Variable Cost (per pair)	21.50	
Contribution (per pair)		10.00

B.E.P (in units) = Rs.3,60,000 = 36,000 pairs of chappals.

Rs.10

(d) As per part (a)
B.E.P. (in unit) = 40,000 pair of Chappals.

Total pair of Chappals sold = 50,000

Excess numbers of pair of chappals sold above the B.E.P are 10,000

Sales Revenue (10,000 pairs @ Rs.30)	3,00,000	
Total Variable cost 10,000 @ Rs.21.30	2,13,000	
Profit		87,000

Segregation of fixed and variable cost in semi variable cost

Q.31 Following information is available for the first and second quarter of the year 2008-09 of ABC Limited:

	Production (in units)	Semi-variable cost (Rs.)
Quarter I	36,000	2,80,000
Quarter II	42,000	3,10,000

You are required to segregate the semi-variable cost and calculate:

(i) Variable cost per unit and

(ii) Total fixed cost.

Solution:

	Production (in units)	Semi-variable cost (Rs.)
Quarter I	36,000	2,80,000
Quarter II	42,000	3,10,000
Difference	6,000	30,000

Variable Cost per Unit $= \frac{\text{Change in Semi Variable Cost}}{\text{Change in Production units}}$

$= \frac{\text{Rs.30, 000}}{\text{6,000 units}}$

= Rs.5 per unit

Total Fixed Cost = Semi Variable Cost – (Production × Variable Cost per Unit)

Total fixed cost in Quarter I:

= 2,80,000 – (36,000 × 5)

= 2,80,000 – 1,80,000

= 1,00,000

Total fixed cost in Quarter II:

= 3,10,000 – (42,000 × 5)

= 3,10,000 – 2,10,000 = 1,00,000

Identification of fixed and variable overheads and computation of BEP

Q.32 PQ Ltd. reports the following cost structure at two capacity levels:

(100% capacity)

2,000 units1,500 units

Production overhead I Rs. 3 per unit Rs. 4 per units

Production overhead II Rs. 2 per unit Rs. 2 per unit

If the selling price reduced by direct material and labour is Rs.8 per unit, what would be its break-even point?

Solution:

Computation of production Overheads

Production on overheads	100% Capacity 2,000 units		75% Capacity 1,500 units	
	Per units	Total	Per units	Total
I	3	6,000	4	6,000
II	2	4,000	2	3,000

Conclusion:- Production overheads I are Fixed Overheads & Production Overheads II are variable overheads.

Contribution per unit = Selling Price as reduced by Direct Material & Labour Cost (-) Variable overheads

= Rs.8 - Rs.2

= Rs.6 per units

Break Even Point = Fixed Production Overheads

Contribution per unit

= Rs.6, 000

Rs.6 per unit

= 1,000 units

Cost Break Even Point

Q.33 A company wants to buy a new machine to replace one which is having frequent breakdown. It received offers for two models M1 and M2 .Further details regarding these models are given below:

	M1	M2
Installed capacity (units)	10,000	10,000
Fixed overhead per annum (Rs.)	2,40,000	1,00,000
Estimated profit at the above capacity (Rs.)	1,60,000	1,00,000

The product manufactured using this type of machine (M1 or M2) is sold at Rs.100 per unit.

You are required to determine:

a) Break-even level of sales for each model.
b) The level of sales at which both the models will earn the same profit.
c) The model suitable for different levels of demand for the product.

Solution:

	M1	Rs.	M2
Estimated Profit	1,60,000		1,00,000
(+) Fixed overhead	2,40,000		1,00,000
Estimated Contribution	4,00,000		2,00,000
Installed capacity (No. of units)	10,000		10,000
Contribution p.u.	40		20
SP p.u	100		100

(a) BEP (units) = Fixed Cost / Contribution p.u. = 6,000 units 5,000 units

(b) Cost BEP (units) = (2,40,000 – 1,00,000) / (40 – 20) = 1,40,000 / 20

= 7,000 units

(c) No. of units Model to be chosen

Less then 7,000 units M2

= 7,000 units Any of the two

More than 7,000 units M1

The option having lower V.C per units is a better option, if the expected sales volume is more than the level of COST BREAK EVEN (i.e. 7,000) & the proposal having lower fixed cost if would be better if the expected sales level is below the level of COST BREAK EVEN POINT.

Q.34 Two competing companies ABC Ltd. And XYZ Ltd. Produce and sell the same type of product in the same market. For the year ended March, 1995, their forecasted profit and loss accounts are as follows:

Particulars	ABC Ltd.		XYZ Ltd.	
	Rs.	Rs.	Rs.	Rs.
Sales		2,50,000		2,50,000
Less: Variable Cost of Sales	2,00,000		1,50,000	
Fixed Costs	25,000		75,000	
		2,25,000		2,25,000
Forecasted Net operating Profits		25,000		25,000

You are required to compute:

(1) P/V Ratio.

(2) Break-even Sales.

You are also required to state which company is likely to earn greater profits in conditions of:

(a) Low demand, and

(b) High demand.

Solution: Particulars ABC Ltd. XYZ Ltd.

	Rs.	Rs.

Sales	2,50,000	2,50,000
Contribution (Fixed expenses plus profit)	50,000	1,00,000
P/V Ratio	$\frac{50,000}{2,50,000} \times 100 = 20\%$	$\frac{1,00,000}{2,50,000} \times 100 = 40\%$
Break-even Sales	$\frac{25,000}{20\%} = 1,25,000$	$\frac{75,000}{40\%} = 1,87,500$

Profit situation for ABC Ltd. Will be better than that of XYZ Ltd. In case of low demand since even if sales are halved. ABC Ltd. Will still not incur a loss whereas XYZ Ltd. Has a safety margin of only Rs.62,500. In case the sales drop to Rs.2,00,000, the profit will be as follows:

Particulars	ABC Ltd.	XYZ Ltd.
	Rs.	Rs.
Contribution	40,000	80,000
Fixed Cost	25,000	75,000
Profit	15,000	5,000

In the case of high demand, XYZ Ltd. Will do better than ABC Ltd. Since additional sales will produce profit at the rate of 40% of the sales as against only 20% in the case of the other company. If sales improve to Rs.3,00,000 i.e. Rs.50,000 above the present level, the profit of ABC Ltd. Will be only Rs.35,000, i.e. Rs.25,000 (at present) plus 20% of Rs.50,000. The profit of XYZ Ltd. Will be Rs. 45,000 i.e. Rs.25,000, as at present, plus 40% of Rs.50,000.

Composite Break Even Point

Q.35 Raj Ltd. Manufactures three products X,Y and Z. The units selling price of these products are Rs.100, Rs.160 and Rs.75 respectively. The corresponding unit variable costs are Rs.50, Rs.80 and Rs.30. The proportions (quantity wise) in which these products are manufactured and sold are 20%, 30% and 50% respectively. The total fixed costs are Rs.14,80,000.

Calculate (i) overall break even quantity and (ii) the product wise break up of such quantity.

Solution: Total units sold = ×

X = 0.2×

Y = 0.3×

Z = 0.5×

	X	Y	X
Contribution per unit	50	80	45
(SP - VC)			
X units sold	0.2 ×	0.3 ×	0.5 ×
Overall Contribution	10 ×	24 ×	22.5 ×

= 10× + 24× + 22.5×

= 56.5×

At BEP Total Fixed Cost = Total Contribution

14,80,000 = 56.5×

×= 26,195

X	Y	Z
20%	30%	50%
5,239	7,858	13,098

Q.36 A company has a fixed cost of Rs.20, 000. It sells two products – A and B, in the ratio of 2 units of A and 1 unit of B. Contribution is Re. 1 per unit of A and Rs.2 per unit of B. How many units of A and B would be sold at break-even point?

Solution: Let the Break Even Number of units of product B be × & Product A =2 ×

At BEP, Fixed cost = Contribution

20,000 = (2× 1) + (x × 2)

20,000 = 4×

x = 5,000 (Product B)

2 × = 10,000 (Product A)

Q.37 A Company sells two products, J and K. The sales mix is 4 units of J and 3 units of K. The contribution margins per unit are Rs.40 for J and Rs.20 for K. Fixed costs are Rs.6, 16,000 per month. Computes the break-even point.

Solution

Let 4× = No. of units of J

Then 3× = No. of units of K

BEP in × units = $\frac{\text{Fixed cost}}{\text{Contribution}} = \frac{\text{Rs.616000}}{4(40) + 3(20)}$

or $\frac{616000}{220} = 2800$ units

Break even point of Product J = 4 × 2800 = 11200 units

Break even point of Product K = 3× 2800 = 8400 units

Determination of Variable Selling Expenses, Variable Factory Overheads, Contribution, BEP, Factory COGS

Q.38 The following miscellaneous information regarding the operations of 1994 has been made available from the records of Acme Corporation:

	Rs.
Sales	1,00.000
Direct materials used	40,000
Direct labour	15,000
Fixed manufacturing overhead	20,000
Fixed selling and administration expenses	10,000
Gross profit	20,000
Net loss	5,000

There are no beginnings or ending inventories.

You are required to calculate:

(i) Variable selling and administration expenses
(ii) Contribution margin in rupees
(iii) Variable factory overhead
(iv) Break-even point in rupee sales
(v) Factory cost of goods sold.

Solution:

(i) Net Loss = Gross profit – Fixed Selling & Administration exp. – Variable Selling & Administration Exp.
(5,000) = 20,000 – 10,000 – Variable Selling & Administration Exp.

Variable Selling & Administration Exp. = 20,000 – 10,000 + 5,000 =15,000

(ii) Contribution = Sales – Variable costs
= 1,00,000 – (40,000 – 15,000 + 15,000 + 5,000)

= 1,00,000 – 75,000

= 25,000

(iii) Cost of Goods Sold = Direct material used + Direct labour + Fixed manufacturing overhead + Variable manufacturing overhead
80,000= 40,000 + 15,000 +20,000 + Variable manufacturing overhead

Variable manufacturing overhead = 5,000

(iv) BEP = Fixed cost
(in Rs.) P/V Ratio

= 20,000 + 10,000

25,000 × 100

1,00,000

= 30,000

25%

= Rs.1,20,000

(v) Cost of Goods Sold = Sales – Gross Profit
= 1,00,000 – 20,000

= 80,000

Determination of Selling Price Per Unit and BEP

Q.39 A Japanese Soft Drink Company is planning to establish a subsidiary company in India produce mineral water. Based on the estimated annual sales of 40,000 bottles of the mineral water, cost studies produced the following estimates for the Indian subsidiary:

	Total Annual costs	Percent of Total Annual Cost which

		is variable
Material	2,10,000	100%
Labour	1,50,000	80%
Factory Overheads	92,000	60%
Administration Expenses	40,000	35%

The Indian production will be sold by manufacturer's representatives who will receive a commission of 8% of the sale price. No portion of the Japanese office expenses is to be allocated to the Indian subsidiary. Required:

(i) Compute the sale price per bottle to enable the management to realize an estimated 10% profit on sale proceeds in India.

(ii) Calculate the break-even point in Rupee sales and also in number of bottles for the Indian subsidiary on the assumption that the sale price is Rs.14 per bottle.

Solution: Working Notes:

(i) Commission is 8% of sales revenue.
Profit is 10% of sales revenue.

Hence Cost of Sales is 82% of sales revenue.

If Cost of Sales is Rs.82 then sales revenue is Rs.100.

If Cost of Sales is Rs.4,92,000 then sales revenue $= \frac{\text{Rs.4,92,000} \times \text{Rs.100}}{\text{Rs.82}}$

= Rs.6,00,000

Computation of the Sale Price per bottle

Total Sales Revenue = Rs.6,00,000

Number of mineral water bottles sold = 40,000

Sales price per bottle = $\frac{\text{Rs.6,00,000}}{40,000}$ = Rs.15.

(ii) (a) Variable Cost

	Total	Per unit
No. of bottles	40,000	1(one)
	Rs.	Rs.

Material		2,10,000	5.25
Labour (80% of Rs.1,50,000)	1,20,000	3.00	
Factory Overhead (60% of Rs.92,000)	55,200	1.38	
Administration expenses (35% of Rs.40,000)	14,000	0.35	
Commission (Rs.14 × 40,000 × 8%)	44,800	1.12	
		4,44,000	11.10

(b) Total (annual) Fixed Cost:

= (Fixed Labour Cost + Fixed Factory Overheads + Fixed Admn. Expenses)

= (Rs.1,50,000 × 20% + Rs.92,000 × 40% + Rs.40,000 × 65%)

= Rs.92,800.

(c) P/V ratio = $\frac{\text{Sales – Variable Cost}}{\text{Sales}}$ × 100 = $\frac{\text{Rs.14 - Rs.11.10}}{\text{Rs.14}}$ × 100 = 20.714%

(d) Contribution per bottle = Sales – Variable Cost

= Rs.14 - Rs.11.10 = Rs.2.90

Computation of Break-Even-Point

Break-Even-Point (in Rupees sales) = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}}$

= $\frac{\text{Rs.92,800}}{20.7142\%}$ = Rs.4,48,000

Break-Even-Point (in number of bottles) = $\frac{\text{Fixed Cost}}{\text{Contribution per bottle}}$

= $\frac{\text{Rs.92,800}}{\text{Rs.2.90}}$

= 32,000 bottles.

Determination of Sales, Net Profit, Price Indifference Point, BEP

Q.40 DD amusement park charges Rs.4 each for all rides in the park. Variable costs amount to Re.0.80 per ride and fixed costs are Rs.32,00,000. Last year's net income was Rs.6,40,000. Rising costs have cut sharply into net income for DD for the last 2 year. This year management again expects a cost increase of 25 percent in variable costs and 10 percent in fixed costs. To help offset these increases, the management is considering raising the price of a ride to Rs.5. Required:

1) How many rides did DD sell last year?
2) If the price increase is not implemented, what is the expected net income for this year assuming the same volume of activity?
3) Compute the price indifference point for the new ride price.
4) Compute the Break-even point for this year using the old price and the new price.
5) Should management raise the price of a ride, if the price increase will reduce ride volume 10 percent from the last years' level? In that situation, what will be expected net income?

Solution: (1) Rides which DD Amusement park sell last year

$$\text{(No. of rides DD sell last year)} = \frac{\text{Fixed Cost + Net Income last year}}{\text{Contribution per ride last year}}$$

$$= \frac{\text{Rs.32,00,000 + Rs.6,40,000}}{\text{Rs.3.20}}$$

$$= 12,00,000 \text{ rides}$$

(2) Expected net income for this year if price increase is not implemented

(assuming the same volume of activity)

	Rs.
Charges per ride	4
Less: Expected Variable cost per ride (Refer to working note 1)	1
Contribution per ride: (A)	3
No. of rides: (B)	12,00,000
Total expected contribution for all rides: (C) = (A) × (B)	36,00,000
Less: Expected fixed costs (Refer to working note (ii))	35,20,000
Expected net income	80,000

(3) Price indifference point for the new ride price: Price indifference point is a point at which the expected profits remain the same irrespective of sales price and costs.

	Rs.
Net ride price	5.00
Less; Variable cost	1.00
Contribution per ride	4.00
Fixed cots of this year: (A)	35,20,000
Net income of last year: (B)	6,40,000
Contribution required: (A) + (B)	41,60,000

Price – indifference point = $\frac{\text{Rs. } 41,60,000}{\text{Rs.}4}$ = 10,40,000 rides

(4) Break even point for this year using the old price and the new price

Break even point $= \frac{\text{Fixed costs}}{\text{Contribution per ride}}$

At old price $= \frac{\text{Rs. } 35,20,000}{\text{Rs.}4 - \text{Re.}1}$

= 11,73,334 rides

At new price $= \frac{\text{Rs. } 35,20,000}{\text{Rs.}5 - \text{Re.}1}$

= 8,80,000 rides

(5) Expected net income if the price increase will reduce ride volume by 10% from the last year's levels:

	Rs.
Charges per ride	5.00
Less: Variable cost	1.00
Contribution per ride: (A)	4.00
No. of rides (12,00,000) : B	10,80,000

Total contribution for all rides: (A) × (B)	43,20,000
Less: Fixed costs	35,20,000
Expected net income	8,00,000

Justification:

Since the increase in price of a ride will increase the net income by Rs.7,20,000 (Rs.8,00,000 - Rs.80,000) the management should raise the price of a ride.

Working Notes: (i)

(i) Expected Variable cost this year	
Variable cost last year	Re.0.80 per ride
Add: Expected increase this year (25% of Re.0.80)	Re.0.020 per ride
Expected variable cost his year	1.00 per ride
(ii) Expected fixed costs this year	
	Rs.
Fixed costs last year	32,00,000
Add: Expected increase this year (10% of Rs.32,00,000)	3,20,000
Expected fixed costs this year	35,20,000

Determination of Selling Price Per Unit

Q.41 Novelty Sports Ltd. Has for the past several years produced boxing gloves which are sold at Rs.2,800 per pair. Higher costs in recent years have made management to consider about the adequacy of this selling price.

The labour rate was increased from Rs.175 per hour to Rs.225 per hour and the cost of leather has gone up from Rs.110 to Rs.215 per square foot during the last five years. Fixed expenses have increased 25% from the level of Rs.18,00,000 five years ago. Over the same period variable overhead has increased by 30% or Rs.300 per pair of gloves. Each glove requires 1.5 sq. ft. of leather and one hour of direct labour.

Calculate the selling price the company has to charge under the new cost structure to break-even at the same number of units as five years ago.

Solution: Past Present

Direct Material

(3 ft. × Rs. 110 / Rs. 215) 330 645

(+) Direct Labour 350 450

(175 × 2 hrs.)

(225 × 2 hrs.)

(+) Variable overhead 1000 1300

Variable Cost per units 168 2395

Fixed Cost 18,00,000 22,50,000

Past Contribution = 1120

B.E.P. (units) = 18, 00,000

1,120

= 1,607 units

Revised contribution = ?

1607 units 22, 50,000

Contribution per unit

Contribution per unit 22, 50,000

1607

Contribution per unit 4000

(+) Variable Cost per unit = 2395

Selling price per unit 3795

Q.42. The variable cost structure of a product manufactured by a company during the current year is as under

	Rs. Per unit
Material	120
Labour	30
Overheads	12

The selling price per unit is Rs. 270 and the fixed cost and sales during the current year are Rs. 14 lakhs and Rs. 40.5 lakhs respectively.

During the forthcoming year the direct workers will be entitled to a wage increase of 10% from the beginning of the year and the material cost, variable overhead and fixed overhead are expected to increase by 7.5% and 3% respectively.

The following are required to be computed.

(a) New sale price in the forthcoming year if the current P/V ratio is to be maintained.
(b) Number of units that would require to be sold during the forthcoming year so as to yield the same amount of profit in the current year, assuming that selling price per unit will not be increase.

Solution:	Old		New
Material	120	+ 7.5%	129
Labour	30	+ 10%	33
Overhead	12	+ 5%	12.6
Variable Cost	162	=	174.6

(a) Exiting P/V Ratio = $\frac{108}{270} \times = 100 = 40\%$ & Variable cost ratio = 60%

P/V Ratio is to be maintained thus

$$SP = \frac{174.6}{60\%} = 291$$

(b) Current

$\frac{40.5 \text{ lakhs}}{270}$ = 15,000 units

Variable Cost p.u.	162
	24,30,0000
(+) Fixed Cost	14,00,000
+ profit	2,20,000
Sales	40,50,000

Desired Sales = 14,42,000 + 2,20,000

270 – 174.4

= 16,62,000

95.4

= 17,422 units

Determination of Sale, Selling price per Unit and Margin of Safety

Q.43 A company produces single product which sells for Rs. 20 per unit. Variable cost is Rs. per unit and Fixed overhead for the year is Rs. 6, 30,000 Required:

(a) Calculate sales value needed to earn a profit of 10% on sales.

(b) Calculate sales price per unit to brig BEP down to 1, 20,000 units.

(c) Calculate margin of safety sales if profit is Rs.60, 000.

Solution: (a) Let the units to be sold to earn a profit of 10% on sales.

Sales value = 20x

V.C. = 15x

Profit = 10% x 20x = 2x

Fixed overheads = 6,30,000

Sales = V.C. + Profit + Fixed Overheads

20x = 15x + 2x + 6,30,000

3x = 6,30,000

X = 6,30,000 = 2,10,000 units

3

Sales Value = 2, 10,000 units × Rs.20

= 42, 00,000

(a) BEP = Fixed Overheads
Contribution per unit

1,20,000 units = Rs. 6,30,000

Contribution per unit

Contribution per units = $\frac{\text{Rs. 6, 30,000}}{\text{1, 20,000 units}}$

= Rs.5.25

Selling price per unit to bring BEP to 1,20,000 units = V.C. per unit + Contribution per unit

= Rs.15 + Rs.5.25

= Rs.20.25

(c) P/V ratio = $\frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Rs.5}}{\text{Rs.20}} \times 100 = 25\%$

Margin of Safety = $\frac{\text{Profit}}{\text{P/V ratio}} = \frac{\text{Rs.60, 000}}{25\%}$ = Rs.2, 40,000

Step Cost and Computation of BEP

Q.44 Kalyan University conducts a special course on "Computer Application" for a month during summer. For this purpose, it invites applications from graduates. An entrance test is given to the candidates and based on the same; a final selection of a hundred candidates is made. The Entrance Test consists of four objective type examinations and is spread over four days, one examination per day. Each candidate is charged a fee of Rs.50 for taking up the entrance test. The following data was gathered for the past two years:

Kalyan University

Statement of Net Revenue from the Entrance Test for the Course of "Computer Applications"

Particulars	1993 Rs.	1994 Rs.
Gross Revenue (Fees collected)	1,00,000	1,50,000
Costs:		
Evaluation	40,000	60,000
Question	20,000	30,000
Hall Rent at Rs.2,000 per day	8,000	8,000
Honorarium of Chief Administrator	6,000	6,000

Supervision Charges (one Supervisor for every 100 Candidates at the rate of Rs.50 per day)	4,000	6,000
General Administration Expenses	6,000	6,000
Total Cost	84,000	1,16,000
Net Revenue	16,000	34,000

You are required to compute:

(a) The budgeted net revenue if 4,000 candidates take up the entrance test in 1995.
(b) The break even number of candidates.
(c) The number of candidates to be enrolled if the net income desired is Rs.20,000.

Solution: (a) Statement showing Budgeted Net Revenue from the Entrance Test in 1995

Number of candidates		4,000
(a) Gross revenue (fees collected) 4,000 × 50		Rs.2,00,000
Costs:		
Variable – Evaluation (4,000 × Rs.20)	80,000	
- Question booklets (4,000 × Rs.10)	40,000	
- *Supervision charges × (40 supervisors × Rs.200)	8,000	1,28,000
Fixed – Hall rent (Rs.2,000 × 4 days)	8,000	
- Honorarium to chief administrator	6,000	
- General administrative expenses	6,000	20,000
(b) Total Cost (Variable + Fixed)		1,48,000
Net Revenue (A - B)		52,000

Note: Gross revenue is given. Number of candidates can be found out by dividing gross revenue with fees charges per candidate.

* Supervision costs vary with every 100 candidates. If the candidates are less than 100, it becomes fixed.

(b) Let 100 candidates be one unit.

Contribution per units = Rs.5,000-Rs.2,000 - Rs.1,000 - Rs.200 = Rs.1,800

Break Even Point (No. of units) = Rs.20,000/ Rs.1,800 = 11.1111

B.E. number of candidates = 1,111,11 candidates.

Supervision cost is semi fixed if the candidates are less than 100 in number. This cost is variable if the candidates are in multiple of 100. For 11.11 candidates another supervisor has to be engaged for four days. The supervision charges will be Rs.50 × 4 days = Rs.200 (fixed cost). The variable cost @ Rs.2 per candidate has already been recovered. The unrecovered fixed cost will be Rs.200 – (11.11 × Rs.2) or Rs.177.78. Additional 8.89 units (Rs.177.78 ÷ Rs.20*) will have to be added to the existing BEP. Hence the revised BEP = 1111.11 + 8.89 = 1,120 candidates.

(c) Sales for desired profit = (Rs.20,000 + Rs.20,000) / Rs.1800 = 22.2222 units or

= 2222.22 candidates.

For 22.22 candidates additional fixed cost will be = Rs.200 – (22.22 × 2) or Rs.155.56.

To recover this amount 7.78 candidates will have to be added to 2,222.22

Thus, the desired number of candidates = 2,222.22 + 7.78 or 2,230 candidates.

*Gross revenue	Rs.2,00,000
Less: Variable cost without supervision charges	1,20,000
	80,000
No. of candidates in 1987	4,000
Revised contribution per candidate	Rs.20

Key Factor Ranking

Q.45 A company has a Machine X which can produce either product A or B. The cost data relating to A and B are as follows:

	Product A	Product B
Selling price	Rs.20.00	Rs.30.00
Variable Expenses	14.00	18.00
Contribution	6.00	12.00

Following additional information is also given:

(a) Capacity of Machine X is 1,000 hours.

(b) In one hour Machine X can produce 3 units of A and 1 unit of B.

Should Machine X produce A or B?

Solution: Statement showing contribution per hour of Machine X

	Product A	Product B
Sales	Rs.20.00	Rs.30.00
Variable Expenses	14.00	18.00
Contribution per unit	6.00	12.00
Contribution per hour	18.00	12.00
Rank	I	II

Machine X should be used to produce A.

Q.46 The following particulars are obtained from costing records of a factory:

Particulars	Product A (per unit) Rs.	Product B (per unit) Rs.
Selling Price	400	1000
Material (Rs.40 per litre)	80	320
Labour (Rs.20 per hour)	100	200
Variable Overhead	40	80

Total fixed overheads - Rs.30,000

Comment on the profitability of each product when:

(a) raw material is in short supply;

(b) production capacity is limited;

(c) sales quantity is limited;

(d) sales value is limited;

(e) only 1,000 litres of raw material is available for both the products in total and maximum sales quantity of each product is 300 units.

Solution: Particulars	Product A (per unit)	Product B (per unit)

	Rs.	Rs.	Rs.	Rs.
Selling Price		400		1000
Less: Variable Costs:				
Materials	80		320	
Labour	100		200	
Variable Overhead	40	220	80	600
Contribution per unit		180		400
P/V Ratio = Contribution × 100 / Sales	180 × 100 / 400 = 45%		400 × 100 / 1000 = 40%	
Contribution per litre of material	Rs.180 / 2 litres = Rs.90		Rs.400 / 8 litres = Rs.50	
Contribution per Labour hour	Rs.180 / 5 hrs. = Rs.36		Rs.400 / 10 hrs. = Rs.40	

(a) When raw material is in short supply, contribution per litre of product A is higher and hence product A is more profitable.

(b) When production capacity is limited, contribution per hour of product B is higher and hence product B is more profitable.

(c) When sales quantity is limited, contribution per unit of product B is higher and hence product B is more profitable.

(d) When sales value is limited, the P/V Ratio of product A is higher and hence product A is more profitable.

(e) When raw material as well as sales quantity both are limited, the raw material should first be used for maximum number of units of product A i.e. for 300 units. 600 litres of material shall be consumed and the balance 400 litres shall be utilized for producing 50 units (i.e. 400/8) of product B. The profit in such a case would be as follows:

	Rs.

Contribution from 300 units of product A (300 × 180)	54,000
Contribution from 50 units of product B (50 × 400)	20,000
Total Contribution	74,000
Less: Fixed overheads	(30,000)
Maximum Profit	44,000

Q.47 Khalsa Automation produces and sells two small components P and Q used in automobiles. The details regarding unit income and costs of these components are as under:

	Products	
	P (Rs.)	Q (Rs.)
Selling Price	12	20
Direct Material	2	4
Direct Labour	2	1
Variable Factory Overhead	2	4
Fixed Factory Overhead	2	4
Total Cost of Goods Sold	8	13
Gross Profit per unit	4	7

Factory overheads, both fixed and variable, have been accounted for on machine hour basis. Sales outlook is such that the plant could operate at full capacity on either of both products. Both P and Q are processed through the same cost centers. Selling costs are all fixed. Which product should be preferred? Give a brief explanation in support of your answer.

Solution:	P	Q
Contribution	6	11
Mach. Hrs. ratio p.u.	1	2
Contribution per Mach. Hr. ratio	Rs.6	Rs.5.50
Rank	I	II

Key Factor Ranking, Determination of Optimal Product Mixed and Maximum Profit

Q.48 Vinak Ltd. Which produces three products furnishes you the following data for 2006 – 07:

	Products		
	A	B	C
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 content as percentage of variable costs (%)	50	50	50

The fixed expenses are estimated at Rs.6,80,000. The Company uses a single raw material in all the three products. Raw material is in short supply and the company has a quota for the supply of raw materials of the value of Rs.18,00,000 for the year 2006 – 07 for the manufacture of its products to meet its sales demand. You are required to:

(i) Set a product mix which will give a maximum overall profit keeping the short supply of raw materials in view (ii) Compute that maximum profit.

Solution: (i) The Product mix is as under:-

Products	Selling price unit Rs.	PV Ratio %	Variable as % of sales price %	Cost Per Unit Rs.	Material Content @ 50% of v.cRs./ Unit	Contribution		Rank
A	100	10	90	90	45	10	22.2*	3
B	75	20	80	60	30	15	50.0	2
C	50	40	60	30	15	20	133.3	1

Product	Material Cost/Unit Rs.	Units	Total Material Cost Rs.	Amount Available for Materials Rs.
C	15	10,000	1,50,000	18,00,000
B	30	25,000	7,50,000	16,50,000
A	45	20,000	9,00,000	9,00,000

(ii) Computation of maximum profit:

Product	Units	Selling Price/Unit Rs.	Contribution per unit Rs.	Total Contribution Rs.
A	20,000	100	10	2,00,000
B	25,000	15	25	3,75,000
C	10,000	50	20	2,00,000
				7,75,000
Less: Fixed expenses				6,80,000
			Profit	95,000

Contribution as percentage of material content

A: 10 × 100 = 22.2%; B: 15 × 100 = 50%; C: 20 × 100 = 133.33%

45 30 15

Q.49. From the following data, recommend the most profitable product mix, presuming that direct labour hours available are only 700:

	Products	
	A	B
Contribution p.u.	Rs. 30	Rs. 20
Direst labour hrs. per unit	10 hrs.	5 hrs.

The maximum production possible for each of the products A and B is 100 units. The fixed Overheads are Rs. 2,000

Solution:	A	B
Contribution	30	20
Labour Hrs.	10 hrs.	5hrs.
Contribution per labour hr.	Rs. 3	Rs. 4
Rank	II	I
Maximum production possible	100	100

Total labour hrs. available	700 hrs.	
(-) hrs. for B (100 × 5)	500 hrs.	
Hrs. available for A	200 hrs.	
Hrs. required for A p.u.	10 hrs.	
= 20 units		
Contribution (A = 30 × 20)		600
(B = 20 × 100)		2000
(-) Fixed Cost (fixed Overheads)	(2000)	
Net profit	600	

Q.50. A firm can produce three different products from the same raw material using the same production facilities. The requisite labour is available in plenty at Rs. 8 per hour for all products. The supply of raw material which is imported at Rs. 8 per kg. is limited to 10,400 kgs. For the budget period. The variable overheads are Rs. 5.60 per hour. The fixed overheads are Rs. 50,000. The selling commission is 10% on sales.

(a) From the following information, you are required to sugest the most suitable sales mix, which will maximize the firm's profits. Also determine the profit that will be earned at that level:

Product	Market demand (units)	Selling price per unit Rs.	Labour hours required per (unit)	Raw material required per unit Kgs.
X	8,000	30	1	0.7
Y	6,000	40	2	0.4
Z	5,000	50	1.5	1.5

(b) Assume, in above situation, if additional 4,500 kgs. Of raw material is made available for production, should the firm go on for further production, if it will result in additional fix overheads of Rs. 20,000 and 25 percent increase in the rates per hour for labour and variable overheads on additional units.

Solution: (a) Statement of contribution and Ranking

Products per units	X	Y	Z

	Rs.	Rs.	Rs.
Direct material	5.60	3.20	12.00
	(0.7 kg. × Rs. 8)	(0.4 kg. × Rs. 8)	(1.5 kg. × Rs. 8)
Direct labour	8.00	16.00	12.00
Variable overhead	5.60	11.20	8.40
	(1 hr. × Rs. 5.60)	(2 hr. × Rs. 5.60)	(1.5 hr. × Rs. 5.60)
Selling Commission	3.00	4.00	5.00
Total Variable Cost: (A)	22.20	34.40	37.40
Selling price (B)	30.00	40.00	50.00
Contribution: [(B) – (A)]	7.80	5.60	12.60
Contribution per kg. raw material	11.14 (Rs. 7.80 / 0.7 kg.)	14.40 (Rs. 5.60 / 0.4 kg.)	8.4 (Rs. 12.60 / 1.5 kg.)
Ranking	II	I	III

Statement of profit as per Suggested Sales Mix

Balance available for other products	Production propriety	Raw material required per unit	Units produced	Raw material consumed (Total 10,400 Kgs.)	Contribution
Kgs.		Kgs.		Kgs.	Kgs.
8,000	X	0.4	6,000	2,400	33,600
2,400	Y	0.7	8,000	5,600	62,400
Nil	Z	1.5	1,600	2,400	20,160

(b) When additional 4,500 Kgs. Of raw material is made available of production, the same would be utilized to produce 3,000 additional units of product Z. The additional profit which will accrue form this of this material is as follows:

Rs. Rs.

Contribution for 3,000 units @ Rs. 12.60 per unit		37,800	
Less: Increase in labour cost for 3,000 units @ Rs. 3 per unit	9,000		
Increase in variable overheads for 3,000 units @ Rs. 2.10 per unit	6,300	15,300	
Additional Contribution		22,500	
Less: Additional Fixed Overheads		(20,000)	
Additional Profit			2,500

Since the use of additional 4,500 kgs. Of material can increase the profit by Rs. 2,500, it is desirable to go in for the production of 3,000 additional units of Z.

Q.51. 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 would result in maximization of profits. The company contemplates growing Apples, Oranges and peaches:

Particulars	Apples	Lemons	Oranges	Peaches
Selling price per box (Rs.)	15	15	30	45
Season yield in boxed per acre	500	150	100	200
Costs:	Rs.	Rs.	Rs.	Rs.
Material per acre	270	105	90	150
Labour: Growing per 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.

(a) The area available is 450 acres butt 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.
(b) 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 boxed.

Calculate the total profit that would accrue if your advice is followed.

Solution: Statement Showing Contribution per Care

Particulars	Apples	Lemons	Oranges	Peaches
Selling price per box Rs.	15	15	30	45
Season yield in boxes per acre	500	150	100	200
Sales Value per acre (A) Rs.	7,50	2,250	3,0000	9,000
Material Cost per acre Rs.	270	105	90	150
Labour: Growing per acre Rs.	300	225	150	195
Picking, and Transport per acre				
500 × 4.50 Rs.	2,250			
150 × 4.50		675		
100 × 4.50			450	
200 × 9				1,800
Variable Cost per acre Rs. (B)				
Contribution per acre (A) - (B) Rs.	2,820	1,00,5	690	2,145
Preference according to Contribution per acre	4,680 II	1,245 IV	2,310 III	6,855 I

Since the minimum quantity of production of each type is 18,000 boxes and all the four types of fruits have to be produced, the minimum acreage to be allocated to each fruit would be as follows:

Apples =	18,000/500	=	36 acres	
Lemons	=	18,000/150	=	120 acres
Oranges	=	18,000/100	=	180 acres
Peaches	=	18,000/200	=	90 acres
		Total		426 acres

Lemons and oranges require 300 acres in total to produce. Moreover, 300 acres of land is suitable only for these two products, hence 300 acres would be used to produce only these products. The balance of

24 acres (i.e., 450 - 426) is available for production of any of the fruits. Since the peaches give the highest contribution per acre and hence they should be preferred for allocation of 24 acres. The total acreage for peaches would therefore be 90 + 24 = 114 acres.

Statement of Profit

Particulars	Apples	Lemons	Oranges	Peaches	Total
Area (acres)	36	120	180	114	450
Contribution per acre Rs.	4,680	1,245	2,310	6,855	
Total Contribution Rs.	1,68,480	1,49,400	4,15,800	7,81,470	15,15,150
Less: Fixed Costs					2,10,000
Net Profit					13,05,150

Q.52 Taurus Ltd. produces three products – A, B and C, from the same manufacturing facilities. The cost and other details of the three products are as follows:

	A	B	C	Total
Selling price/unit (Rs.)	200	160	100	
Variable cost/ unit (Rs.)	120	120	40	
Fixed expenses/month (Rs.)				2,76,000
Maximum production per month (units)	5,000	8,000	6,000	
Total hours available for the month				200 hours
Maximum demand per month (units)	2,000	4,000	2,400	

The processing hours cannot be increased beyond 200 hours per month.

You are required to:

(a) Compute the most profitable product-mix;
(b) Compute the overall break-even sales of the company for the month based on the mix calculated in (a) above.

Solution: (a) **M/s Taurus Limited**

Most Profitable Product Mix

Product	*No. of units to be produced	Contribution per unit Rs.	Total Contribution Rs.
A	2,000	80	1,60,000
B	1,600	40	64,000
C	2,400	60	1,44,000
Total			3,68,000
Less: Fixed Expenses:			2,76,000
Profit			92,000

*Refer to Working Note 1

(b) Overall Break Even Sales

[Based on the mix calculated in (a) part]

Break Even Sales = $\frac{\text{Fixed Costs}}{\text{Contribution}}$ × Sales

= $\frac{\text{Rs.2, 76,000}}{\text{Rs.3,68,000}}$ × *Rs.8,96,000 = Rs.6,72,000

*Refer to Working Note 2.

Working Notes: 1.

Products	A	B	C
Selling price/Units Rs. (I)	200	160	100
Variable cost/unit (Rs.) (II)	120	120	40
Contribution/unit (Rs.) (I-II)	80	80	60

Maximum production per hour (units)	$\frac{5,000}{200}$ = 25	$\frac{8,000}{200}$ = 40	$\frac{6,000}{200}$ = 30

Contribution per hour (Rs.)	2,000	1,600	1,800
(Maximum production per hour × contribution per unit)	(Rs.80 × 25)	(Rs.40 × 40)	(Rs.60 × 30)
Ranking	1	3	2
Units to be produced	2,000	1,600	2,400
Time required for the units to be produced (Hrs)	80	40	80

2. Statement of Contribution

Products	Units	Selling price Per Unit	Sales Revenue
			(i)
		Rs.	Rs.
A	2,000	200	4,00,000
B	1,600	160	2,56,000
C	2,400	100	2,40,000
			8,96,000

Q.53 From the following particulars, find the most profitable product mix and prepare a statement of profitability of that product mix: —

	Product A	Product B	Product C
Units budgeted to be produced and sold	1,800	3,000	1,200
Selling price per unit Rs.	60	55	50
Requirement per unit:			
Direct Materials	5 kg	3 kg	4 kg
Direct Labour	4 hrs	3 hrs	2 hrs
Variable Overheads	Rs.7	Rs.13	Rs.8
Fixed Overheads	Rs.10	Rs.10	Rs.10
Cost of Direct Materials per kg.	Rs.4	Rs.4	Rs.4

Direct Labour Hour Rate	Rs.2	Rs.2	Rs.2
Maximum Possible Units of Sales	4,000	5,000	1,500

All the three products are produced from the same direct material using the same type of machines and labour. Direct labour, which is the key factor, is limited to 18,600 hours.

Solution: Statement of Most Profitable Product Mix

Products:	A Rs.	B Rs.	C Rs.
Selling price per unit (i)	60	55	50
Variable Cost:			
Direct Material	20	12	16
Direct Labour	8	6	4
Variable Overhead	7	13	8
Total Variable Cost (ii)	35	31	28
Contribution per unit [(i) – (ii)]	25	24	22
Contribution per hour (Refer to Note 1)	6.25	8	11
Ranking of most profitable product mix	III	II	I

Statement of Profitability of the most profitable product mix

	Products			
	A	B	C	Total
Ranking	III	II	I	
Units produced and sold	150	5,000	1,500	
(Refer to Note 2)				
Contribution per unit (Rs.)	25	24	22	
Total contribution on units	Rs.3,750	Rs.1,20,000	33,000	1,56,750
Sold (Rs.)	(150 × Rs.25)	(5,000×Rs.24)	(1,500×Rs.22)	
Less: Fixed Cost (Rs.)				60,000

(Refer to Note 3) ———

Profit (Rs.) 96,750

Notes:

(1) Products	A	B	C
Contribution per unit (Rs.)	25	24	22
Direct labour hours per unit	4	3	2
Contribution per hour (Rs.)	25 / 4 = 6.25	24 / 3 = 8	22 / 2 = 11

(2) Here direct labour hour is the key factor and only 18,600 hours are available to produce the three products. The available 18,600 hours are utilized in the order of the ranking assigned i.e. first of all product C then product B and lasly product A will be produced.

The number of units of each product to be produced will depend upon the maximum possible sale of each product. The details of the products to be produced keeping in view of available hours and their ranking are as below:

		Total hours utilized
Product C	1,500 units × 2 hrs.	3000
Product B	5,000 units × 3 hrs.	15,000
Product A	150 units × 4 hrs.	600
	Total hours	18,600

	Products			
	A	B	C	Total
Budgeted units to be produced and sold:	1,800	3,000	1,200	
Fixed overhead (Rs.) per unit	10	10	10	
Total fixed overhead (Rs.)	18,000	3,0000	1,2000	60,000

Q.54. A company manufactures three products. The cost data are as under:

	A	B	C

Direct Materials	Rs.	64	152	117
Direct Labour dept.	Rate per hour	Hrs.	Hrs.	Hrs.
	Rs.			
1	5	18	10	20
2	6	5	4	7
3	4	10	5	20
Variable Overhead		Rs.16	9	21
Fixed Overheads		Rs. 4,00,000 per annum		

The budget was prepared at a time, when the market was sluggish. The budgeted quantities and selling

Product	Budgeted Qty.	Selling price (Rs.) / unit
A	9,750	270
B	7,800	280
C	7,800	400

Later the market improved and the sales quantities could be increased by 20% for product A and 25% each for products B and C. the sales manager confirmed that the increased quantities could be achieved at the prices originallo8y budgeted. The production manager stated that the output cannot be increased beyond the budgeted level due to limitation of direct labour hours in Department 2.

Required: (1) present a statement of budgeted. Profitability.

(2) Set optimal product mix and calculate the optimal profit.

Solution: (1) Statement of Budgeted profitability

Products	A	B	C	Total
Budgeted Quantity (Units) (1)	9,750,	7,800	7,800	
	Rs.	Rs.	Rs.	
Selling price per unit	270	280	280	
Variable Cost per unit:				
Direct Materials	64	152	117	

Direct Labour	160	94	222	
Variable Overheads	16	9	21	
Total Variable Cost per unit (3)	240	255	360	
Contribution per unit (4) [(2) – (3)]	30	25	40	
Total Contribution (1) × (4)	2,92,500	1,95,000	3,12,000	7,99,500
Less: Fixed Cost				4,00,000
Profit				3,99,5000

(2) Statement of Optimal product Mix and Profit

Products		B	C	Total
Contribution per unit (1)	30	25	40	
Direct Labour hours in Department 2(2)	5	4	7	
Contribution per direct labour hour (1) / (2) (Rs.)	6	6.25	5.71	
Ranking	II	I	III	
Optimal product Mix Units (3)	11,700 (58,500 hrs.)	9,750 (39,000 Hrs.)	5,292 (37,044 Hrs.)	
Total Contribution (Rs.) (1) × (3)	3,51,000	2,43,750	2,11,680	8,06,430
Less: Fixed Costs (Rs.)				4,00,000
Optimal profit				4,06,430

Working Notes: Total Hours Available In Department 2

Products (b)	Units (b)	Hrs. (c)	Total Hrs. (d) = (b) × (c)

A	9,750	5	48,750
B	7,800	4	31,200
C	7,800	7	54,600
Total			1,34,550

2. Maximum Sales Quantities of Products (Under Improved Market Conditions)

Products	Units	Increase in percentage	Total number of units
A	9,750	20	11,700
B	7,800	25	9,750
C	7,800	25	9,750

Break-even Charts

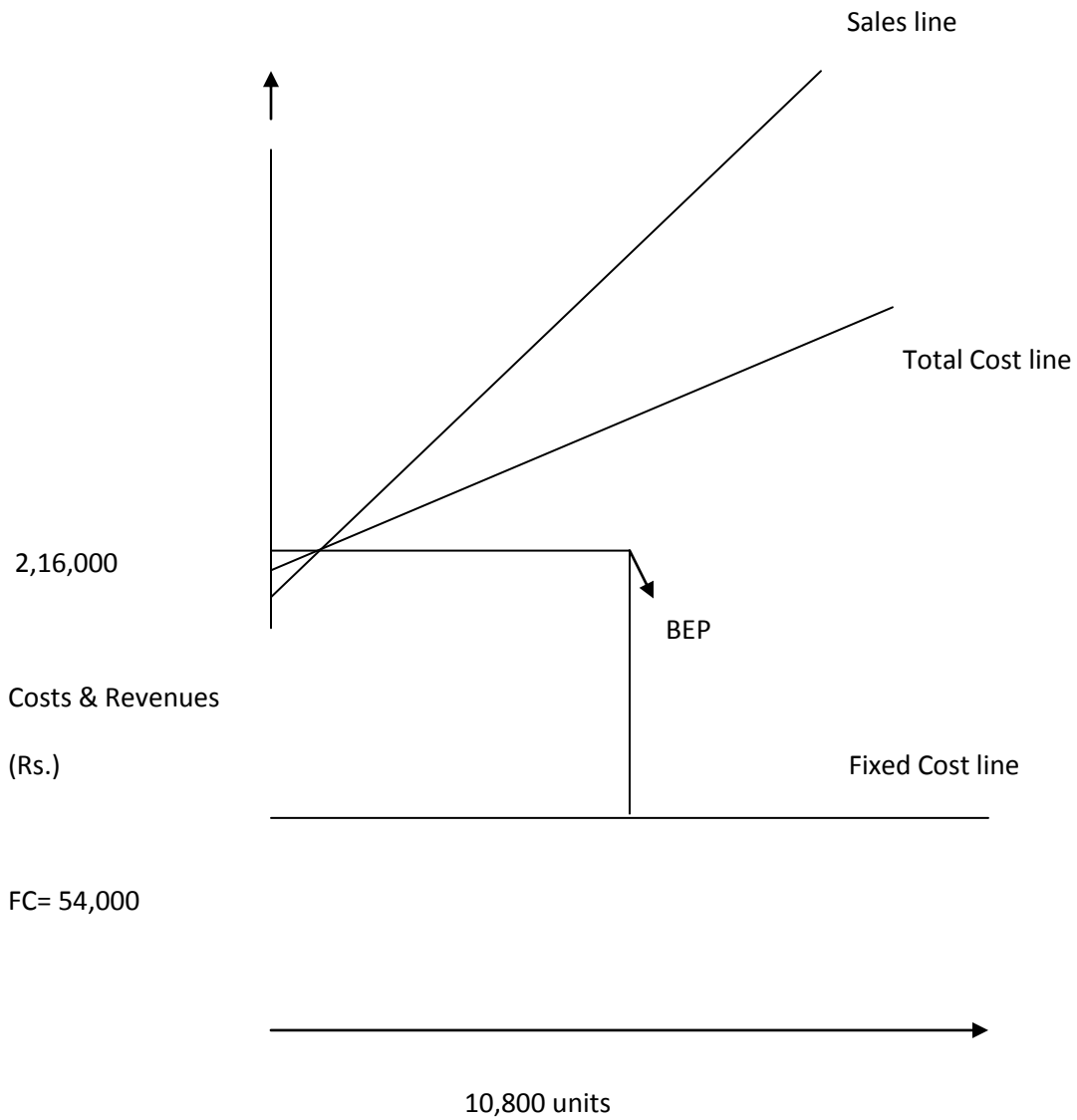
Q.55. From the following particulars draw a break-even chart and find out the break-even point:

	Rs.
Variable cost per unit	15
Fixed expenses	54,000
Selling price per unit	20

What should be the selling price per unit, if the break-even point is to be brought down to 6,000 units?

Solution: BEP (units) = $\frac{\text{Rs. 54,000}}{\text{Rs. 20 - Rs.15}}$ = 10,800 units

BEP (Rs.) = 10,800 units × Rs.20 = Rs.2,16,000



BEP = Fixed Cost / Contribution p.u = 6,000 = 54,000 / Contribution per unit

Contribution p.u. = Rs.9

SP = 9 + 15 = Rs.24

Q.56 (a) Plot the following data on a graph and determine the break-even point:

Direct Labour	100 per unit
Direct Material	40 per unit

Variable Overheads	100% of direct labour
Fixed Overheads	60,000
Selling Price	Rs.400 per unit

(b) In order to increase efficiency in production, the concern installs improved machinery which results in an increase in fixed overhead of Rs.20,000 but the variable overhead is reduced by 40%.

You are required to plot the data on the above graph and to determine the new break-even point assuming that there is no change in sale price.

Solution: (a) Total Variable Cost per unit = 100 + 40 + 100 = 240

Selling price = 400

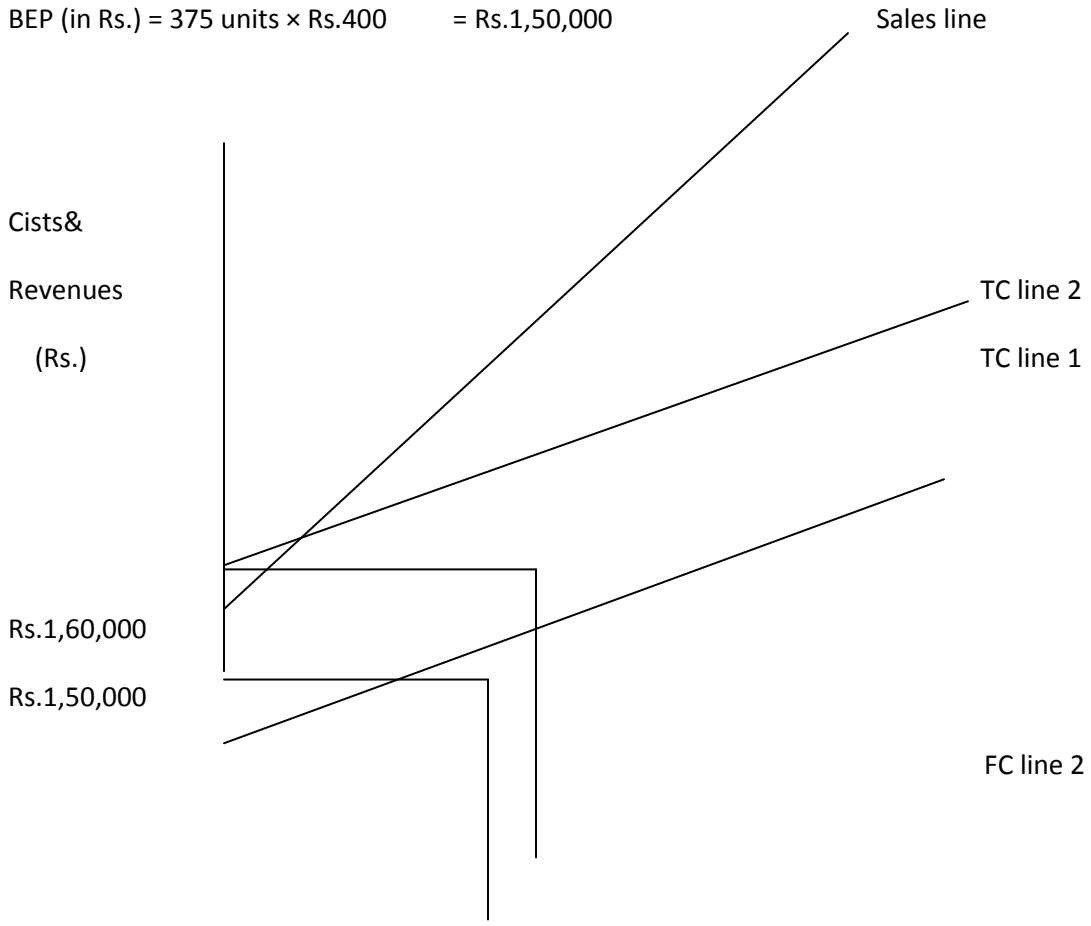
Contribution = 400 – 240

= 160

Fixed Cost = 60,000

BEP (in Rs.) = $\frac{60,000}{160}$ = 375 units

BEP (in Rs.) = 375 units × Rs.400 = Rs.1,50,000



Rs.80,000

Rs.60,000 FC line 1

375 400

(b) Total Variable Cost per unit = 100 + 40 + 60 = 200

Fixed Cost = 80,000

BEP (in units) = $\frac{80,000}{400-200}$

= 400 units

BEP (in Rs.) = 400 units × Rs.400 = Rs.1,60,000

Cost Statement as per Marginal/Absorption Costing

Q.57 Your company has a production capacity of 2,00,000 units per year. Normal capacity utilization is reckoned as 90%. Standard variable production costs are Rs.11 per unit. The fixed costs are Rs.3,60,000 per year. Variable selling costs are Rs.3 per unit and fixed selling costs are Rs.2,70,000 per year. The unit selling price is Rs.20. In the year just ended on 30th June 1998, the production was 1,60,000 units and sales were 1,50,000 units. The closing inventory on 30.6.98 was 20,000 units. The actual variable production costs for the year were Rs.35,000 higher than the standard.

(i) Calculate the profit for the year 1998:

(a) by the absorption costing method, and (b) by the marginal costing method.

(ii) Explain the difference in the profits.

Solution: (i) (a) Cost Sheet (Absorption costing)

Fixed Cost	3,60,000
(+) Variable Cost (11 × 1,60,000 + 35,000)	17,95,000
Total cost of production	21,55,000
(+) Opening Stock of Finished Goods	1,30,000

[(10,000) × (11 +2)]	
(-) Closing Stock of Finished Goods	(2,69,375)
(21,55,000 × 20,000)	
1,60,000	
Cost of Goods sold	20,15,625
Selling Overhead	
Fixed	2,70,000
Variable (1,50,000 × Rs.3)	4,50,000
Cost of Sales	27,35,625
(+) Profit	2,64,375
Sales	30,00,000

(b) Marginal costing Approach

Variable Cost of production	17,95,000
Opening Stock of Finished Goods	1,10,000
(10,000 × 11)	
(-) Closing Stock of Finished Goods	(2,24,375)
(17,95,000 × 20,000)	
1,60,000	
Variable Cost of Goods sold	16,80,625
(+) Variable Selling Overhead	4,50,000
Variable Cost of Sales	21,30,625
Sales	30,00,000
(-) Variable Cost of Sales	(21,30,625)
Contribution	869,375
(-) Fixed Cost (3,60,000 + 2,70,000)	(6,30,000)

Profit	2,39,375

(ii) The reason for difference in profits as per absorption costing and marginal costing is that absorption costing includes fixed cost in inventory valuation and marginal costing ignores the same. Marginal costing considers fixed cost as period cost and charges the entire fixed cost of the period against the contribution earned during the period.

Q.58 Mega Company ha just completed its first year of operations. The unit costs on a normal costing basis are as under:

		Rs.
Direct material 4 kg @ Rs.4	=	16.00
Direct labour 3 hrs @ Rs.18	=	54.00
Variable overhead 3 hrs @ Rs.4	=	12.00
Fixed overhead 3 hrs @ Rs.6	=	18.00
		100.00

Selling and administrative costs:

Variable	Rs.20 per unit
Fixed	Rs.7,60,000

During the year the company has the following activity:

Units produced	=	24,000
Units sold	=	21,500
Unit selling price	=	Rs.168
Direct labour hours worked	=	72,000

Actual fixed overhead was Rs.48,000 less than the budgeted fixed overhead. Budgeted variable overhead was Rs.20,000 less than the actual variable overhead. The company used on expected actual activity level of 72,000 direct labour hours to compute the predetermine overhead rates.

Required:

(i) Compute the unit cost and total income under:

(a) Absorption costing

(b) Marginal costing

(ii) Under or over absorption of overhead.

(iii) Reconcile the difference between the total income under absorption and marginal costing.

Solution: **Computation of Unit Cost & Total Income**

Unit Cost	Absorption Costing (Rs.)	Marginal Costing (Rs.)
Direct Material	16.00	16.00
Direct Labour	54.00	54.00
Variable Overhead	12.00	12.00
Fixed Overhead	18.00	--
Unit Cost	100.00	82.00

Income Statements

Absorption Costing

Sales (21500 × 168)		36,12,000
Less: Cost of goods sold (21500 × 100)	(21,50,000)	
Less: Over Absorption	(28,000)	(21,22,000)
Gross Profit		14,90,000
Less: Selling & Distribution Expenses		(11,90,000)
Net Operating Profit		3,00,000

Marginal Costing

Sales		36,12,000
Less: Variable Cost of goods sold (21500 × 82)	(17,63,000)	
Add: Under Absorption of variable overheads	(20,000)	(17,83,000)
		18,29,000
Less: Variable Selling & Distribution Expenses		(4,30,000)
Contribution		13,99,000

Less: Fixed Factory and Selling & Distribution Overheads (38,400 + 7,60,000)		(11,44,000)
Profit		2,55,000

(ii) Under or over absorption of overheads:

	Rs.
Budgeted Fixed Overheads 72,000 Hrs. x Rs.6	4,32,000
Less: Actual Fixed Overheads was less than Budgeted Fixed Overhead	(48,000)
Actual Fixed Overheads incurred	3,84,000
Budgeted Variable Overheads 72,000 Hrs.× Rs.4	2,88,000
Add: Actual Variable Overheads was higher than Budgeted	20,000
Actual variable overheads	3,08,000
Both Fixed Variable Overheads applied 72,000 Hrs × Rs.10	7,20,000
Actual Overheads (3,84,000 + 3,08,000)	6,92,000
Over Absorption	28,000

(iii) Reconciliation of Profit

Difference in Profit: Rs.3,00,000 – 2,55,000 = Rs.45,000

Due to Fixed Factory Overhead being included in Closing Stock in Absorption Costing not in Marginal Costing.

Therefore.

Difference in profit = Fixed Overhead Rate (Production - Sale)

18 (24,000 – 21,500) = Rs.45,000

Q.59 ABC Ltd. can produce 4, 00,000 units of a product per annum at 100% capacity. The variable production costs are Rs. 40 per units and the variable selling expenses are Rs. 12 per sold unit. The budgeted fixed production expenses were Rs. 24,00,000 per annum and the fixed selling expenses were Rs. 16,00,000. During the year ended 31st March, 2008 the company worked at 80% of its capacity. The operating data for the year are as follows:

Production 3,20,000 units

Sales @ Rs. 80 per unit	3,10,000 units
Opening stock of finished goods	40,000 units

Fixed production expenses are absorbed on the basis of capacity and fixed selling expenses are recovered on the bases of period.

You are required to prepare Statements of Cost and Profit for the year ending 31st March, 2008:

(i) On the basis of marginal costing

(ii) On the basis of absorption costing

Solution: Statement of Cost & Profit for the year ending 31st March 2008

(i) On the basis of Marginal Costing

		Rs.
Sales (3,10,000× Rs.80)		2,48,00,000
Less: Variable COGS (see w.n. (1))	(1,24,00,000)	
Less: Variable selling expenses (3,10,000 × Rs.12)	(37,20,000)	
Contribution		86,80,000
Less: Fixed cost:- Production		(24,00,000)
- Selling		(16,00,000)
Profit		46,80,000

Working note (1):-	(Rs.)
Variable cost of production (3,20,000 units × Rs.40)	1,28,00,000
(+) Opening Stock of Finished Goods (40,000 units × Rs.40)	16,00,000
(-) Closing Stock of Finished Goods (50,000 units × Rs.40)	(20,00,000)
Variable C.O.G.S.	1,24,00,000

(ii) On the basis of Absorption Costing

		Rs.
Variable cost of production (3,20,000 × Rs.40)		1,28,00,000
(+) Fixed cost of production	19,20,000	

Rs.24,00,000 × 3,20,000 units

4,00,000 units ——————

Total cost of production	1, 47, 20,000
(+) Opening stock of finished goods (40,000 units × Rs.46)	18, 40,000
(-) Closing stock of finished goods (50,000 units × Rs.46)	(23, 00,000)
Cost of Goods Sold	1,42,60,000
(+) Selling & distribution expenses	
→ Variable (3,10,000 units × Rs.12)	37,20,000
→ Fixed	16, 00,000
Cost of Sales	1, 95, 80,000
(+) Profit	52, 20,000
Sales	2, 48, 00,000
Profit before charging under absorbed overheads	52, 20,000
(-) Under absorbed overheads	(4, 80,000)
Profit before charging under absorbed overheads	47, 40,000

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Chapter - 2

MATERIAL COSTING

Q.1. What do you mean by Material Cost?

Ans:-

For cost ascertainment purposes, Materials refer to the tangible, physical input used in relation to production. Materials may be classified into Direct Materials and Indirect Materials.

Q. 2. What is Direct Material and Indirect Material?

Classification into Direct and Indirect costs is based on the relationship with the finished product. An item of material is considered as Direct if it satisfies the following conditions:

(a) There is a direct relationship between the material cost and the finished product.
(b) Such relationship is capable of being expressed or quantified. For example, each unit of the finished output requires 10 kg of Material A and 2 kg of Material B.
(c) Such expression or quantification achieves control purpose. Therefore, insignificant or immaterial relationship and quantification are ignored.
(d) An item of material cost which does not satisfy the above criteria is regarded as Indirect Material Cost.

Q. 3 (CA PE-II May 2003 ,2005,2007,June 2009 ,Nov-2007& Nov. 2003))

Discuss the accounting treatment of spoilage and defective in cost Accounting ?

Ans :- Spoilage can be defined as the materials which are badly damaged in the course of manufacturing operations to the extent that they cannot be ratified economically and hence taken out of process ,to be disposed off in some manner without further processing .Spoilage may be either normal or abnormal .

Defective products are such semi finished or finished products produced by a manufacturing unit ,which are not in conformity with laid down standard or dimensional specifications ,Defectives produced can be re worked or reconditioned by the application of additional material ,labour and /or processing and brought to the point of either standard or sub-standard product .The costs incurred for reconditioning are known as the " cost of re causes such as sub-standard materials .beds workmanship carelessness in planning .laxity in inspection etc .

The deference between spoilage and defectives is that while Spoilage cannot be repaired or reconditioned ,defectives can be rectified and transformed either back to standard production or to seconds .

Treatment of Spoilage and defectives in cost Accounting: - Under cost Account normal Spoilage costs i.e. which is inherent in the operation) are included in cost either by charging the loss due to Spoilage to the production order or charging it to production overheads so that it is spread over all products .Any value realized from the sale of Spoilage is created to production order or production overhead account .as the case may be .The cost of abnormal Spoilage(i.e. arising out of causes not inherent in manufacturing process)

And charged to the costing profit and Loss Account .When v work is the result of rigid specifications the cost of Spoilage work is absorbed by good production while the cost of disposal is charged to production overheads .The problem of accounting for defective work is the problem of accounting of the costs of rectification or rework .

The possible ways of treatment are as below

(i) Defectives that are considered inherent in the process and are identify as normal can be recovered by using the following methods .

(a) Charged to good products: The loss is absorbed by good units .The method is used when seconds have a normal value and defectives rectified into seconds or first are normal.

(b) Changed to general overheads : when the defectives caused in one department are reflected only on further processing the rework costs are charged to general overheads

(c) Changed to the departments overheads: - in the departments responsible for defectives can be identified then the rectification costs should be charged to that department .

(d) Charged to costing Profit and Loss Account : if defectives are abnormal and are due to causes beyond the control of organization ,the rework cost should be charged to costing profit and Loss Account .

(ii) where defectives are easily identifiable with specific jobs .the work costs are debited to the job .

Procedure for the control of Spoilage and defectives : To control Spoilage allowance for a normal Spoilage should be fixed up and actual Spoilage should be compared with standard set for it .A systematic procedure of reporting would help control over spoilage . A Spoilage report would highlight the normal and abnormal Spoilage ,the department responsible ,the caused of Spoilage and the corrective action taken if any ,

Q. 4 (CA PE-II May 2003)

Write short notes on the following

(i) Re order quantity
(ii) Re order level
(iii) Maximum stock level
(iv) Minimum stock level

Ans :-

Re order quantity :- It refers to the quantity stock for which an order is to be placed at anyone point of time .it should be such that it minmises the combined annual costs of placing an order and holding stock ,such an ordering quanity in other words to known as economic order Quatity (EOQ) .in other words economic order quanity (EOQ) is an recorder quanity but not a vica versa

It can be determined by using the following mathematical expression EOQ=ROQ=

$$\sqrt{2 \times annualrequiementofin\,ventoryite\,\min units \times Orediring\cos tperorder\,/\,annualcarring\cos tperunitpe\,rannum}$$

(ii) Re order Level :- it is the level at which fresh order should be placed for the replacement of stock .

Re-order level =Maximum re-order period ×Maximum usages consumption

OR

Re order Level = Minimum level +(Average rate of consumption ×Average time to obtain fresh supplies)

(iii) Maximum stock Level :- it indicates the maximum figure of stock held at any time .

Re-order level + Re-order quatity - [minimum consumption ×minimum re-order period]

(iv) Minimum stock Level :- it indicates the lowest figure of stock balance which must be maintained in hand at all times ,so that there is no stoppage of production due to non availability of inventory .

= Re-order level - [Average rate of consumption ×Average time of stock delivery]

Q. 5 (CA PE-II Nov. 2003, 2004) :- Distinguish clearly Bin cards and store ledger

Ans :-

Bin Card *:* Material are kept in appropriate bins, drawers of other containers. A bin card is made out for each type of material. It shows quantities of each materials received, issued and in stock. Maintaining a bin card is not a part of the accounting record as such, but it shows the quantity of each material in hand at all times and is a check on the stores ledger in the accounting department.

Stores ledger :- Store ledger is maintained in the cost accounts department .Here entries are posted by the stores ledger clerk .He records the quantitative and value about receipts ,issues and closing balance along with code number of material ,maximum ,minimum and recorder levels . Here tyransaction can be after the issue of materials .

Q. 6 (CA PEII Nov .2004) What is inventory control ? Mention its objectives and various methods of inventory for proper control ?

Ans. Inventory comprises stock of raw materials, work-in-progress, finished goods, stores and components. The aim of inventory control is to achieve maximum efficiency in the management of inventory.

Investment in inventory normally accounts for an important part of the total assets. Adequate and proper control of inventory, therefore, is an important feature of cost accounting system.

Objectives of Inventory Control :

1. Effective use of financial resources available to business, i.e. to maintain the investment in inventory at the lowest level consistent with operating requirements.
2. Avoidance of the "*out of stock*' danger, i.e. to provide a supply of required materials without any delay for efficient and uninterrupted operations.
3. Economy in purchasing as effected by quantity buying and favorable raw material market.
4. Service to customers i.e. maintaining sufficient stocks of finished products to meet reasonable expectations of customers for prompt delivery of their orders.
5. Accurate and regular material reports to management by keeping perpetual inventory and other up-to-date records.

The various techniques used for inventory control are as follows :

1. ABC of analysis.
2. Level setting.
3. Economic purchase quantity.
4. Proper purchase procedure.
5. Proper storage.
6. Perpetual inventory system.
7. Establishment of a system of budgets.
8. Review of slow and non-moving items.
9. Use of ratios, e.g. inventory turnover.

Q.7 (CA PE-II May 2006 ,IPCC June 2009) What do you understand by ABC Analysis ? What are its advantages?

Ans. The ABC method is an analytical method of stock control which aims at concentrating efforts on those items where attention is needed most. It is based on the premise that a small number

of the items in inventory may typically represent the bulk money value of the total materials used in production process, while a relatively large number of items may represent a small portion of the money value of stores used and that small number of items should be subject to the greatest degree of continuous control.

Under this system, the materials stocked may be classified into a number of categories according to their importance, i.e. their value and frequency of replenishment during a period. The first category, we may call it the group of 'A' items, may consist of only a small percentage of total items handled but its combined value may be a large portion of the total stock value. The second category, naming it as group of 'B' items, may be relatively less important. In the third category, consisting of 'C' items, all the remaining items of stock may be included which are quite large in number but their value is not high.
The advantages of ABC analysis are :

1. Closer and strict control on those items which represent a major portion of total stock value.
2. Investment in inventory can be regulated and funds can be utilised in the best possible manner.
3. Savings in stock carrying costs.
4. Helps in maintaining enough safety stock for C category of items.
5. Scientific and selective control helps in the maintenance of high stock turnover rate.

Q.No 8 (CA IPCC Nov 2009) What is meant by '*maximum level*', and '*ordering level*' with regard to maintenance of stocks ? What are the factors that govern the fixing of levels ?

Ans. The following factors help in the fixation of these levels :

1. Rate of consumption of materials.
2. Lead time, i.e. time lag.
3. Storage capacity.
4. Availability of funds for investment in inventories.
5. Cost of storage.
6. Risks of loss due to deterioration, theft, fire, etc.
7. Seasonal factors - certain materials are cheaply available during certain seasons.

TYPES OF STOCK LEVELS :

1. **Maximum Level :** The maximum level is that quantity of material above which the stock of any item should not generally be allowed to go.
   The formula for computing maximum level is as follows :

Maximum Level = Re-order level + Re-order quantity - (Minimum consumption x Minimum Re-order period)

2. **Minimum Level :** The minimum level is that level of stock below which it should not normally be allowed to fall.
   Minimum Level is compound as under :

   Minimum Level = Re-order level - (Normal consumption x Normal Re-order Period).

3. **Ordering Level or Re-order Level** *:* This is that level of materials at which a new order for materials is to be placed. In other words, this is the level at which a purchase requisition is made out.

The formula is as follows :
Re-order level = (Maximum consumption x Maximum Re-order period).

4. *Average Stock Level :* This is computed with the help of the following formula :
   Average Stock level = Minimum Level + 1/2 of Re-order quantity.

   or

   Average Stock level = (Minimum Level + Maximum Level)/2

5. *Danger Level :* It is the level below which stock should not be allowed to fall except under emergency conditions. When stock reaches this level, urgent action for purchase is initiated.

Q.No 9. (CA PCC Nov. 2007) What are the costs associated with the EOQ ?

The following are the costs associated with the EOQ, in addition to the cost of raw materials, i.e. price paid to the supplier :

(a) Buying or Ordering Costs: These are costs associated with every purchase order and are incurred every time a purchase order is made out. Some examples are :
- Cost of paperwork -Purchase Requisition, Purchase Order.
- Cost of placing advertisements in newspapers inviting quotations from suppliers.
- Cost of administration -negotiation and liaison with suppliers.
- Cost of inspection, destructive sample testing etc.
- As the number of purchase orders increases, these costs also rise. Hence the firm would try to reduce the number of purchase orders in order to reduce the annual buying costs.

(b) Carrying or Stockholding Costs: These are costs associated with carrying one unit of the raw material in stock. It includes :
- Interest on working capital blocked in raw material inventory.
- Storage Insurance.
- Warehousing Charges.
- Loss due to deterioration of materials during storage
- Increased risk of obsolescence, etc.

As the number of purchase orders decreases, quantity ordered every time increases. Hence carrying cost also increases based on average inventory held.

Q. 10 (CA PE-II May 2007) :- Explain the following

Economic Batch Quantity in Batch Costing

Ans :- Economic Batch Quantity in Batch Costing : There are two types of costs involved in Batch Costing (i) Set-up costs carrying cost

If the batch size is increased ,set up cost per unit will come down and the carrying costs . will increase .if the batch size is reduced ,set up cost per unit wil increasse and the carrying cost will come down .

Economic Batch quantity will balance both these opponents costs .it is calculated as follows :

$$EBQ = \sqrt{2DS/C}$$

Where

D =Annual Demand in units

S = Setup cost per batch

C = Carrying cost per unit per annum

Q.No 11 (CA PCC Nov. 2007) **:-**Explain FIFO and LIFO method of pricing of issue of materials ? Which of these methods would you recommend in rising prices and why ?

Ans.: ***First In First Out (FIFO) :***

This methods operates under the assumption that the materials which are received first are issued first and, therefore, the flow of cost of materials should be also in the same order. In other words, the materials issued are priced at the oldest cost price listed in the store ledger account and consequently the materials in hand are valued at the price of the latest purchases.

Advantages:

1. The method is realistic in so far as it assumes that materials are issued to production in the order of their receipts.
2. The valuation of closing stock tends to be nearer current market prices as well as cost.
3. Being based on cost, no unreleased profits enter into the financial result.
4. The method is easy to operate if the prices do not fluctuate very frequently.

Disadvantages :

1. The issue price may not reflect current market prices and, therefore, in times of rising prices, the charge to production is unduly low.
2. The cost of consecutive similar jobs may differ simply because the prior job exhausted the supply of lower priced stock. This renders comparison between different job difficult.

Last In First Out (LIFO) :

This method operates on the assumption that the latest receipts of materials are issued first for production and the earlier receipts are issued last, i.e. in the reverse order to FIFO.

Advantages :

1. The method keeps the value of issues close to the current market prices.

2. Unrealised profit or loss is usually made by using this method.

Disadvantages :

1. The value of closing stock may be quite different from the current market value and hence may not be acceptable for income tax purposes.
2. This method does not conform to the physical flow of materials.

Under conditions of rising market prices, LIFO method is generally considered better. This is so because under LIFO method reasonably correct effect of current prices is reflected in the cost and the cost is not understated.

1. **Danger Level.** (Danger Point). This level is below the minimum quantity. It is a level at which normal issues of the materials are stopped, but issued under special instructions. When the materials reach below the minimum level, i.e. danger level, the store-keeper must make special arrangements to get fresh issues, so that the production may not be help up for want of materials.
   Danger Level = Average rate of consumption x Emergency supply time

2. Economic Order Quantity (EOQ).

(Re-ording Quantity). It is not a stock level. It is a quantity to be ordered when the stock reaches the minimum level. Reorder quantity is such that when it is added to the minimum stock, it should not exceed the maximum level. It is the quantity of inventory which can be reasonably ordered at a time and purchased economically. It is also known as standard order quantity, optimum quantity or economic lot size. It means that the total cost is at minimum. The problem is, how much to buy at a time. In case, large quantities are to be purchased the cost of carrying the inventory is high. This includes interest on investment obsolescence, overstocking losses, space costs etc. On the other hand, for frequent purchases, in small quantities, the cost is high – short of materials, loss of sales, increased in buying expenses such as stationary, postage etc. therefore, the quantity to be ordered depends upon two factors, i.e. the acquisition cost and cost of possessing materials. When order for material is placed, it must facilitate more trade discount, economy in transport etc. and at the same time it should not incur heavy charges on account of storage, insurance etc.

$$\text{Formula EOQ} = \sqrt{\frac{2AB}{CS}}$$

EOQ	=	Economic Order quantity
A	=	Annual consumption
B	=	Buying cost per order
C	=	Cost per unit
S	=	Storage and carrying cost.

Average Stock

The level indicates the average stock held by the firm. It is calculate by the following formula:

$$\text{Average Stock Level} = \text{Maximum Level} + \text{Minimum Level} \times \frac{1}{}$$

2

A more refined method of measuring average stock level is given below:

1

Average Stock Level = Minimum Stock Level + --- Reorder quantity

2

UNSOLVED QUESTIONS

CONCEPT NO 1 :- QUESTIONS BASED ON EOQ

Q1:→ A company manufactures a product having monthly demand of 2000 units. For one unit of the finished product, 2 kgs of a particular raw material is needed. The purchase price of the material is Rs.20 per kg. The ordering cost is Rs.120 per order and holding cost is 10% per annum. Calculate

(i) Economic Order Quantity (EOQ)
(ii) Ordering and Holding Cost.

Q2:→ JP Ltd. manufacturer of a special product, follows the policy of EOQ for one of its components. The components details are as follows:

	Rs.
Purchase Price per Components	200
Cost of an Order	100
Annual Cost of Carrying One unit in Inventory	10% of Purchase Price
Total Cost of storage and Ordering per Annum	4,000

The company has been offered a discount of 2% on the price of the component provided the lot size is 2,000 components at a time.

You are required to:

a) Compute the EOQ
b) Advise whether the quantity discount can be accepted. (Assume that the inventory carrying cost does not vary according to discount policy.)
c) Would your advise differ if the company is offered 5% discount of a single order?

Q3:→ Pumpkin Pump Co. uses amount 75,000 valves per year and the usage is fairly constant at 6,250 valves per month, the valves cost Rs.1.50 per unit when bought in quantities and the carrying cost is estimated to be 20% of average inventory investment on the annual basis. The cost to place an order and process the delivery is Rs.18. It takes 45 days to receive delivery from the date of an order and a safety stock of 3,200 valves is desired.

You are required to:

(i) the most economical order quantity and frequency of orders.
(ii) The order point.

Q4:→ A company manufactures a product which is purchased at Rs.60 per kg. The company incurs handling cost of Rs.360 plus freight of Rs.390 per order. The carrying cost of inventory of raw material is Re.0.50 per kg per month. In addition, the cost of working capital finance on

investment in inventory of raw material is Rs.9 per kg per annum. The annual production is 1,00,000 units and 2.5 units are obtained from 1kg of raw material.
You are required to:
(i) Calculate EOQ of raw material.
(ii) How frequently the orders should be placed.
(iii) If the company proposes to rationalize placement of order on quarterly basis, what percentage of discount in the price of raw material should be negotiated.

Q5:→ EXE Ltd. has received an offer of quantity discounts on its order of materials as under

Price per tonne	Tonnes Nos.
1,200	Less than 500
1,180	500 and less than 1,000
1,160	1,000 and less than 2,000
1,140	2,000 and less than 3,000
1,120	3,000 and above

The annual requirement for the material is 5,000 tonnes. The ordering cost per order is Rs.1,200 and the stock-holding cost is estimating at 20% of material cost per annum. You are required to compute the most economical purchase level.
What will be your answer to the above question if there are no discounts offered and the price per tonne is Rs.1,500 ?

Q6:→ The quarterly production of a company's product is 20,000 units. Each unit of product requires 0.5 kg of raw material. The cost of placing one order is Rs.100 and inventory carrying cost of 1 kg. is Rs.2 per annum. The lead time for procurement of order is 36 days and safety stock of 1,000 kgs. of raw material is maintained by the company. The company has been able to negotiate following discount structure with the raw material supplier:

Order Quantity (kgs.)	**Total Discount (Rs.)**
Upto 6,000	NIL
6,000 – 8,000	400
8,000 – 16,000	2,000
16,000 – 30,000	3,200
30,000 – 45,000	4,000

You are required to:
(i) Calculate the reorder point taking 30 days in a month.
(ii) Prepare a statement showing total cost of procurement and storage of raw material after considering the discount if the company elects to place one, two, four or six orders in a year.
(iii) State the number of orders which the company should place to minimize the cost after taking EOQ into consideration.

CONCEPT NO 2 :- QUESTIONS BASED ON TYPES OF STOCK LEVELS

Q7:→ Two components A and B are used as follows:

Normal usage : 50 units per week each.
Minimum usage : 25 units per week each.
Maximum usage : 75 units per week each.
Re-order Quantity:
A : 300 units B : 500 units
Re-order Period:
A : 4 to 6 weeks B : 3 to 4 weeks
Calculate for each components:
(i) Minimum level;
(ii) Maximum level; and
(iii) Average Stock level.

Q8:→ A company uses three raw materials A, B and C for a particular product for which the following data apply:

Raw Material	Usage per units	Re-order quantity	Price per	Delivery (in weeks) Min	Avg.	Max	Re-order Level	Minimum Level
	Kgs.	**Kgs.**	**Kg.**				**(kg.)**	
A	10	10,000	0.10	1	2	3	8,000	
B	4	5,000	3.30	3	4	4	4,750	
C	6	10,000	0.15	2	3	4		2,000

Weekly production varies from 175 to 225 units, averaging 200 units of the said product. What would be the following quantities:
1. Minimum Stock of A;
2. Maximum Stock of B;
3. Average Stock level of A;
4. Re-order level of C

CONCEPT NO 3 :- QUESTIONS BASED ON STOCK OUT

Q 9:→ Following information is provided to you:
1. Annual Demand = 54,000 units.
2. Purchase Price = Rs.360 per unit.
3. Total 360 days in a year.
4. Cost of one order = Rs.9,000.
5. Inventory carrying cost per unit per annum = Rs.300.
6. Lead time is generally 6 days but it can be upto 10 days in the following manner: -

i.	Delivery days	:6	7	8	9	10
ii.	% of occurrence :	75	10	5	5	5

Required:
1. EOQ and how frequently the orders to be placed.
2. If the firm is willing to assume 15% risk of being out of stock, what would be the re-order point and safety stock.

3. If the firm is willing to assume 5% risk of being out of stock, what would be the re-order point and safety stock.
4. If stock out risk is 5%, what would be ordering cost and carrying cost.
5. Suppose, the ordering cost, becomes Rs.600 and inventory carrying cost becomes Rs.720 per unit per year, compute EOQ and how frequently the orders should be placed.

CONCEPT NO 4 :- QUESTIONS BASED ON OPTIMAL LEVEL OF SAFETY STOCK

Q 10:→ *M/s Tyrotubes trades in four wheeler tyres and tubes. It stocks sufficient quantity of tyres of almost every vehicle. In year end 2011-12, the report of sales manager revealed that M/s Tyrotubes experienced stock-out of tyres.*
The stock-out data is as follows:

STOCK OUT OF TYRES	NO. OF ITEMS
100	2
80	5
50	10
20	20
10	30
0	33

Stock out cost = `150. Per unit, Carrying cost per unit = ` 50

Determine optimum safety level.

Q11:→ A company uses EOQ model to determine the optimum number of units to be ordered. It is now desired to determine how much safety stock to hold.
The company estimates annual demand (360 working days) to be 36,000 units. Using EOQ model, the company orders 3,600 units at a time. The lead time for the order is 6 days. The annual carrying cost of one unit is Rs.450. The stock – out cost is estimated to be Rs.900 per unit.
The company has analysed the demand during 200 past re-order periods. The records indicate the following patterns:

Demand during Lead time	Number of times the quantity was demanded
540	6
560	12
580	16
600	130
620	20
640	10
660	6

	200

Required:

(1) Determine the level of re-order under existing situation.

(2) Determine the level of safety stock that the company should maintain in order to minimize expected stock-out cost and carrying cost (consider safety stock level of 0, 20, 40 and 60 units).

(3) What should be the company's new re-order point?

CONCEPT NO 5 :- QUESTIONS BASED ON APROPRIATE SUPPLIER OF RAW MATERIAL

Q12:→ XYZ Ltd. has capacity to produce 5000 tons of product in a year. The product passes through two departments P and Q. The sales forecast for the next year is full utilization of production capacity in the following customer mix:

John: 3000 tons at Rs.1,80,000 per ton

Tom: 2000 tons at Rs.2,00,000 per ton.

The company has option to buy raw material from anyone or more of the following three suppliers:

(a) Supplier L is prepared to supply 3800 tons of material @ Rs.65,000 per ton.

(b) Supplier M offers to supply 4000 tons of material @ Rs.60,000 per ton.

(c) Supplier N offers to supply @ Rs.70,000 per ton and agrees to give a discount of 5% and also bear entire transport cost subject to the condition that the entire input requirement is purchased from him.

The cost of transporting materials from suppliers premises to XYZ Ltd. is Rs.3,000 per ton in case of purchases from L and Rs.5,000 per ton in case of M.

Average scrap in production Department P is 5% and in Department Q 10% of the final output. The scrap of Department P realizes Rs.20,000 per ton and that of Department Q Rs.25,000 per ton.

Budgeted costs for the two departments for the next year:

	Departments	
	P	Q
Direct labour	Rs.20,00,000	Rs. 50,00,000
Overheads	Rs.60,00,000	Rs.1,50,00,000

Calculate:

(a) The gross quantity of material input to be purchased.

(b) The selection of the source of procurement and net per ton cost of procurement; and

(c) The total profitability for the next year assuming that the distribution cost is 10% of cost of production.

CONCEPT NO 6 :- QUESTIONS BASED ON STORE LRDGER on FIFO, LIFO, WEIGHTE AVERAGE

Q13:→ Oil India is a bulk distributor of Octane Petrol. The following of information is available of June, 2001:

		Rs.
Sales		9,45,000
Selling Overheads		25,000
Opening stock :	1,00,000 litres @ Rs.3 per litre	3,00,000
Purchases		
June 1	2,00,000 litres @ Rs.2.85 per litre.	
June 30	1,00,000 litres @ Rs.3.03 per litre.	
Closing stock on June 30 :	1,30,000 litres.	

Compute the following data by first-out, weighted average and last in and first out, method of inventory costing:

a) Value of inventory on June 30.
b) Amount of the cost of goods sold for June.
a) Profit or Loss for June.

CONCEPT NO 7 :- QUESTIONS BASED ON MATERIAL TURNOVER RATIO

Inventory Turnover (Material Turnover)

It is a ratio which is useful to measure the inventory performance. It is a ratio of the value of materials consumed during a period to the average value of inventory during the period. A high ratio is an indicator of fast moving stock. And a low ratio indicates that locking of working capital in undesirable items.

$$\text{Material turnover ratio} = \frac{\text{Cost of material used}}{\text{Average value of material in stock}}$$

$$\text{Material turnover in days} = \frac{\text{Days during the period}}{\text{Inventory turnover ratio}}$$

Q14:→

The following data are available in respect of material X for the year ended 31st March, 2011.

	(`)
Opening stock	90,000
Purchases during the year	2,70,000
Closing stock	1,10,000

Calculate:

(i) Inventory turnover ratio, and

(ii) The number of days for which the average inventory is held.

Q15:→

From the following data for the year ended 31st December, 2011, calculate the inventory turnover ratio of the two items and put forward your comments on them.

DATE	PURCHASE (UNITS)	CONSUMPTION (UNITS)	BALANCE (UNITS)
01-04-2008	200		200
18-04-2008		100	100
10-01-2009		50	50
16-03-2009	200		250
31-03-2009		250	NIL
TOTAL CONSUMPTION		400	

Calculate material turnover ratio.

Q 16:→

the following transactions are related to a component during the year 2008 – 09

	MATERIAL x (`)	MATERIAL Y (`)
Opening Stock	25,000	87,500
Closing Stock	15,000	62,500
Purchases	1,90,000	1,25, 000

Determine the fast moving material.

CONCEPT NO 8 :- QUESTIONS BASED ON INPUT OUTPUT RATIO

Input-Output Ratio

The input-output ratio is the ratio of raw materials put into production and the standard raw materials content of the actual output. It enables in determining whether the usage of materials is favourable or adverse. For instance, if 100 kilograms of material 'A' is put in the process and the final product contained only 80 kilograms of material 'A', then the input-output ratio is 100/800 or 5:4 (125%). The ratio is obtained as follows:

Standard cost of actual quantity

Standard cost of a standard quantity

The comparison of actual ratio and the standard ratio facilitates to know the performance of the firm. And the favourable or adverse use of material can also be known.

Q 17:→.

From the following, compute input-output ratio

Standard Actual

Input of material	5 kg.	1000 kg.
Output of raw material in final product	4.5 kg.	800 kg.
Cost per kg. of material	Rs.9	

Q 18:→

A chemical manufacturing units uses ingredient A as basic raw material. The cost of raw material is ` 20 per Kg, and input output ratio is 120%. Due to a sudden shortage in the market, the material becomes unavailable and the manufacturing unit is considering the use of any of the following substitutes available :

MATERIAL	INPUT – OUTPUT RATIO	` per kg
B_1	135%	26
B_2	115%	30

You are required to recommend which of the above substitutes is to be used. Also indicates additional cost required to be incurred.

PROBLEMS AND SOLUTION

Chapter 2 material costing

PROBLEM AND SOLUTION OF MATERIAL COSTING

CONCEPT NO 1 :- QUESTIONS BASED ON EOQ

Q 19:→

The following information relating to a type of Raw material is available:

Annual demand	2000 units
Unit price	` 20.00
Ordering cost per order	` 20.00
Storage cost	2% p.a.
Interest rate	8% p.a.
Lead time	half-month

Calculate economic order quantity and total annual inventory cost of the raw material.

(IPCC NOV. 2009)

SOL :-

$$EOQ = \sqrt{\frac{2 \times AnnualConsumption \times Buying\ \cos tperorder}{Storage\ \cos tperunit}}$$

$$= \sqrt{\frac{2 \times 2{,}000 \times 20}{\text{Rs.}20 \times (2 + 8/100)}}. \qquad = \sqrt{\frac{80{,}000}{2}}.$$

= 200 units

<u>The annual Inventory cost</u>

Cost of 2,000 units @ Rs. 20 (2,000×20)	= Rs. 40,000
No of order 2000/200	= Rs. 10
Ordering cost 10×20	= 200
Carring cost of Average Inventory 200/2×20×10/100	=Rs. 200
	Rs. 40,400

Q 20:→

From the following information ,find out the economic order quantity .

Annual consumption	12,000 units (360 days)
Cost per unit	Re.1
Ordering cost	Rs.12 per order
Inventory carrying cost	24%
Normal lead time	15 days
Safety stock	30 days consumption

Required: (b) Also find out

(i) When should the order be placed and
(ii) What should be the ideal inventory level immediately before the material order is received ?

SOL:- calculation of EOQ

$$= \sqrt{\frac{2 \times 12{,}000 \times 12}{24\% \times Rs.1}}$$

= 1095

A = 12,000 units

O = Rs.12 per order

C = 24% x Rs.1

(b) (i) ROL = SSL + (Normal Consumption x Normal Lead Time)

= 1,000 units + (12,000 units / 30 days x 15 days) = 1,500 units

(ii) SSL = Safety Stock Time x Annual Consumption / 360 days

(30 days x 12,000 units / 360 days) = 1000 units

= 2236 units

Q 21:→

ML Manufacturing Ltd. is required **1**000 units of material 'EX' on the average for a week which is purchased at a price of Rs. 30 per unit .The ordering cost is Rs. 150 per purchase order and inventory carrying cost per unit amounted to Rs. 0.06 per week .The reorder period is 1 to 3 weeks and the weekly usage of material 'EX' varies from 750 to 1250 units .

(iii) The Economic Order Quantity
(iv) Re-Order stock level Minimum stock level and maximum Stock level

SOL:-

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}} \qquad = \sqrt{\frac{2 \times 52{,}000 \times 150}{3.12}}$$

A = 1,000 x 52 = 52,000 units

O = Rs.150 per order

C = 0.06 x 52 = Rs.3.12

(ii) Stock Level = Max Re-order Period x Max. Usage

= 3 weeks x 1250 units

= 3750 units

Minimum Level = Re-order level – (Average Re-order Period x Average Usage)

= 3750 units – (2 weeks x 1000 units) = 1750 units

Maximum Level = Re-order Level + Re-order Quantity – (Min. Re-order period x Min. Usage)

= 3750 + 2236 – (1 x 750) = 5236 units

CONCEPT NO 2 :- QUESTIONS BASED ON TYPES OF STOCK LEVELS

Q 22:→

You are required to calculate the following levels for part no. 123456 from the information given there under:

(1) Re-ordering level

(2) Maximum level

(3) Minimum level

(4) Danger level

(5) Average stock level.

The following data may be used to calculate the re-ordering quantity.

`

Total cost of purchasing relating to the order	20
Purchase price per unit including transportation	50
Annual cost of storage of 1 unit	5
Number of units to be purchased during the year	5000
Lead times average	10days

	Maximum	15 days
	Minimum	6 days
	Max. For emergency purchase	4 days
Rate of consumption	average	15 units per day
	Maximum	20 units per day

Solution:

(a) Re-ordering Level = Maximum Consumption x Maximum Lead Time

= 20 units per day x 15 days

= 300 units.

(b) Maximum Level = Reorder Level + Reorder Qty. – (Min Consumption x Min Lead time)

= 300 + 200 – (10 x 6 days)

= 440 units

(c) Minimum Level = Reorder level – (Average Consumption x Average Reorder Period)

= 300 – (15 units x 10 days)

= 150 units

(d) Danger Level = Average Consumption x Lead time for emergency purchases

= 15 units x 4 days = 60 units

(e) Average Stock Level

$$= \frac{\text{Maximum Level + Minimum Level}}{2} = \frac{\text{440 units + 150 units}}{2} = 295 \text{ units}$$

Working Notes: Given:

A = Annual Requirement = 5000 units

O = Ordering Cost per order = Rs.20

C = Carrying Cost per unit per annum = Rs.5 per unit,

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}}$$

$$= \sqrt{\frac{2 \times 5{,}000 \times 20}{5}}$$

= 200 units

Q 23:→

ZED Company supplies plastic crockery to fast food restaurants in metropolitan city. One of its products is a special bowl, disposable after initial use, for serving soups to its customers.

Bowls are sold in pack 10 pieces at a price of Rs. 50 per pack.

The demand for plastic bowl has been forecasted at a fairly steady rate of 40,000 packs every year. The company purchases the bowl direct from manufacturer at Rs. 40 per pack within a three days lead time. The ordering and related cost is Rs. 8 per order. The storage cost is 10% per cent per annum of average inventory investment.

Required:

(i) Calculate Economic Order Quantity.
(ii) Calculate number of orders needed every year.
(iii) Calculate the total cost of ordering and storage bowls for the year.
(iv) Determine when should the next order to be placed. (Assuming that the company does not maintain a safety stock and that the present inventory level is 333 packs with a year of 360 working days.

(CA –May 2008)

Solution: (i) Economic order quantity

$$EOQ = \sqrt{\frac{2 \times A \times O}{C}}$$

$$= \sqrt{\frac{2 \times 2{,}40{,}000 \times 8}{4}}$$

=

$$\sqrt{2{,}60{,}000}$$

= 400 packs

(ii) Number of orders per year

$$\frac{\text{Annual requirements}}{\text{Economic order quantity}}$$

$\frac{40,000}{400}$ = 100 order per year

(iii) Ordering and storage costs Rs.

Ordering costs: 100 orders x Rs.8.00	800
Storage cost:- (400/2) x (10% of 40)	800
Total cost of ordering & storage	1,600

(iv) (a) Day's requirement served by each order = $\frac{40,000}{360}$ = 111 per day

This implies that 111 packs are consumed everyday.

(b) Number of days the present inventory can be used = $\frac{333}{111}$ = 3 days requirement

(c) Time interval for placing next order = Inventory left for day's requirement – Lead time of delivery

3 day's requirements – 3 days normal lead time = 0

This means that next order for the replenishment of supplies has to be placed immediately.

Q 24:→

The annual carrying cost of material 'X' is Rs. 3.6 per unit and its total carrying cost is Rs. 9,000 per annum. What would be the Economic order quantity for material 'X', if there is no safety stock of material X?

(CA PCC Nov. 2008)

Solution:

Annual Carrying Cost = (EOQ/2 + Safety Stock Units) x Carrying cost per unit

Rs. 9,000 = (EOQ/2 + 0) X Rs.3.60

Rs.9,000/Rs.3.60 x 2 = EOQ

EOQ = 5,000 units

Q 25:→

A MANUFACTURER OF SURAT PURCHASED THE CHEMICALS A, B AND C FROM BOMBAY. THE INVOICE GAVE THE FOLLOWING :

		Rs.	
Chemical A : 3,000 kg.	@ Rs. 4.20 per kg.	12,600	
Chemical B : 5,000 kg.	@ Rs. 3.80 per kg.	19,000	
Chemical C : 2,000 kg.	@ Rs. 4.75 per kg.	9,500	
Sales Tax			2,055
Railway Freight		1,000	
	Total Cost		44,155

A shortage of 200 kg. in Chemical A, of 280 kg. in Chemical B and of 100 kg. in Chemical C was noticed due to breakages. At Surat, the manufacturer paid Octroi Duty @ Re. 0.10 per kg. He also paid Cartage Rs. 22 for Chemical A, Rs. 63.12 for Chemical B and Rs. 31.80 for Chemical C. Calculate the rate of issue per kg. that you would suggest for pricing issue chemicals assuming a provision of 5% towards further deterioration.

[CA (INTER) NOV., 1991 (16 MARKS)]

Solution:	**A**	**B**	**C**
Purchase Price	12,600	19,000	9,500
Add: Sales Tax (Sales ratio)	630	950	475
Add: Freight (3:5:2)	300	500	200
	13,530	20,450	10,175
Add: Octroi (computed on net quantity received)	280	472	190
Add: Cartage	—	63.12	31.8
Total Cost	13,810	20,985.12	10,396.8
Chemicals in hand (see working note)	2,660	4,484	1,805
Cost per unit	5.20	4.68	5.76

Working Note: **A** **B** **C**

Quantity ordered	3000	5000	2000
Less: Shortage	(200)	(280)	(100)
Net: Quantity received	2,800	4,720	1,900
Less: 5% towards			
Further deterioration	140	(236)	(95)
Chemicals in hand	2,660	4,484	1,805

CONCEPT NO 2 :- QUESTIONS BASED ON

A cost incurred by a business when it is unable to fill an order and must complete it later. A backorder cost can be discrete, as in the cost to replace a specific piece of inventory, or intangible, such as the effects of poor customer service. Backorder costs are usually computed and displayed on a per-unit basis.

Q 26:→

Given the following annual demand monthly carrying cost ,back order cost and cost per order compute the economic order quantity ,the total annual relevant cost and length of the inventory cycle :

Annual demand	1,15,000 units
Ordering costs	Rs. 2,100 per order
Carrying costs	Rs. 0.25 per unit per month
Back order cost	Rs. 1.25 per unit per month

Solution:

(i) EOQ = $= \sqrt{\dfrac{2 \times A \times O}{C \times \left(\dfrac{B}{B+C}\right)}}$

$$= \sqrt{\frac{2 \times 1,15,000 \times 2,100}{(0.25 \times 12) \times \left(\dfrac{1..25 \times 12}{1.25 \times 12) + (0.25 \times 12)}\right)}}$$

$$= \sqrt{\frac{2 \times 1,15,000 \times 2,100}{3 \times \left(\frac{15}{15+3}\right)}}$$

$$= \sqrt{\frac{2 \times 1,15,000 \times 2,100}{2.5}}$$

= 13,900 units

(ii) Total Annual Relevant Cost = $= \sqrt{2 \times A \times O \times C \times 3 \times \left(\frac{B}{B+C}\right)}$

$$= \sqrt{2 \times 1,15,000 \times 2100 \times 3\left(\frac{15}{15+3}\right)}$$

(iii) No. of orders p.a. = $\frac{115000}{13900 \text{ units}}$ = 8.27 orders

Time between 2 orders = $\frac{360 \text{ days / 12 months}}{8.27 \text{ orders}}$ = 43.5 days / 1.45 months

Q 27:→

Given the following data for item of uniform demand :

Annual demand	800 units
Cost of an item	Rs. 40
Ordering cost	Rs. 800

Inventory carrying cost 40 %

Back order cost Rs. 10

Find out :

(a) Minimum cost order quantity
(b) Maximum of back orders
(c) Time between orders
(d) Total annual cost .

Solution:

$$EOQ = \sqrt{\frac{2 \times A \times O}{C \times \left(\frac{B}{B+C}\right)}} = = \sqrt{\frac{2 \times 800 \times 800}{16 \times \left(\frac{10}{26}\right)}} = 456$$

(ii) Maximum of back orders = 456 x $\frac{16}{26}$ = 281 units

(iii) No. of orders p.a. = $\frac{800}{456}$ = 1.75 orders

Time between 2 orders = $\frac{360}{1.75}$ = 205 days

(iv) **(Rs.)**

Annual Purchase Cost (800 units x Rs.40)	32,000
(+) Annual Relevant Cost	2,807
Total Annual Cost	34,807

CONCEPT NO 2 :- QUESTIONS BASED ON INVENTORY TURN OVER RATIO

Q 28:→

The inventory records of Suneel Brothers, Delhi, for the year 1998 show the following figures:

	Opening Stock	*Purchases*	*Closing Stock*
Material A	700 kg	11,500 kg	200 kg
Material B	200 litres	11,000 litres	1,200 litres
Material C	1,000 kg	1,800 kg	1,200 kg

The inventory is valued @ Re.1 per kg or litre.

Calculate the material turnover ratios regarding each of these materials and express in number of days the average inventory held. What inference do you draw?

Solution:

Materials Consumed	Opening stock + Purchases – Closing Stock
Material A	700 + 11,500 – 200 = 12,000 Kg of Rs.12,000
Material B	200 + 11,000 – 1,200 = 10,000 litres of Rs.10,000
Material C	1,000 + 1,800 – 1,200 = 1,600 kg of Rs.1,600
Average Inventory	(Opening Stock + Closing Stock) / 2
Material A	(700 + 200) /2 = 450 kg of Rs.450
Material B	(200 + 1,200)/2 = 700 litres of Rs.700
Material C	(1,000 + 1,200)/2 = 1,100 kg. of Rs.1,100
Material Turnover Ratio	Value of materials consumed during a period
	Value of average inventory held
Material A	12,000/450 = 26.67
Material B	10,000/700 = 14,29
Material C	1,600/1,100 = 1.46

Material Turnover Ratio expressed in number of days:

= Value of average inventory x Days of the period

Materials consumed

= Days of the period

Inventory Turnover

Material A = 450 x 365 / 12,000 or 365 / 26.6 = 14 days approx.

Material B = 700 x 365 / 10,000 or 365 / 14.29 = 26 days approx.

Material C = 1,100 x 365 / 1,600 or 365 / 1.46 = 250 days

The above figures clearly show that material A has the highest inventory turnover ratio, while material C has the lowest. The control has to be exercised over purchase of material C.

Since the I.T.R. of A is more than B. So, A is more fast moving material than B.

CONCEPT NO 4 :- QUESTIONS BASED ON OPTIMAL LEVEL OF SAFETY STOCK

Q 29:→

A & Co. has projected the following for a product P

Annual requirement	10,400 units
Economic Order Quantity	1,040 units
Expected usages per week	200 units
Reorder period	2 weeks

The probability distribution of usage of a probabiliy a two week period is as follows :

Usage(units)	150	250	310	400	460	500	560
Probability	.05	.05	.10	.50	.10	.15	.05

The stock out cost is Rs. 4 per unit carrying cost of Rs. 5.2 per unit per annum .calculate safety stock and reorder point .

Solution: ROL = Safety Stock Level + (Normal Consumption x Normal Period)

0 + (200 x 2) = 400

60 + (200 x 2) = 460

100 + (200 x 2) = 500

160 + (200 x 2) = 560

Statement showing determination of Optimal Level of Safety Stock

SSL	ROL. (Units	No. of order (units)	Shortage Units per order	Annual shortage (units)	Annual shortage cost Per units (4)	Prob.	Expected Annual Stock Out Cost	Annual Carrying Cost of SSL (Rs.)	Total Cost
0	400	10 10 10	60 100 160	600 1000 1600	2400 400 6400	0.10 0.15 0.05	240 600 320	- - -	
							1160		1160
60	460	10	40	400	1600 4000	0.15 0.05	240 200	(5.2 x 60)	
		10	100	1000			440	312	752
100	500	10	60	600	2400	0.05	120	5.2x100	
							120	520	640
160	560	-	-	-	-	-	-	160x5.2	832

Optimal Safety Stock Level = 100 Units

ROL = 500 units

Q 30:→

The consumption pattern of a component used in an assembly is as under :

Two monthly consumption units	Proability
500	0.15
600	0.20
700	0.30
800	0.20
900	0.15

The stock out cost is Rs. 18 per unit and the two monthly holding cost is also Rs. 18 per unit .Determine the optimal safety stock .

Solution: Statement of expected consumption (units)

Consumption	**Probability**	**Expected consumptions (Units)**
500	0.15	75
600	0.20	120
700	0.30	210
800	0.20	160
900	0.15	135
Total	1.00	700

On the basis of safety stock of 0, 100 or 200 units, the following analysis is prepared:

Safety Stock units	**Reorder level units**	**Stock out units per order**	**No. of orders p.a.**	**Annual stock out units**	**Prob.**	**Expected annual stock out units**	**Expected annual stock out costs**	**Annual holding cost**	**Total annual expected cost**
0	700	200	6	1200	0.15	180			
		100	6	600	0.20	120			
						300	32,400	—	32,400

100	800	100	6	600	0.15	90	9,720	10,800	20,520
200	900	—			—		—	21,600	21,600

Expected total cost is low at a safety stock of 100 units. Hence optimal safety stock is 100 units.

CONCEPT NO 4 :- QUESTIONS BASED ON ABC ANALYSIS

Q 31:→

A Factory uses 4,000 varieties of inventory. In terms of inventory holding inventory usage, the following information is complied:

No. of varieties of inventory	% of item	% value of inventory holding (average)	% of inventory usage (in end-product)
3.875	96.875	20	5
110	2.750	30	10
15	0.375	50	85
4,000	100.00	100	100

Classify the items of inventory as per ABC analysis with reasons:

(CA inter Nov. 1999)

Solution: Classification of the items of inventory as per ABC analysis

(1) 15 number of varieties of inventory items should be classified as 'A' category items because of the following reasons:

(i) Constitute 0.375% of total number of varieties of inventory handled by stores of factory, which is minimum as per given classification in the table.

(ii) 50% of total use value of inventory holding (average) which is maximum according to the given table.

(iii) Highest in consumption about 85% of inventory usage (in end-product).

(2) 110 number of varieties of inventory items should be classified as 'B' category items because of the following reasons:

(i) Constitute 2.75096 of total number of varieties of inventory items handled by stores of factory.

(ii) Requires moderate investment of about 30% of total use value of inventory holding (average).

(iii) Moderate in consumption about 10% of inventory usage (in eng product).

(3) 3,875 number of varieties of inventory items should be classified as 'C' category items because of the following reasons:

(i) Constitute 96.875% of total varieties of inventory items handled by stores of factory.

(ii) Requires about 20% of total use value of inventory holding (average).

(iv) Minimum inventory consumption i.e. about 5% of inventory usage (in end product).

Q 32:→

:- A factory uses 4,000 varieties of inventory .in terms of inventory hildoign and inventory usage the following information is completed :

No of varities of inventory	%	% value of inventory holding (average)	% of inventory usage (in end product)
3,875	96,875	20	5
110	2,750	30	10
15	0.375	50	85

Classify the items of inventory as per ABC analysis with reasons

Solution : classification of the inventory as per ABC analysis

1.15 number of verities of inventory items should be classified as " A" category items because of the following reasons

(i) Calculate 0.375% of total number of varieties of inventory handled by stores of factory which is minimum as per given classification in the table .
(ii) 50% of total use value of inventory handled by stores of factory which is minimum as per given classification in the table .
(iii) 50% of total use value of inventory holding (average) which is maximum according to the given table .
(iv) Highest in consumption about 85% of inventory usage (in end product)

2. 110 number of varieties of inventory items should be classified as 'B' category items because of the following reasons .

(i) Constitute 2.75096 of total number of varities of inventory items handled of inventory hilsing average)
(ii) Requires moderate investment of about 30% of total use value of inventory holding (average)
(iii) Moderate in consumption about 10% of inventory usage (in end product)

3. 3.875 number of varieties of inventory items should be classified

(i) Constitute 96.875% of total varieties of inventory items handled by stores of factory .
(ii) Required about 20% of total use value of inventory holding (average)
(iii) Minimum inventory consumption i.e. about 5% of inventory usage (in end of product)

CONCEPT NO 6 :- QUESTIONS BASED ON STORE LRDGER on FIFO, LIFO, WEIGHTE AVERAGE

Q 33:→

from the following transaction extracted from the books of accounts of a manufacturing concern as on 31st December 200,work out (a) consumption value of raw materials in the month and (b) value sock as on 31st December ,200 under the following four methods of price issue :

(i) FIFO
(ii) LIFO
(iii) Moving Weighted Average cost (End of month)
(iv) Periodic weighted Average Cost (End of month)

Show the result in a tab lour form

		Quality in Units	Rate per unit
2000 December	1 opening stock	300	9.70
	3 purchases	250	9.80
	11 issues	400	
	15 purchases	300	10.05
	20 issues	210	
	25 purchases	150	10.30
	29 issues	100	

Solution

Date	Particulars	Receipt			Issues			Balance		
		Unit	Rate	Value	Unit	Rate	Value	Unit	Rate	Value
Dec. 00			₹	₹		₹	₹		₹.	₹
1	Op. stock	--	-----		-----	-----	-----	300	9.70	2,910
3	Purchases	250	9.80	2,450	-----	-----	-----	300	9.70	2,910
								250	9.80	2,450
								550		5,360
11	Issues	---	----		300	9.70	2910			
					100	9.80	980	150		1,470

				---	400				9.80	
15	Purchases	300	10.05		-----	----	----	150		1,470
								300	9.80	3,015
				3,015				450	10.05	4,485
20	Issues	---	----		150	9.80	1,470			
					60	10.05	603	240		2,412
				----	210		2,073		10.05	
25	Purchases	150	10.30						10.30	
						----	----	240		2,412
				1,545				150	10.05	1,545
								390	10.30	3,957
29	Issue	---	---		100	10.05	1,005	140		1,407
								150	10.05	1,545
				----					10.30	
		700		7,010	710		6,968	290		2,952

a. value of closing Stock 290 units : 140 units @ ₹ 10.05 per units 1,408

150 units @ ₹ 10.30 per units 1,545

2,952

B Value of consumption

Opening stock 300 units @ ₹ 9.70 per unit = 2,910

Add: Receipts

250 units = ₹ 2,450.00

300 units = ₹ 3,015.00

150 units = ₹ 1,545.00

700 units = ₹ 7,00,000 = 7,010

Total (300+700) 1000 units = 9,920

Less csloing stock 290 units = 2,952

Value of Issues to production (710 units) = 6,968

(ii) LIFO Method

Date	Particulars	Receipt			Issues			Balance		
		Unit	Rate	Value	Unit	Rate	Value	Unit	Rate	Value
Dec. 00			₹	₹		₹	₹		₹.	₹
1	Op. stock	--	-----	-----	-----	-----	-----	300	9.70	2,910
3	Purchases	250	9.80	2,450	-----	-----	-----	300	9.70	2,910
								250	9.80	2,450
								550		5,360
11	Issues	---	----	---	250	9.80	2,450			
					150	9.70	1,455	150	9.70	1,455
					400		3,905			
15	Purchases	300	10.05	3,015	-----	----	----	150	9.70	1,455
								300	10.05	3,015
								450		4,470
20	Issues	---	----	----	210	10.05	2110.5	150	9.70	1,455
								90	10.05	904.5
								240		2,359.5
25	Purchases	150	10.30	1,545	----	----		150	9.70	1,455
								90	10.05	904.5
								150	10.30	2,359.5
								390		
29	Issue	---	---	----	100	10.30	1,030	150	9.70	1,455.0
								90	10.05	904.5
								50	10.30	515.0

(iii) Moving weighted average Method

Date	Particulars	Receipt			Issues			Balance			Remarks
		Unit	Rate	Value	Unit	Rate	Value	Unit	Rate	Value	
Dec.00			₹	₹		₹	₹		₹.	₹	a. average Rate per unit ₹ 9.75 (app)
1	Op. stock							300	9.70	2,910	
3	Purchass	250	9.80	2,450	-----	-----	-----	300	9.70	2,910	
								250	9.80	2,450	b. average Rate per unit ₹ 9.94 (app)
								550		5,360a	
11	Issues	---	----	---	400	9.75	3,900	150		1,460*	c. average Rate per unit ₹ 10.08 (app)
15	Purchases	300	10.05	3,015	-----	----	----	300		3,015	
								450		4,475b	
20	Issues	---	----	----	210	9.94	2,087.4	240		2,387.6 a	
25	Purchases	150	10.30	1,545	-----	----	----	150		1545.0	
								390		3,932.6 c	
29	Issue	--	--	---	100	10.08	1,008	290		2924.6	

(1). Value of closing Stock of 290 units =: ₹ 2,924.06 or ₹ 10.08 approx per unit

(2) Value of consumption (issues of 710 units = ₹ 6,995.40 ₹

a. 400 units @ ₹ 9.75 per unit 3,900.00
b. 210 units @ ₹ 9.94 per unit 2,087.40
c. 100 units @ ₹ 10.08 per unit 1,008.00
6,995.40

* ₹ 5,360- ₹ 3,90= ₹ 1,460

(iv) Weighted average Methos (Periodic)

Date	Particulars	Receipt			Issues			Balance			Remarks
		Unit	Rate	Value	Unit	Rate	Value	Unit	Rate	Value	
Dec.00			₹	₹	₹	₹	₹		₹.	₹	a. Average Rate per unit ₹ 9.92
1	Op. stock							300	9.70	2,910	
3	Purchases	250	9.80	2,450	----	----	----	250	9.80	2,450	
15	Purchases	300	10.05	3,015	----	----	----	300	10.05	3,015	
25	Purchases	150	10.30	1,545	----	----	----	150	10.30	1545	All Issues Are priced at this Rate
								1000		9,920	
11	Issues	----	----	----	400	9.92	3,968				
20	Issues	----	----	----	210	9.92	2,083.2				
29	Issue	----	----	----	100	9.92	992.0	240	29.0	2,876.8	
					710		7,043.2				

Value of consumption (issues of 710 units = ₹ 7,043.20

Value of closing stock 290 units = ₹ 2,876.80

* ₹ 9,920 - ₹ 7,043.20 =v2,876.80

Q 34:→

A.T Ltd. furnished the following store transations for September ,1982 :

1.9.82	Opening balance	25 Units ₹ 162.50

4.9.82	Receiptsa from B & Co. GRN No 26	8 Units
6.9.82	Issues Req.No 97	50 Units @ ₹5.57 perunit
7.9.82	Returns to B & co.	12 Units
10.9.82	Issues Req.No 108	10 Units
11.9.82	Issues Req.No 110	15 Units
13.9.82	Receiptsa from B & Co. GRN No 33	20 Units
15.9.82	Issued Req.No 121	25 Units @ ₹6.10 perunit
17.9.82	Received replecement from B & Co. GRN no 38	10 Units
19.9.82	Returned from departt material of M & Co. MRR No 4	10 Units
20.9.82	Returned from department material of M & Co. MRR No 4	5 Units
22.9.82	Transfer from Job 182 to Job 187 in the Dept. MTR 6	5 Units
26.9.82	Issued Req.No 146	10 Units
29.9.82	Transfer from Dept. " A " to Dept. " B" MIR 10	5 Units
30.9.82	Shortage in stock taking	2 Units

Write up the period stores ledger on FIFO Method and discuss how would you treat the shortage in stock taking .

Solution : **Stock Ledger**

Date	Receipt			Issues			Balance		
	Units	Rate	Amount	Units	Rate	Amount	Units	Rate	Amount
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.9.82	----	----	----	---	----	----	25	6.50	162.50
4.9.82	----	----	----	8	6.50	52	17	6.50	110.50
6.9.82	50	5.75	287.50	---	----	----	17	6.50	398.00
							50	5.75	
7.9.82	---	---	---	12	6.50	78	5	6.50	320
							50	5.75	

10.9.82	----	---	---	10	5.75	57.50	5	6.50	262.50
							40	5.75	
12.9.82	---	----	----	5	6.50				
				10	5.75	90	30	5.75	172.50
13.9.82	---	---	----	20	5.75	115	10	5.75	57.50
15.9.82	25	6.10	152.50	---	---	----	10	5.75	
							25	6.10	210.00
17.9.82	---	---	----	10	5.75	115	25	6.10	152.50
19.9.82	10	5.75	57.50	---	---	---	25	6.10	
							10	5.75	210.00
20.9.82	5	5.75	28.75	---	---	----	5	5.75	
							25	6.10	
							10	5.75	238.75
26.9.82	---	---	---	5	5.75		20	6.10	
				5	6.10	59.25	10	5.75	179.50
30.9.82	---	---	---	2	6.10	12.20	18	6.10	
							10	5.75	167.30

Working Notes :

1. The ,aterial received as replacement from vendor has been treated as fresh suupply .
2. in the absense of information the price of the material received from within on 20.9.82 has been taken as the price of the earlier issue mode on 1.79.82 in FIFO physical flow of material is irrelevant for pricing
3. the issue of material on 26.9..82 has been made first out of the material received from within .
4. the entries for transfer from one job and department to other on 22.9.82 and 29.9.82 are book entries for adjusting the cost of respective jobs and as such they have not been shown in the stores ledger account .
5. the shortage in stock taking of 2 units of ₹ 12.20 will be written off from costing P&L Account .

CONCEPT NO 4 :- QUESTIONS BASED ON RAW MATERIAL PURCHASE

Q 35:→

The following details are available in respect of a consignment of 1,250 kgs. of material X:

(i) Invoice Price Rs. 20 per kg.
(ii) Excise Duty 25% on Invoice Price.
(iii) Sales Tax 8% of Invoice Price including Excise Duty.

(iv) Trade Discount 10% on Invoice Price.
(v) Insurance 1% of Aggregate Net Price.
(vi) Delivery Charges Rs. 250.
(vii) Cost of containers @ Rs. 60 per container for 50 kg. of material. Rebate is allowed @ Rs. 40 per container if returned within six weeks, which is normal feature.
(viii) One container load of material was rejected on inspection and not accepted.
(ix) Cost of unloading and handling @ 0.25% of the cost of materials ultimately accepted.

On the basis of above you are required to find out the landed cost of per kg. of material X.

Solution: Statement showing computation of Landed Cost per Kg. of Material:-

	Amount
Invoice Price (1250 x Rs.20)	25,000
Less: Trade discount (10% x 25000)	(2,500)
Net Invoice Price	22,500
Add: Excise duty	5,625
(25% of Rs.22,500)	
Net Invoice Price including excise duty	28,125
Add: Sales Tax (8% x 28125)	2,250
Add: Insurance 22500	225
Add: Delivery Charges	250
Add: Cost of containers	1,500
(1250/50 x Rs.60)	
Less: Returnable price of containers	(1000)
(25 x 40)	
Total cost of 25 containers	31,350
Less: Cost of container rejected	(1,254)
(31350 / 25 x 1)	
Cost of 1200 kg	30,096
Add: Handling & Unloading charges	300
(Rs..025 x 1200 kg)	
Cost of Material Landed	30,396

Material Landed	1,200 kg
Cost per kg.	Rs.25.33

Q 36:→

in invoice in respect of a consignment **of** Chemicals A and B provides the following information :

	Rs.
Chemical A: 10,000 Lbs at Rs..10.00 per LB .	1,00,000
Chemical B: 8,000 LBS at Rs.13 per Lb.	1,04,000
Sales Tax @ 10%	20,400
Railway Freight	3,840

Total Cost	2,28,240

A shortage of 500 LBS. in Chemical A, and 320 Lbs Chemical B is noticed due to normal breakages . you are required to determine the rate per Lbs of each chemical .assuming a provision of 2% for further deterioration

Solution:

	A	**B**
Purchase Price	1,00,000	1,04,000
Add: S.Tax (10% of purchase price)	10,000	10,400
Freight	2,133	1,707
(in the ratio of 5 : 4)		
Total Cost	1,12,133	1,16,107
Units Received (See working notes)	9,310	7,526
Cost per unit	12.04	15.43

Working Notes:

Units purchased	10,000	8,000
Shortage	(500)	(320)
	9,500	7,680
(-) 2% for further Determination	(190)	(154)

9,310	7,526

Q 37:→

At what price per unit would Part No.A32 be entered in stores ledger, if the following invoice was received from a supplier:

Invoice	Rs.
200 units of Part No.A32 @ Rs.5 per unit	1,000.00
less: 20% discount	200.00

	800.00
Add: excise duty @ 15%	120.00

	920.00
Add: Packing charges	50.00

	970.00

Notes:

1. 2% discount will be given for payment in 30 days.
2. Documents substantiating payment of excise duty is enclosed for claiming MODVAT CREDIT.

Solution:

	Rs.
200 units part no. 32 @ 5	1,000
Less: 20% discount	(200)
Add: Packing	50
Charges for non returnable boxes	850

Cost per unit = 850/200

= Rs.4.25

The particulars relating to 1200 kgs. of a certain raw material purchased by a company during June, were as follows :

(a) Lot price quoted by supplier and accepted by the company for the placing the purchase order :

Lot up to 1,000 kg. @ Rs. 22/- kg.

Between 1,000 - 1,500 kg. @ Rs. 20/-kg.

" 1,500 - 2,000 kg. @ Rs. 18/-kg.

(b) Trade Discount 20%
(c) Additional charge for containers @ Rs. 10 per drum of 25 kg.
(d) Credit allowed on return of containers @ Rs. 8 per drum.
(e) Sales Tax at 10% on raw material and 5% on drums.
(f) Total freight paid by the purchaser Rs. 240.
(g) Insurance at 2.5% (on net invoice value) paid by purchaser.
(h) Stores overhead applied at 5% on total purchase cost of material.

The entire quantity was received and issued to production. The containers are returned in due course. Draw up suitable statement to show :

(i) Total cost of material purchased; and

Solution: (i) Computation of Total Cost of Material purchased

	Invoice Price (Rs.20 x 1,200 kg.)	24,000
(-)	Trade discount (20%)	(4,800)
	Net Invoice Price of Material	19,200
(+)	Charges for containers (1,200 kg. / 25 kg. x 1 drum x Rs.10)	480
(+)	Sales tax on material (19,200 x 10%)	1,920
	Drums (480 x 5%)	24
(+)	Freight inwards	240
(-)	Returnable Price of Containers (Rs.8 x 48 drums)	384
(+)	Insurance (2.5% x 19,200)	480
	Purchase Cost	21,960
(+)	Stores overheads (5% x 21,960)	1,098
	Total Cost of Material in stores issued to production	23,058
(ii)	Quantity issued production	1,200 kg.
	Cost per kg. issued to production	Rs.19.215

Costing

IPCC – GR. I

Study Note – 4

Overheads

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Meaning:

Broadly speaking, every form of production involves two types (portions) of costs – direct and indirect. Direct costs can conveniently be identified with particular units production, i.e. direct materials, direct labour chargeable (direct) expenses. Indirect cost cannot be traced to any unit of production. The word indirect indicates that the cost accountant is either unable or unwilling to allocate cost to a particular cost unit, but it is generally apportioned to or absorbed by cost units or cost centers on a certain suitable basis. Overhead is also known as, 'overheard cost', 'overhead charges', 'non-productive cost', 'burden', 'loading', 'on cost' etc.

ICMA defines overhead as 'total cost of indirect materials, wages and expenses'. Wheldon says, '"Overhead may be defined as the cost of indirect materials, indirect labour and such other expenses including services as cannot conveniently be charged to a specific unit. Alternatively, overheads are all expenses other than direct expenses." Blocker and Weltmer define, "Overhead costs are operating costs of a business enterprise, which cannot be traced directly to a particular unit of output. Further such costs are invisible or unaccountable."

Again "Overhead" is the aggregate of indirect material cost, indirect wages and indirect expenses". The total cost is broadly divided into

(1) Prime cost, which comprises Direct Materials, Direct Labour and Direct Expenses; and
(2) Overhead, which comprises Indirect Materials, Indirect Labour and Indirect Expenses. Thus, the expenses incurred over and above the head of Prime Cost are known as Overhead Expenses.

CONCEPT NO 8:- MACHINE HOUR RATE

Machine-Hour Rate. The machine-hour rate method of allocation of factory overheads is used in those cases where the processes of manufacture are carried out by machines and there is very little manual labour. The Institute of Cost and Management Accountants, England defines a machine-hour rate as "an actual or predetermined rate of cost apportionment or overhead absorption, which is calculated by dividing the cost to be apportioned or absorbed by the number of hours for which a machine or machines are operated or expected to be operated."

The cost of running a machine per hour can be called the machine-hour rate. A separate rate for each machine or group of machines can be established, which can be related to overhead costs of the producing department. The actual or predetermined rate of manufacturing overhead (factory overhead) absorption is computed by dividing the manufacturing cost to be absorbed by the number of hours for which a machine or a group of machines are operated or expected to be operated. Thus,

$$\text{Machine hour rate} = \frac{\text{Factory overhead}}{\text{Machine-hour during a given period}}$$

e.g.

Overheads to be absorbed = Rs.1,500

No. of machine – hours = 500

$$\text{Machine – hour rate} = \frac{1{,}500}{500} = \text{Rs.}3$$

If a job takes 15 machine hours, factory overhead absorbed by that job will be 15 x 3 = Rs.45.

Problem -1

Calculate depreciation charged from the information below

Cost of the machine	Rs. 100,000
Installation charges	Rs. 50,000
Scrap value	Rs. 10,000
Life of machine	10 years

Problem -2

Calculate per hour depreciation:

Cost of the machine	Rs. 100,000
Scrap value	Rs. 25,000
Annual working hours	6,250
Life period of the machine	12 Years

Problem -3

Calculate Machine hour rate

Cost of machine	Rs. 100,000
Scrap value	10,000
Total working life	9,000 hours
Repairs over entire life	Rs. 18,000

Problem -5

Find out machine hour rate from the data given below:

Cost of the machine Rs. 90,000

Installation expenses Rs.10,000

Scrap value Rs. 20,000
Annual working hours 10,000
Total life working life hours 80,000
Repairs annual 20,000

Problem -6

Calculate MHR from the following details –

Total cost of machine	Rs. 200,000
Scrap value	Rs. 10,000
Life period of the machine	10years
Annual working hours	9,500
Repairs annual	Rs. 19,000
Standing charges	Rs. 28500

Problem -7

Calculate MHR-

Total depreciation charges	Rs. 10 per hour
Total cost of the machine	Rs. 200,000
Scrap value	Rs. 50,000
Repairs over entire life	Rs. 30,000
Standing charges annual	Rs. 2,500
Annual working hours	1,250

Problem -8

Calculate per hour power charges:
Power consumed 20 units per hour
Power cost 25 paise per units

Problem -9

Calculate the Machine Hour Rate on the basis of the following data:

Cost of machine	18,700
Estimated scrap value after the expiry of its useful life of 9 years	700
Annual running time of the machine	4,000 hours
Power consumed by the machine	5 units per hour
Rate of power	8 paise per unit
Annual factory expenses	9,120

Charge 1/6th of the annual factory expenses to the machine in question

Ans- 1.28

Problem -10

Calculate machine hour rate for machine A from the information given below:
Cost of the machine Rs.16,000
Estimated scrap value of the machine Rs. 1,000
Effective working life 10,000 hours
Running time per four weekly period 160 hours
Average cost of repairs and maintenance charges per four weekly periods Rs. 40
Power used by machine 4 units per hour at a cost of 5 paise per hour
Ans—Rs. 1.95

Problem -11

Compute the MHR from the following data-
Cost of the machine Rs.144000
Installation charges Rs. 6,000
Residual value Rs. 6,000
Estimated working life of the machines 12,000 hours
Average cost of Repairs over entire life of the machine Rs. 12,000
Standing charges allocated to the machine per year Rs. 5,760
Power bill per year Rs. 7,200
Power consumed by the machine is 20 units per hour at a cost of 25 paise per unit.
Ans – Rs. 22

Problem -12

Cost Rs. 24,000
Scrap value Rs. 4,000
Estimated working life 40,000 hours
Estimated cost of repairs and maintenance during the whole life of the machine Rs. 2,000
Standing charges of the department for 4 weekly period Rs. 3,000
Number of machines in the department 30
Working hours in 4 weekly period: 100 hours
Power used per hour – 4 units @ 10 paise per unit.
Compute machine hour rate.
Answer—1.95

Problem -13

From the following information compute Machine Hour Rate-
Cost Rs. 6,000
Estimated scrap value Rs. 1,000
Effective working life 5,000 hours
Hours worked in January 100
Estimated cost of repairs and maintenance over life of the machine – 1,250
Standing charges allocated to this machine for January—Rs. 50
Power used by the machines- 10 units per hour at a cost of 10 paise per unit
Answer—Rs. 2.75

Problem -14

Rent of the department [space occupied by the machine is 1/5th of the department] 780 per annum
Lighting [number of men in the department 12, two men engaged on this machine] 288 per annum
Insurance etc 36
Cotton, waste, oil etc 60
Salary of foreman [1/4th of the foreman's time is occupied by this machine] 6,000
The cost of the machine is Rs. 9,200 and it has an estimated scrap value of Rs. 200
It is assumed from past experience-
1. That the machine will work for 1800 hours per annum
2. That it will incur expenditure of Rs. 1125 in respect of repairs and maintenance per annum
3. That it consumes 5 units of power per hour at the cost of 6 paise per unit
4. That the working life of the machine will be 18,000 hours.

Answer- 2.425

Problem -15

The following expenses were incurred annually in connection with a factory having 8 machines of similar size and specifications-

1. lighting for the factory Rs. 800
2. supervision Rs 900
3. repairs Rs. 2,400
4. rent and rates Rs. 4,000
5. attendants- two persons looking after 8 machines paid @ Rs. 60 per month each
6. interest on loan Rs. 2,000
7. power consumed for the shop at 10 paise per unit Rs. 9,600
8. depreciation per machine Rs. 300
9. each machine consumes 10 units of power in an hour

Calculate Machine Hour Rate if a machine runs for 1,200 hours in a year.
Answer – 2.243

Problem -16

Calculate the MHR from the following information:

1. bought of machinery Rs. 45000
2. installation charges Rs. 5000
3. life of the machine 5 years
4. working life of the machine per year 2500 hours
5. repairs charges 75% of depreciation
6. electric power consumed: 10 units per hour @ Rs. 15 paise per unit
7. lubricant oil Rs. 4 per day of 8 hours
8. consumable stores @ Rs. 10 per day of 8 hours
9. wages of machine operator @ Rs. 8 per day of 8 hours

Answer --- 11.25 per hour

Problem -17

Using the following information, calculate machine hour rate:

1.	Factory overheads directly allocated to machine	Rs. 90,000 per annum
2.	Factory overheads not directly allocated to machines:	
	Factory rent, taxes and insurance	Rs. 120,000 per annum
3.	Area occupied by the machines	6,000 square feet
4.	Total area of the factory	72,000 square feet

There are five machines of similar size and specifications in the factory and one particular machine operates on a 40 hour week and every machine remains idle for 80 hours in a year.

Answer--- Rs. 10 per hour

Problem -18

From the following data given below compute MHR:

Cost of the machine Rs. 90,000

Installation charges Rs. 10,000

Estimated scrap value nil

Estimated repairs charges per year Rs. 1,000

Estimated working life of the machine 10,000 hours

Standing charges allocated to the machine per year Rs. 6,000

Estimated working hours per year 2,000 hours

Power consumption of machine is 20 units per hour and the rate of power per 100 units is 10.

Machine hour rate per hour Rs. 15.50

Problem -19

A machine shop cost center contains three machines of equal capacities. Three operators are employed on each machine, payable Rs. 20 per hour each. The factory works for forty eight hours in a week which includes 4 hours set up time. The work is jointly done by operatoRs. The operators are paid fully for the fortyeight houRs. In additions they are paid a bonus of 10 per cent of productive time. Costs are reported for this company on the basis of thirteen four-weekly period.

The following details of factory overheads applicable to the cost center are available:

- Depcaiton 10% per annum on original cost of the machine. Original cost of the each meahine is Rs. 52,000.
- Maintenance and repairs per week per machine is Rs. 60.
- Consumable stores per week per machine are Rs. 75.
- *Power*: 20 units per hour per machine at the rate of 80 paise per unit.
- *Fixed cost on three machines*: Rent per annum Rs. 5,400, Heat and Light per annum Rs. 9,720, and foreman's salary per annum Rs. 12,960.

Required:

1. Calculate the cost of running one machine for a four week period.

Calculate machine hour rat

Problem -20

The following particulars refer to the process used in the treatment of a material subsequently incorporated in a component forming part of

Problem -21

A machine shop has 8 identical drilling machines manned by 6 operators. The machine cannot be worked without an operator wholly engaged on it. The original cost of all these machine works out to Rs.8 lakhs. These particulars are furnished for a 6 month period:

Normal available hours per month per worker

Absenteeism (without pay) hours P.M. per worker	18
Leave (with pay) hours P.M. per worker	20
Normal idle time unavoidable hours per worker P.M.	10
Average rate of wages per worker for 8 hours a day	Rs.20
Average rate of production bonus estimated	15% on wages
Value of power consumed	Rs.8,050
Supervision and indirect labour	Rs.3,300
Lightning and electricity	Rs.1,200
These particulars are for a year:	
Repairs and maintenance including consumables	3% of value of machine
Insurance	Rs.40,000
Depreciation	10% of original cost
Other sundry works expenses	Rs.12,000
General management expenses allocated	Rs.54,530

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

Problem -22

X Limited having fifteen different types of automatic machines furnishes information as under for 1996 – 97:

(i) Overhead expenses: Factory rent Rs.96,000 (Floor area 80,000 sq.ft.). Heat and gas Rs.45,000 and supervision Rs.1,20,000.

(ii) Wages of the operator are Rs.48 per day of 8 hours. He attends to one machine when it is under set up and two machines while they are under operation.

In respect of machine B (one of the above machines) the following particulars are furnished:

(i) Cost of machine Rs.45,000, Life of Machine – 10 years and scrap value at the end of its life Rs.5,000.

(ii) Annual expenses on special equipment attached to the machine are estimated at Rs.3,000.

(iii) Estimated operation time of the machine is 3,600 hours while set up time is 400 hours per annum.

(iv) The machine occupies 5,000 sq.ft. of floor area.

(v) Power costs Rs.2 per hour while machine is in operation.

Find out the comprehensive machine hour rate of machine B. Also find out machine costs to be absorbed in respect of use of machine B on the following two work – orders:

		Work order 31	Work order 32
Machine set up time	(Hours)	10	20
Machine Operation time	(Hours)	90	180

Problem -23

In a factory a machine is considered to work for 208 hours in a month. It includes maintenance time of 8 hours and set up time of 20 hours.

The expenses data relating to the machine are as under:

- Cost of the machine is Rs.5,00,000. Life is 10 years. Estimated scrap value at the end of life is Rs.20,000.
- Repairs and maintenance per annum Rs.60,480
- Consumable stores per annum Rs.47,520
- Rent of building per annum (The machine under reference occupies 1/6th of the area) Rs.72,000
- Supervisor's salary per month (common to three machines) Rs. 6,000
- Wages of operator per month per machine Rs. 2,000
- General lighting charges per month allocated to the machine Rs.1,000
- Power 25 units per hour at Rs.2 per unit

Power is required for productive purposes only. Set up time though productive, does not require power. The supervisor and operator are permanent. Repairs and maintenance and consumable stores vary with the running of the machine.

Calculate a two – tier machine hour rate

(a) set up time
(b) running time.

Problem -24

: Gemini enterprises undertakes three different jobs A, B and C. All of them require, the use of a special machine and also use the computer. The computer is hired and the hire charges work out to Rs.420000 per annum. The expenses regarding the machine are estimated as follows:

	Rs.
Rent of the quarter	17,500
Depreciation per annum	2,00,000
Indirect charges per annum	1,50,000

During the first month of operation the following details were taken from the job register: -

		A	B	C
Number of hours the machine was used:				
(a)	Without the use of computer	600	900	---
(b)	With the use of the computer	400	600	1000

You are required to compute the machine hour rate: -

(a) For the firm as whole for the month when the computer was used and when the computer was not used.

(b) For the individual jobs A, B and C.

CONCEPT NO 1:- DEPARTMENTALIZATION OF OVERHEADS

After collection of overheads on the basis of standing orders, the overheads are to be assigned to cost centers or departments. The process of assigning the expenses to departments is known as departmentalization. In all cases direct allocation is not possible. Certain types of expenses are there which need further sub – division. For example, factory rent is further divided or apportioned to the departments of factory. Similarly, the expenses of the service departments are to be apportioned among the production departments. The process of distribution of expenses to various departments is known as primary distribution. The common bases used for allocation are as follows:

Overhead Cost	Bases for Distribution
Electric power	Horse – power of machines, KWH
Electric light	No. of light points, floor space, hours used, direct (if metered)

Depreciation of plant etc.	Capital value
Delivery expenses	Weight, volume etc.
Audit fees	Sales or total cost
Supervision	No. of employees
P.F. and contribution to E.S.I.	Direct wages
Rent, rates, depreciation, repairs of factory building	Floor space occupied
Store – keeping	Weight or value of materials handled
Advertising	Actual expenses or % of sales
Personnel department Time and wage office	No. of employees
Safety	
Recreation	No. of employees or total wages

Problem -25

Amit Company has five departments; P, N, R, S are producing departments, and T is a service department. The actual costs for a period are as follows:

	Rs.
Repairs	2,000
Rent	2,500
Depreciation	1,200
Supervision	4,000
Insurance	1,500
Employer's liability of employees' Insurance	600
Light	1,800

The following data are also available in respect of the five departments:

	Dept.	Dept.	Dept.	Dept.	Dept.

		P	N	R	S	T
Area sq.ft.		140	120	110	90	40
No. of workers		25	20	10	10	5
Total wages	Rs.	10,000	8,000	5,000	5,000	2,000
Value of plant	Rs.	20,000	18,000	16,000	10,000	6,000
Value of stock	Rs.	15,000	10,000	5,000	2,000	-----

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

Problem -26

International Motors manufacture crankshafts for jeeps and trucks. They have furnished the following particulars for the quarter ended 31st March:

	Rs.
Materials	2,98,000
Direct wages	42,000
Store Expenses	20,000
Machinery Maintenance	4,600
Depreciation	22,300
Staff welfare	12,000
General expenses	30,000
Administration & selling expenses	27,000

Additional information provided by them:

		Jeep	Truck
1.	Production (nos.)	300	400
2.	Material cost ratio per vehicle	1	2
3.	Direct labour ratio per vehicle	2	3
4.	Machine hour ratio per vehicle	1	2

Calculate the cost per crankshaft of each vehicle, indicating the basis of apportionment adopted by you.

CONCEPT NO 2:- APPORTIONMENT OF OVERHEADS

The primary distribution of factory overhead apportions all overhead costs to the different departments – production and service departments – both. That is, in apportioning the factory overhead no distinction is considered between producing department and

servicing department at the primary stage. Service departments do not themselves manufacture anything but it is the production departments, which involved in manufacturing. The cost of the service department is borne by the producing department. Therefore, it is necessary that overhead costs of service departments should further assigned to production department. The process of reassignment or reapportionment of service departments overhead to producing departments or centers is termed as secondary distribution. The basis for the secondary distribution is the benefit received by each department. The following are a few examples:

Service Department Cost	Bases of Apportionment
Purchase	No. of purchases or value of materials purchased of each dept.
Accounts	No. of employees
Stores	Value of stores issued, quantity of stores issued of number of requisitions.
Canteen, medical	No. of employees
Repairs maintenance	Hours worked
Transport (external)	Truck miles, truck hours, No. of packages
Steam	Based on a consumption return
Crane service	Crane hours, weight of the materials handled
Tool – room	Direct labour hours
Inspection	Inspection hours spent
Fire protection service	Capital values
Employer's liability insurance	Number of workers or direct wages
Internal transport	No. of requisitions, weight or cost of materials

Method of Reapportionment (Redistribution)

Overhead expenses are either wholly assigned to production and service departments or are apportioned by adopting a suitable basis. This process is known as Primary Distribution. After completing the Primary Distribution of overhead expenditure, the next step in this regard is the redistribution of service department costs among the different production departments. This process is known as Secondary distribution or reapportionment.

The following are the important methods of reapportionment of service department costs to other production departments:

(a) DIRECT REDISTRIBUTION
(b) STEP METHOD
(c) RECIPROCAL SERVICE METHOD.

(i) Repeated Distribution Method.
(ii) Simultaneous Equation Method.
(iii) Trial and Error Method.

(a) DIRECT REDISTRIBUTION

Under this method, the cost of the service department is apportioned directly to the production department only ignoring the services rendered by one service department to the other.

Problem -27

Small Company Ltd. has three production departments and four service departments. The expenses for these departments as per Primary Distribution Summary were:

	Rs.	Rs.
Production Departments:		
A	30,000	
B	26,000	
C	24,000	

		80,000
Store Departments:		
Stores	4,000	
Time-keeping and accounts	3,000	
Power	1,600	
Canteen	1,000	

		9,600

Total		89,600

The following information is also available in respect of the production departments:

	Dept. A	Dept. B	Dept. C
Horse power of machine	600	600	400
Number of workers	40	30	30
Value of stores requisitioned	Rs 5,000	3,000	2,000

Apportion the costs of variable service departments to the production departments.

(b) STEP METHOD

Under this method, the cost of the most serviceable departments is first apportioned to other production as well as the service department. Therefore, a sequence of apportionment must be chosen. After apportioning the first service

department, the next service department is taken up. Thus, the service departments are apportioned off one after another. The department to which apportioning has already been done is not charged again. hence, the cost of the last service department is apportioned to only production department.

Problem -28

A manufacturing company has two production departments X and Y, and three service departments – Time – keeping, Stores and Maintenance. The Departmental Distribution Summary showed the following expenses for 1986 January.

Production Departments	
X:	Rs.36,000
Y:	Rs.24,000
Service Departments	
Stores:	Rs.7,500
Time – keeping	Rs.6,000
Maintenance	Rs.4,500

Other information relating to these departments were:

	Production Departments			Service Departments	
	X	Y	Stores	Time-Keeping	Maintenance
No. of employees	20	15	10	8	5
No. of store requisition	24	20	-----	----	6
Machine Hours	1,800	1,200	-----	----	----

Apportion the costs of the Service Departments to Production Departments X and Y.

(c) RECIPROCAL SERVICE METHOD

When there are two or more service departments, it is recognized that they render service to each other. These inter-departmental services (inter – service transfers) are taken into consideration, and are not ignored in redistributing expenses of the service departments. There are mainly three methods: Repeated Distribution, Simultaneous Equation and Trial Error Method.

(i) Repeated Distribution Method.

The overhead expenses, according to primary distribution summary are written against the respective departments one after another. Then the expenses of service departments are redistributed to the production department as well as service department on the basis of

agreed percentage. This process is repeated until the figures of the service departments are exhausted or become too small to matter.

Problem -29

A company has three production departments and two service departments. Distribution summary of the overheads is as follows:

Production Departments	
A	Rs.13,600
B	Rs.14,700
C	Rs.12,800
Service Departments	
X	Rs.9,000
Y	Rs.3,000

The expenses of service departments are charged on a percentage basis which is as follows:

	A(%)	B(%)	C(%)	X(%)	Y(%)
X Departments	40	30	20	----	10
Y Departments	30	30	20	20	----

Apportion the cost of service departments by using the repeated distribution method.

CONCEPT NO 3:- DISTRIBUTION OF SALLING OVERHEADS

Problem -30

A company is making a study of the relative profitability of the two products A and B. In addition to direct costs indirect selling and distribution costs to be allocated between the two products are as under:

	Rs.
Insurance charges for inventory (finished)	78,000
Storage costs	1,40,000
Packing and forwarding charges	7,20,000
Salesmen salaries	8,50,000
Invoicing costs	4,50,000

Other details are:

	Product A (Rs.)	Product B Rs.
Selling price per unit	500	1,000
Cost per unit (exclusive of indirect selling and distribution costs)	300	600
Annual sales in units	10,000 Units	8,000 units

Average Inventory	1,000	800
Number of Invoices	2,500	2,000

One unit of product A requires a storage space twice as much as product B. The cost to pack and forward one unit is the same for both the products. Salesman are paid salary plus commission @ 5% on sales and equal amount of efforts are put forth on the sales of each of the products:

Required:

(i) Set up a schedule showing the appointment of the indirect selling and distribution costs between the two products.

(ii) Prepare a statement showing the relative profitability of the two products.

SAME AS Q.N. 81

CONCEPT NO 3:- QUESTIONS BASED ON CONCEPTS 2, 3, &4

Problem -31

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

		Production Departments		Service Departments	
		PD1	PD2	SD1	SD2
Direct Material (Rs.)		80,000	40,000	10,000	20,000
Direct Wages (Rs.)		95,000	50,000	20,000	10,000
Overheads		80,000	50,000	30,000	20,000
Power requirement at normal capacity operations					
Actual power consumption during the period	(Kwh)	20,000	35,000	12,500	17,500
	(Kwh)	13,000	23,000	10,250	10,000

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

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

	PD1(%)	PD2(%)	SD1(%)	SD2(%)
SD1	50	40	----	10
SD2	60	20	20	----

Problem -32

A company which sells four products, some of them unprofitable discontinuing the sale of one of them. The following information is available regarding income, costs and activity for the year ended 31st March 1998:

	A	B	C	D
Sales (Rs.)	3,00,000	5,00,000	2,50,000	4,50,000
Cost of sales (Rs.)	2,00,000	4,50,000	2,10,000	2,25,000
Area of storage (sq.ft.)	50,000	40,000	80,000	30,000
Number of parcels sent	1,00,000	1,50,000	75,000	1,75,000
Number of invoices sent	80,000	1,40,000	60,000	1,20,000

Fixed Assets: -

Rent and insurance	30,000 Sq.ft.
Depreciation	10,000 Parcel
Salesmen's salaries and expenses	50,000 Sales volume
Administration wages and salaries	50,000 No. of invoices

Variable costs: -

Packing wages and materials	20 paise per parcel
Commissions	4% of sales
Stationary	10 paise per invoice

You are required to prepare Profit and Loss Statement, showing the percentage of profit or loss to sales for each product. **SAME AS Q.N. 80**

Problem -33

Modern manufactures limited have three production departments P1, P2 and P3 and two service departments S1 and S2 details pertaining to which are as under: -

	P1	P2	P3	S1	S2
Direct wages (Rs.)	3000	2000	3000	1500	195
Working hours	3070	4475	2419	----	----
Value of machines	60000	80000	100000	5000	5000
H.P. of machine	60	30	50	10	-----
Light points	10	15	20	10	5
Floor space (sq.ft.)	2000	2500	3000	2000	500

The following figures extracted from the accounting records are relevant: -

Rent and rates	5000
General lightning	600
Indirect wages	1939
Power	1500
Depreciation on machine	10000
Sundries	9695

The expenses of the service departments are allocated as under: -

	P1	P2	P3	S1	S2
Service department 'S1'	20%	30%	40%	----	10%
Service department 'S2'	40%	20%	30%	10%	----

Find out the total cost of product X which is processed for manufacturing in Departments P1, P2 and P3 for 4.5 and 3 hours respectively, given that its direct material cost is Rs.50 and direct labour cost is Rs.30. **SAME AS 48**

Problem -34

E books is an online book retailer. The company has four departments. The two sales departments are corporates sales and consumer sales. The two support departments are Administrative (Human resources, accounting) and information systems. Each of the sales departments conducts merchandising and marketing operations independently.
The following data are available for October 2003:

	Revenues	No.of Employees	Processing time used (in minutes)
Corporate sales	16,67,750	42	2400
Consumer sales	8,33,875	28	2000
Administrative		14	400
Information systems		21	1400

Cost incurred in each of four departments for October 2003 are as follows:

Corporate sales	12,97,751
Consumer sales	6,36,818
Administrative	94,510
Information systems	3,04,720

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

Required:

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

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

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

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

Problem -35

An engine manufacturing company has two production departments:

(i) Snow mobile engine and

(ii) Boat engine and

(iii) Two service departments

(a) Maintenance

(b) Factory Office.

Budgeted cost data and relevant cost drivers are as follows:

Snow mobile engine	6,00,000
Boat engine	17,00,000
Factory office	3,00,000
Maintenance	2,40,000

Cost drivers:

Factory office management	No.of employees
Snow mobile engine	1080 employees
Boat engine	270 employees
Maintenance engine	150 employees

	1500 employees

Maintenance Department:

Snow mobile engine	570 orders
Boat engine	190 orders
Factory office department	40 orders
	---
	800 orders

Required:

(i) Compute the cost driver allocation percentage and then use these percentage to allocate the service department costs by using direct method.

(ii) Compute the cost driver allocation percentage and then use these percentage to allocate the service department costs by using non reciprocal method / step method.

CONCEPT NO 6:- ABSORRPTION OF OVERHEADS

After the redistribution of service department costs to production department, the process of allotment of overhead to cost units takes place. That is, the main idea of primary and secondary distribution of all the expenses of overheads is to charge the costs to production department, and then the total expenses of the production departments are borne by all the cost units by means of absorption rates. The term "absorption" refers to charging of overheads of a cost centre or department to different cost units in a way that each cost unit bears an appropriate portion of its share of overheads. Charging the overheads to individual unit or specific product is known as overhead absorption. In other words, the method of charge of apportionment of overheads of an individual cost centre is known as absorption or recovery of overheads. According to the Terminology of the I.C.W.A. overhead absorption is "the allotment of overhead to cost units by means of rates separately calculated for each cost centre." Overhead absorption can also be called as recovery charge or application of overhead. As a result of absorption, the cost of each unit of product of the producing department includes an equitable share of the total overhead of that department. The process of allotment of overhead to cost unit is of fundamental importance since each unit of production should have its own due share of overhead charged to it, besides material cost and labour cost.

There are several methods in use for determining overhead rates: the basic procedure in all these methods is to divide the amount of overhead expenses by the total number of units of the base selected, such as, units of products, direct labour cost, labour hours, machine hours or direct material cost. The rate so obtained is multiplied to the units of the base contained in each individual product, job etc. in order to arrive at the cost of each unit outturn. Thus:

$$\text{Overhead Rate} = \frac{\text{Overhead Expenses}}{\text{Total quantum of base (quantity or value)}}$$

Methods of Absorption of Overhead

Absorption means the allotment or distribution of overheads to cost units. The task of allocating indirect expenses is easy if there is only one product. But when products are more than one, they need to be identified with particular units of production on some basis. There are a number of methods of computing overhead absorption rate. The methods differ only in so far as the bases selected but in all cases the numerator is the manufacturing overhead. The denominator is the appropriate basis selected for the purpose. The various methods generally applied for the absorption of factory overheads can be grouped under three heads:

(i) Production Unit Method (rate per unit of production)

(II) Percentage Methods:

- (a) Percentage on direct material cost
- (b) Percentage on direct labour cost (Direct wages)
- (C) Percentage on Prime Cost.

(III) Hourly Rate Methods:
(a) Direct Labour Hour rate.
(b) Machine – hour rate.
(c) Dual Hour Rate.

These methods of determining overhead rates are discussed below:

1. **Production Unit Method.** This method is also known as Units of Output Method or Cost Unit Rate Method. This is simple method, when the same type of products is manufactured, the method can be used. The actual or predetermined rate of overhead absorption is calculated by dividing the overhead cost to be absorbed by the number of units produced or estimated to be produced; thus:

$$\text{Cost unit rate or Production unit} = \frac{\text{Factory Overhead}}{\text{No. of units produced}}$$

(e.g.)
Production overhead to be overhead = Rs.1,000
Number of cost units produced = 200

$$\text{Therefore, cost unit are} = \frac{1{,}000}{200} = \text{Rs.}5$$

If 300 units are manufactured, then production overhead of Rs.1,500 (300 x Rs.5) will be charged.

Percentage on Direct Material Cost. The actual or predetermined rate of manufacturing overhead absorption is computed by dividing the manufacturing overheads by the direct material cost and multiplying the result by 100. Thus,

$$\text{Percentage of Direct Material} = \frac{\text{Factory Overheads}}{\text{Direct Material cost}} \times 100$$

Example:
Factory overhead to be absorbed = Rs.35,500
Cost of Direct Materials = Rs.1,40,000

$$\text{Then, Percentage of Direct Material Cost} = \frac{35{,}000}{1{,}40{,}000} \times 100 = 25\%$$

Problem -36

The production department of a factory furnishes the following information for the month of October.

	Rs.	
Materials used	54,000	
Direct wages	45,000	
Labour hours worked		36,000
Hours of machine operation		30,000

Overheads chargeable to the department 36,000

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

Materials used	Rs.6,000
Direct wages	Rs.3,200
Labour hours worked	3,200
Hours of machine operation	2,400

Calculate the overhead charges chargeable to the job by the direct materials cost percentage rate.

3. **Percentage on Direct Labour.** On the basis of past experience, the actual or predetermined rate of manufacturing overhead absorption is computed by dividing the overhead to be absorbed or apportioned by the predetermined direct wages or the expected direct wages and multiplying the result by 100. Thus,

$$\text{Percentage of Direct Labour} = \frac{\text{Factory Overhead}}{\text{Direct wages}} \times 100$$

e.g.

Production overhead	Rs.10,000
Direct wages	Rs.20,000

$$\text{Percentage of direct labour} = \frac{10{,}000}{20{,}000} \times 100 = 50\%$$

Again for example, if the direct labour expense are Rs.60 then the factory overhead to be absorbed is 50% of Rs.60, i.e. Rs.30.

4. **Percentage on Prime Cost.** This method is a combination of percentage on Direct Materials and Labour Cost methods. The actual or predetermined rate of manufacturing overhead absorption is computed by dividing manufacturing overhead cost by the predetermined prime, cost or the expected prime cost and multiplying the result by 100.

$$\text{Percentage on prime cost} = \frac{\text{Factory overhead}}{\text{Prime Cost}} \times 100$$

e.g. Factory Overheads = Rs.45,000
Prime cost amount to = Rs.3,00,000

$$\text{Percentage on prime cost} = \frac{45{,}000}{3{,}00{,}000} \times 100 = 15\%$$

Thus, if the prime cost of a job is Rs.500, then the production cost of the job is 15% of Rs.500 i.e. Rs.75.

As this method is the combination of the last two methods, it has all the merits and demerits of the two methods.

Problem -37

A manufacturer found that his production costs for an accounting period had been as follows:

	Rs.
Direct wages	80,000
Direct material cost	20,000
	1,00,000
Production Overhead	1,60,000
Total Cost :	2,60,000

The direct costs of job 155 were:

Direct wages	Rs.80
Direct Material Cost	Rs.3,000

The job consists of erecting a small building.

You are to calculate the works overhead chargeable to job 155, using the following methods:

(a) Material Cost Rate.
(b) Labour Cost Rate.
(c) Prime Cost Rate.

5. Direct Labour Hour Rate. This is also known as Production Hour Rate. It is a scientific method, because overhead expenses are related to time factor. The actual or predetermined rate of manufacturing overhead absorption is computed by dividing the manufacturing cost by the predetermined labour hours or the expected hours.

$$\text{Direct Labour Hour Rate} = \frac{\text{Factory overhead}}{\text{Direct labour hours during a period}}$$

We can find out the effective working hours for the factory works during a particular period by applying the following formula.

Effective working = No. of average No. of hours

workers employed during a given period	x	for which the factory works during each day.

When calculating effective direct labour hours of the factory, there will be provision for normal idle time.

e.g.

overhead to be absorbed = Rs.1,500

no. of labour hours = Rs.1,200

$$\text{Labour Hour Rate} = \frac{1,500}{1,200} = \text{Rs.}1.25.$$

Thus, is 16 hours are spent on a job, production overhead of that job is 16 x 1.25 = Rs.20.

Suitability

1. It is suitable when most of the work is done manually.
2. It is suitable when the production is not uniform.
3. It is suitable when the percentage method fails to give accurate result.

Problem -38

You are required to find out direct labour – hour rate from the following information:

(a) Total number of operators working in the dept. is 200.

(b) Department works for 300 days in a year and the number of hours worked in a day is 8.

(c) Total departmental overhead are Rs.22,800.

(d) From the total number of days 5% are to be subjected for short or idle time.

Problem -39

An engineering firm has three departments. The budgeted expenses for the current year are:

	Dept. A	Dept. B	Dept. C
	Rs.	Rs.	Rs.
Materials	1,00,000	1,00,000	79,700

Direct wages	1,36,640	87,840	79,300
Direct expenses	1,760	2,280	900
Work expenses	97,600	65,880	61,100
Administration expenses	26,880	25,600	19,890
Direct labour hours	78,080	57,645	48,880

Works expenses are charged to output at a man – hour rate and administration expenses as a percentage on works cost.

Compute man-hour rate and percentages of administration overhead on works cost.

CONCEPT NO 6:-ACCOUNTING TREATMENT OF UNDER AND OVERRECOVERY OF OVERHEADS

Problem -40

In a manufacturing unit, factory overhead was recovered at a pre-determined rate of Rs.25 per man-day. The total factory overhead expenses incurred and the man-days actually worked were Rs.41.50 lakhs and 1.5 lakhs man-days respectively. Out of the 40,000 units produced during a period, 30,000 were sold.

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

How would unabsorbed overheads be treated in cost accounts ?

Problem -41

ABC Ltd. manufactures a single product and absorbs the production overheads at a predetermined rate of Rs.10 per machine hour.

At the end of financial year 1998-99 it has been found that actual production overheads incurred were Rs.6,00,000. It included Rs.45,000 on account of written off obsolete stores and Rs.30,000 being the wages paid for the strike period under an award.

The production and sales data for the year 1989 – 99 as under:

Production :

Finished goods	20,000 units
Work in progress	8,000
(50% complete in all respects)	

Sales:

Finished goods	18,000 units

The actual machine hours worked during the period were 48,000. It has been found that one-third of the under absorption of production overheads was due to lack of production planning and the rest was attributable to normal increase in costs.

You are required to:

(i) Calculate the amount of under absorption of production overheads during the year 1998 – 99 and

(ii) Show the accounting treatment of under absorption of production overheads.

Problem -42

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

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

Problem -43

In a factory, overheads of a particular department are recovered on the basis of Rs.5 per machine hour. The total expenses incurred and the actual machine hours for the department for the month of August were Rs.80000 and 10000 hours respectively. Of the amount of Rs.80000, Rs.15000 became payable due to an award of the Labour Court and Rs.5000 was in respect of expenses of the previous year booked in the current month (August). Actual production was 40000 units, of which 30000 units were sold. On analyzing the reasons, it was found that 60% of the under

absorbed overhead was due to defective planning and the rest was attributed to normal cost increase. How would you treat the under absorbed overhead in the cost accounts.

Problem -44

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

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

How would unabsorbed overheads be treated in cost accounts?

Problem -45

A Limited manufactures two products A and B. The manufacturing division consists of two production departments P1 and P2 and two serviced departments S1 and S2.

Budgeted overheads rates are used in the production departments to absorb factory overhead to the products. The rate of department P1 is based on direct machine hours, while the rate of department P2 is based on direct labour hours. In applying overheads the pre-determined rates are multiplied by actual hours.

For allocating the service department costs to production departments the basis adopted is as follows:

(i) Cost of department S1 to departments P1 and P2 equal and

(ii) Cost of department S2 to departments P1 and P2 in the ratio of 2:1 respectively.

The following budgeted and actual data are available:

Annual Profit Plan Data:

Factory overheads budgeted for the year

		Rs.		Rs.
Departments	P1	25,50,000	S1	6,00,000
	P2	21,75,000	S2	4,50,000

Budgeted output in units:

Product A – 50,000; B – 30,000

Budgeted raw material cost per unit.

Product A – Rs.120; Product B – Rs.150

Budgeted time required for production per unit.

Department P1: Product A: 1.5 machine hours
Product B: 1.0 machine hours

Department P2: Product A: 2 direct labour hours
Product B: 2.5 direct labour hours

Average wage rates budgeted in department P2 are: Product A – Rs.72 per hour and Product B – Rs.75 per hour.
All materials are used in department P1 only.
Actual data (for the month of July 1993)
Units actually produced: Product A – 4,000 units
Product B – 3,000 units

Actual direct machine hours worked in department P1:
On product A – 6,100 hours, Product B – 4,150 hours

Actual direct machine hours worked in department P2:
On product A – 8,200 hours, Product B – 7,400 hours

Cost actually incurred:

		Product A (Rs.)			Product B (Rs.)
Raw Material		4,89,000			4,56,000
Wages		5,91,000			5,52,000
			Rs.		Rs.
Overheads	Department	P1	2,31,000	S1	60,000
		P2	2,04,000	S2	48,000

You are required to:
(i) Compute the predetermined overheads rate for each production department.
(ii) Prepare a performance report for July 1993 that will reflect the budgeted costs and actual costs.

CONCEPT NO 7:- VARIOUS CAPICITY

Problem -46

Machinery was purchased from a manufacturer who claimed that machine could produce 36.5 tonnes in a year consisting of 365 days.
Holidays, break-down, etc., were normally allowed in the factory for 65 days.
Sales were expected to be 25 tonnes during the year and the plant actually produced 25.2 tonnes during the year. You are required to state the following figures:

- Rated capacity

- Practical capacity
- Normal capacity
- Actual capacity

Answers:

- Rated capacity 36.5 tonnes
- Practical capacity 30 tonnes
- Normal capacity 25 tonnes
- Actual capacity 25.2 tonnes

PROBLEMS AND SOLUTIONS

CONCEPT NO 7:-QUESTIONS BASED ON DISTRIBUTION OF OVERHEADS

Problem -47

.A company's production costs for the year ending 30-06-2017 are given below:

Item	P1	P2	P3	Office	Stores	Workshop	Total
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Direct wages	20,000	25,000	30,000	-	-	-	75,000
Direct materials	30,000	35,000	45,000	-	-	-	1,10,000
Indirect materials	2,000	3,000	3,000	1,000	2,000	2,000	13,000
Indirect wages	3,000	3,000	4,000	10,000	10,000	5,000	35,000
Area in (sq. meters)	200	250	300	150	100	250	1,250
Book value of machine	30,000	35,000	25,000	-	-	15,000	1,05,000
Total kw hrs.	15	20	25	-	-	5	65

(000s)							
Machine hours worked	10,000	20,000	15,000	-	-	5,000	50,000

The other expenses are as follows:

(1) Rent Rs. 12,500

(2) Insurance Rs. 1,050

(3) Depreciation 15% of value of machinery

(4) Power Rs. 3,800

(5) Light Rs. 1,250

You are required to prepare an overheads analysis sheet for the departments showing clearly the basis of apportionment, where necessary.

Solution

Overheads Analysis Sheet

		Production Departments			Service Departments			
Items	**Basis of Charge**	**P1**	**P2**	**P3**	**Factory Office**	**Stores**	**Workshop**	**Total**
Indirect Material	Allocation	2,000	3,000	3,000	1,000	2,000	2,000	13,000
Indirect Wages	Allocation	3,000	3,000	4,000	10,000	10,000	5,000	35,000
Rent	Area	2,000	2,500	3,000	1,500	1,000	2,500	12,500
Insurance	Value of Mach	300	350	250	-	-	150	1,050
Deprn.	Value of Mach	4,500	5,250	3,750	-	-	2,250	15,750
Power	H.P.Mach	877	1,169	1,462	-	-	292	3,800
Light	Area	200	250	300	150	100	250	1,250
		12,877	15,519	15,762	12,650	13,100	12,442	82,350
Workshop	Machine Hours	2,765	5,530	4,147	-	-	(12,442)	-
Stores	Direct Materials	3,573	4,168	5,359	-	(13,100)	-	-
Factory Office	Direct Wages	3,373	4,217	5,060	(12,650)	-	-	-
Total Overheads		22,588	29,434	30,328	-	-	-	82,350

Problem -48

A company has three production departments (M1, M2 and M3) and three service department, one of which Engineering service department, servicing the M1 and M2 only. The relevant information's are as follows:

Product X Product Y

M1	10 Machine hours	6 Machine hours
M2	4 Machine hours	14 Machine hours
M3	14 Direct Labour hours	18 Direct Labour hours

The annual budgeted overhead cost for the year is:

	Indirect Wages (Rs.)	Consumable Supplies (Rs.)
M1	46,520	12,600
M2	41,340	18,200
M3	16,220	4,200
Stores	8,200	2,800
Engineering Service	5,340	4,200
General Service	7,520	3,200

	Rs.
Depreciation on Machinery	39,600
Insurance of Machinery	7,200
Insurance of Building	3,240 (Total building insurance cost for M1 Is one third of annual premium
Power	6,480
Light	5,400
Rent	12,675 (The general service deptt. is located In a building owned by the company. It is valued at Rs. 6,000 and is charged into cost at notional value of 8% per annum. This cost is additional to the rent shown above)

The value of issues of materials to the production departments are in the same proportion as shown above for the Consumable supplies.

The following data are also available:

Department	**Book value Machinery (Rs.)**	**Area (Sq. ft.)**	**Effective H.P. hours %**	**Production Direct Labour hour**	**Capacity Machine Hour**
M1	1,20,000	5,000	50	2,00,000	40,000
M2	90,000	6,000	35	1,50,000	50,000
A1	30,000	8,000	05	3,00,000	
Stores	12,000	2,000	-		
Engg. Service	36,000	2,500	10		
General service	12,000	1,500	-		

Required:

1. Prepare an overhead analysis sheet, showing the bases of apportionment of overhead to departments.
2. Allocate service department overheads to production department ignoring the apportionment of service department costs among service departments.
3. Calculate suitable overhead absorption rate for the production departments.
4. Calculate the overheads to be absorbed by two products, X and Y.

(CA PCC May 2007)

Solution

Summary of Apportionment of Overheads

		Production Departments			Service Departments		
Items	**Basis**	**M1**	**M2**	**M3**	**Store Service**	**Eng Service**	**Gen Service**
Indirect wages	Allocation	46,520	41,340	16,220	8,200	5,340	7,520
Consumable stores	Allocation	12,600	18,200	4,200	2,800	4,200	3,200
Depreciation	Capital value of Machine	15,840	11,880	3,960	1,584	4,752	1,584
Insurance of Machine	Capital value of Machine	2,880	2,160	720	288	864	288
Insurance on Building	1/3 to MI Balance area basis	1,080	648	864	216	270	162
Power	HP Hr%	3,240	2,268	324	—	648	--
Light	Area	1,080	1,296	1,728	432	540	324
Rent	Area	2,535	3,042	4,056	1,014	1,268	760
Rent of general service	Direct 8% of 6,000	--	--	--	--	--	480
Total		85,775	80,834	32,072	14,534	17,882	14,318

(ii) Allocation of service departments overheads

		Production Departments			Service Departments		
Service Deptt.	**Basis of Apportionment**	**M1**	**M2**	**M3**	**Store Service**	**Eng Service**	**Gen Service**
Store	Ratio of consumable value (126:182:42)	5,232	7,558	1,744	(14,534)	--	--
Engineering Service	In Machine hours Ratio of M1 and M2 (4 : 5)	7,948	9,934	--	--	(17,882)	--
General Service	LHR Basis 20:15:30	4,406	3,304	6,608	--	--	(14,318)
Total		17,586	20,796	8,352			

(iii) Overhead Absorption rate

	M1	**M2**	**M3**
Total overhead allocated	1,03,361	1,01,630	40,424
Machine hours	40,000	50,000	--
Labour hours	--	--	3,00,000
Rate per MHR	2.584	2.033	--
Rate per Direct Labour	--	--	.135

(iv) Statement showing overhead absorption for Product X and Y

Production Deptt.	Absorption Rate	Product X		Product Y	
		Hours	Rs.	Hours	Rs.
M1	2.584	10	25.84	6	15.50
M2	2.033	4	8.13	14	28.46
M3	.135	4	0.54	18	2.43
			34.51		46.39

Problem -49

Self-help Ltd. has gensets and produces its own power. Data for Power Co are as follows :

Power Hours	Production Deptts.		Service Deptts.	
	A	B	X	Y
Needed capacity production	10,000	20,000	12,000	8,000
Used during the month of May	8,000	13,000	7,000	6,000

During the month of May, costs for generating power amounted to Rs. 9,300; of this Rs. 2,500 was considered to be fixed cost. Service Dept. X renders service to A, B and Y in the ratio, of 13 : 6 : 1, while Y renders service to A and B in the ratio 31 : 3. Given that the direct labour' hours in Deptts. A and B are 1,650 hours and 2,175 hours respectively, find the power cost per,' labour hour in each of these two Deptts.

Solution:

Overheads Distribution Sheet

Particulars	Basis	Production Departments (Rs.)		Service Departments (Rs.)	
		A	B	X	Y
Primary Distribution					
Fixed Cost 2500	Need Capacity	500	1,000	600	400
Variable Cost 6800 (9300 - 2500)	Used Capacity	1,600	2,600	1,400	1,200
T.C. of Service Department				2,000	1,600
Secondary Distribution					
X	13:6:1	1,300	600	(2,000)	100
					1,700
Y	31:3	1,550	150		(1,700)

Factory Overheads		4,950	4,350		
Labour hrs. Factory Overheads per hr.		1,650 Rs. 3	2,175 Rs. 2		

Problem -50

XL Ltd., has three production departments and four service departments. The expenses for these departments as per primary distribution summary are as follows:

Production Departments:	**Rs.**	**Rs.**
A	30,000	
B	26,000	
C	24,000	80,000
Service Departments:	**Rs.**	**Rs.**
Stores	4,000	
Time-Keeping and Accounts	3,000	
Power	1,600	
Canteen	1,000	9,600

The following information is also available in respect of the production departments:

	Dept. A	Dept. B	Dept. C
Horse Power of Machine	300	30	200
Number of workers	20	0	15
Value of Stores requisition in (Rs.)	2,500	15,000	1,000

Apportion the costs of service departments over the production departments.

Solution:

Secondary Overhead Distribution Statement

Item of cost	Basis of apportionment	Total	Production Depts		
			A	B	C
Cost as per primary distribution summary		80,000	30,000	26,000	24,000
Stores	Value of stores				
	Requisition (5:3:2)	4,000	2,000	1,200	800
Time-keeping	No. of workers				

and Accounts	(4:3:3)	3,000	1,200	900	900
Power	H.P. (3:3:2)	1,600	600	600	400
Canteen	No. of workers (4:3:3)	1,000	400	300	300
		89,600	34,200	29,000	26,400

Problem -51

RST Ltd. has two production departments: Machining and Finishing. There are three service departments: Human Resource (HR), Maintenance and Design. The budgeted costs in these service departments are as follows:

	HR	Maintenance	Design
	Rs.	Rs.	Rs.
Variable	1,00,000	1,60,000	1,00,000
Fixed	4,00,000	3,00,000	6,00,000
	5,00,000	4,60,000	7,00,000

The usage of these Service Departments' output during the year just completed is as follows:

	Provider of service		
User of service	HR	Maintenance	Design
HR	-	-	-
Maintenance	500	-	-
Design	500	500	-
Machining	4,000	3,500	4,500
Finishing	5,000	4,000	1,500
Total	10,000	8,000	6,000

Required:

(i) Use the direct method to re-apportion RST Ltd.'s service department cost to its
(ii) Production departments.
(iii) Determine the proper sequence to use in re-apportioning the firm's service department cost by step-down method.
(iv) Use the step-down method to reapportion the firm's service department cost.

(CA PE-II Nov.-2006)

Solution:

(i) Appointment of Service Department Overheads amongst production departments using Direct Method:

	Production Deptts.		**Service Deptts.**		
	Machining Rs.	**Finishing Rs.**	**HR Rs.**	**Maintenance Rs.**	**Design Rs.**
Overhead as per			5,00,000	4,60,000	7,00,000

primary distribution					
Apportionment	5,25,000	1,75,000			
Design 4,500 : 1,500					
Maintenance 3,500 : 4,000	2,14,667	2,45,333			
HR 4,000 : 5,000	2,22,222	2,77,778			
	9,61,889	6,98,111			

(ii) The proper sequence for apportionment of service department overheads is

First HR
Second Maintenance
Third Design

The sequence has been laid down based on service provided.

(iii) Apportionment of Service Department overheads amongst production departments using step-down method.

	Production Department		**Service Department**		
	Machining Rs.	**Finishing Rs.**	**HR Rs.**	**Maintenance Rs.**	**Design Rs.**
Overhead as per primary distribution	--	--	5,00,000	4,60,000	7,00,000
Apportionment HR 4 : 5 – 0.5 : 0.5	2,00,000	2,50,000	(-) 5,00,000	25,000	25,000
Maintenance 7 : 8 : 1	2,12,188	2,42,500	--	(-) 4,85,000	30,312
Design 3 : 1	5,66,484	1,88,828	--	--	(-) 7,55,312
	9,78,672	6,81,328			

Problem -52

A manufacturing company has two production departments X and Y and three service departments, time keeping, stores and maintenance. The departmental summary showed the following expenses for the month of October:

Production departments	Rs.
X	16,000
Y	10,000
Service departments:	
Time keeping	4,000
Stores	5,000
Maintenance	3,000

The other information is:

Particulars	Production depts.		Service depts.		
	X	Y	Time keeping	Stores	Maintenance

No. of employees	40	30	20	16	10
No. of stores requisitions	24	20	-	-	6
Machine hours	2,400	1,600	-	-	-

Solution:

Overheads Distribution Sheet

Particulars	**Basis**	**Production Deptts.**		**Service Deptts.**		
		X	**Y**	**Time Keeping**	**Stores**	**Maintenance**
	No. of Employees	16,000	10,000	4,000	5,000	3,000
Time Keeping	40:30:16:10	1,667	1,250	(4,000)	667	416
					5,667	3,416
Stores	No. of stores requisitions 24:20:6	2,720	2,267		(5,667)	680
					-	4,096
Maintenance	Machine Hrs.	2,458	1,638			(4,096)
	2,400:1,600					
Total Cost of Production Deptts.		22,845	15,155			-

Problem -53

Deccan manufacturing ltd. has three departments which are regarded as production departments. Service departments' costs are distributed to these production departments using the step ladder method of distribution. Estimates of factory overhead costs to be incurred by each department in the forthcoming year are as follows. Data required for distribution is also shown against each department:

Department	Factory overheads	Direct labour hours	No. of employees	Area in sq. meter.
Production:				
X	1, 93,000	4,000	100	3,000
Y	64,000	3,000	125	1,500
Z	83,000	4,000	85	1,500
Service:				
P	45,000	1,000	10	500
Q	75,000	5,000	50	1,500

R	1, 05,000	6,000	40	1,000
S	30,000	3,000	50	1,000

The overhead costs of the four service departments are distributed in the same order, i.e. P, Q, R and S respectively on the following basis:

Department	**basis**
P	Number of employees
Q	Direct labour hours
R	Area in square meters
S	Direct labour hours

You are required to:

(a) Prepare a schedule showing the distribution of overhead costs of the four service departments to the three production departments; and

(b) Calculate the overhead recovery rate per direct labour hour for each of the three production departments.

Solution:

Overheads Distribution Sheet

	Production Deptt. (Rs.)				**Service Deptt. (Rs.)**		
	X	**Y**	**Z**	**P**	**Q**	**R**	**S**
Factory Overheads P (100:125:85:50:40:50)	1,93,000 10,000	64,0000 12,500	83,000 8,500	45,000 (45,000)	75,000 5,000	1,05,000 4,000	30,000 5,000
Q (4:3:4:6:3)	16,000	12,000	16,000		80,000 (80,000)	1,09,000 24,000	35,000 12,000
R (3000:1500:1500:1000)	57,000	28,500	38,500		-	1,33,000 (1,33,000)	47,000 19,000
S (4:3:4)	24,000	18,000	24,000			-	66,000 (66,000)
Total Factory Overheads	3,00,000	1,35,000	1,60,000				-
Labour hours Labour hour rate	4,000 Rs. 75	3,000 Rs. 45	4,000 Rs. 40				

Problem -54

A factory has two service departments P and Q and three production departments A, B, and C. You are supplied with the following information :

		Production Deptts.			Service Deptts.	
Particulars	**Total**	**A**	**B**	**C**	**P**	**Q**
Rent	12,000	2,400	4,800	2,000	2,000	800
Electricity	4,000	800	2,000	500	400	300
Indirect labour	6,000	1,200	2,000	1,000	800	1,000
Depreciation of Machinery	5,000	2,500	1,600	200	500	200
Sundries	4,500	910	2,143	847	300	300
Total	31,500	7,810	12,543	4,547	4,000	2,600

Estimated working hours	1,000	2,000	1,400

Expenses of Service Departments P and Q are apportioned as under.

	A	**B**	**C**	P	Q
P	30%	40%	20%	—	10%
Q	10%	20%	50%	20%	—

You are required to show the apportionment of overheads under different methods of apportioning inter-service departments overheads and also to work-out the production hour rate recovery of overheads in departments A, B and C.

Solution:

Let the total Cost of P department be x
Let the total Cost of Q department be y
x = 4000 + 0.2y -------- (i)
y = 2600 + 0.1x -------- (ii)
Subtitling the eq. (ii) in eq. (i)
x = 4000 + 0.2 (2600 + 0.1x)
x = 4000 + 520 + 0.02x
0.98x = 4520
x = 4612
Subtitling the value of x in eq. (ii)
y = 2600+0.01 (4612)
y = 3061

Overheads Distribution Sheet

		Production Department			Service Department	
<u>Secondary Distribution</u> Total Cost P Department	3:4:2:1	7810 1384	12543 1845	4547 922	4000 (4612)	2600 461
Q Department	1:2:5:2	306	612	1531	(612) 612	3061 (3061)
Total Cost		9500	15000	7000	0	0

Estimated Working hrs. Overheads Rate per operating hour		1000 Rs. 9.50	2500 Rs. 6	1400 Rs. 5	- -	- -

Problem -55

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

		Production Deptt.		**Service Deptts.**	
		PD_1	PD_2	SD_1	SD_2
Direct Materials	(Rs.)	80,000	40,000	10,000	20,000
Direct Wages	(Rs.)	95,000	50,000	20,000	10,000
Overheads	(Rs.)	80,000	50,000	30,000	20,000
Power Requirement at					
normal capacity operations	(Kwh)	20,000	35,000	12,500	17,500
Actual Power Consumption					
during the period	(Kwh)	13,000	23,000	10,250	10,000

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

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

Deptts.	*PD_1*	*PD_2*	*SD_1*	*SD_2*
SD1	**50%**	**40%**	**--**	**10%**
SD2	**60%**	**20%**	**20%**	**--**

You are required to prepare :

(i) Primary Distribution Summary.
(ii) Secondary Distribution Summary
(iii) Calculate the overhead rate per direct labour hour of production departments, given that the direct wages rates of PD_1 and PD_2 are Rs.5 and Rs.4 per hour respectively.

Solution:

(i) Statement of Power Generation Plant Cost to the four Departments:

Particulars	Total	Basis	Production Depts. (Rs.)		Service Depts. (Rs.)	
	(Rs.)		PD_1	PD_2	SD_1	SD_2
Power						
Generation						
Plant Cost:		Normal Capacity				
Fixed: (1,21,875 – 84,375)	37,500	(2:3:5:1.25:1.75) Actual Power	8,824	15,441	5,515	7,720
Variable	84,375	Consumption	19,500	34,500	15,375	15,000
		(13:23:10.25:10)				
Allocated Power						
Generation Cost			28,324	49,941	20,890	22,720
Direct Material	30,000		-----	-----	10,000	20,000
Direct wages	30,000		-----	-----	20,000	10,000
Overheads	1,80,000		80,000	50,000	30,000	20,000
Total overheads	3,61,875		1,08,324	99,941	80,890	72,720

(ii) Re-apportionment of Service Department Cost of Production Department –

Simultaneous Equation Method:
Let Total Overheads of SD1 be = 'x' and
Let Total Overheads of SD2 be = 'y'
Thus, x = 80,890 + 20% of 'y'
y = 72,720 + 10% of 'x'
or x = 80,890 + 0.2y
or x – 0.2 y = 80,890 ---------- (i)
or y = 72,720 + 0.1 x
or -0.1x + y = 72,720
or – 0.02x + 0.2y = 14,544 (Multiplying both sides by '0.2') ---------- (ii)
Solving the above Equation (i) & (ii) we get:-

$$x - 0.2y = 80{,}890$$
$$-0.02x + 0.2y = 14{,}544$$
$$0.98x = 95{,}434$$

or $x = 65{,}434 / 0.98 = \text{Rs. } 97{,}381$

Now, putting the value of 'x' in Eq. (i)

$$x - 0.2y = 80{,}890$$
$$97{,}381 - 0.2y = 80{,}890$$
$$0.2y = 97{,}381 - 80{,}890$$
$$0.2y = 16{,}491$$
$$y = 16{,}491 / 0.2$$
$$y = 82{,}455$$

Total Overheads of SD1 and SD2:	SD1 (Rs.)	SD2 (Rs.)
Total overheads as ascertained being the Value of 'x' and 'y' respectively	97,381	82,455

Less: Proportionate Overheads transferred to other Service Department		
SD1 – (97,381 x 10%)	(9,738)	-----
SD2 – (82,455 x 20%)	-----	(16,491)
	87,643	65,964

Distribution of Service Department Overheads to Production Departments:

Particulars	Production Dept. (Rs.)		Service Dept. (Rs.)	
	PD1	PD2	SD1	SD2
Overheads	1,08,324	99,941	87,643	65,964
Dept. SD1: Overhead apportioned to PD1 & PD2 in ratio of 5 : 4	48,691	38,952	(87,643)	-----
Dept. SD2 : Overhead apportioned to PD1 & PD2 in ratio of 6 : 2	49,473	16,491		(65,964)
Total Overheads	2,06,488	1,55,384	Nil	Nil
Direct labour hours	19,000	12,500		
Factory overheads rate	Rs. 10.87	Rs. 12.43		

Problem -56

ABC Ltd. has three production departments P1, P2 and P3 and two service departments S1 and S2. The following data are extracted from the records of the Company for the month of October, 2007:

	Rs.
Rent and rates	62,500
General lighting	7,500
Indirect Wages	18,750
Power	25,000
Depreciation on machinery	50,000
Insurance of machinery	20,000

Other Information:

	P1	P2	P3	S1	S2
Direct wages (Rs.)	37,500	25,000	37,500	18,750	6,250
Horse Power of Machine used	60	30	50	10	--
Cost of machinery (Rs.)	3,00,000	4,00,000	5,00,000	25,000	25,000
Floor space (Sq. ft)	2,000	2,500	3,000	2,000	500
Number of light points	10	15	20	10	5
Production hours worked	6,225	4,050	4,100	—	--

Expenses of the service departments, S1 and S2 are reapportioned as below:

	P1	P2	P3	S1	S2
S1	20%	30%	40%	--	10%
S2	40%	20%	30%	10%	--

Required:

(i) Compute overhead absorption rate per production hour of each production department,

(ii) Determine the total cost of product X which is processed for manufacture in department P1, P2 and P3 for 5 hours, 3 hours and 4 hours respectively, given that its direct material cost is Rs. 625 and direct labour cost is Rs. 375.

(iv) (CA PE II Nov 2007)

Solution:

Primary Distribution Summary

Item of cost	Basis of apportionment	P_1 (Rs.)	P_2 (Rs.)	P_3 (Rs.)	S_1 (Rs.)	S_2 (Rs.)
Direct wages	Allocation	--	--	--	18,750	6,250
Rent and Rates	Floor area 4 : 5 : 6 : 4 : 1	12,500	15,625	18,750	12,500	3,125
General lighting	Light points 2 : 3 : 4 : 2 : 1	1,250	1,875	2,500	1,250	625
Indirect wages	Direct wages 6 : 4 : 6 : 3 : 1	5,625	3,750	5,625	2812.5	937.5
Power	Horse Power of machines 6 : 3 : 5 : 1	10,000	5,000	8,333	1,667	--
Depreciation of machinery	Value of machinery 12 : 16 : 20 : 1 : 1	12,000	16,000	20,000	1,000	1,000
Insurance of machinery	Value of machinery 12 : 16 : 20 : 1 : 1	4,800	6,400	8,000	400	400
		46,175	48,650	63,208	38,380	12,338

Overheads of service cost centres Let S_1 be the overhead of service cost centre S_1 and S_2 be the overhead of service cost centre S_2.

$S_1 = 38,380 + 0.10\ S_2$
$S_2 = 12,338 + 0.10\ S_1$
Substituting the value of S_2 in S_1 we get
$S_1 = 38,380 + 0.10\ (12,338 + 0.10\ S_1)$
$S_1 = 38,380 + 1233.8 + 0.01\ S_1$
$0.99\ S_1 = 39,613.8$
Therefore, Rs. 40, 014
Therefore, $S_2 = 12,338 + 0.10 \times 40,014$ = Rs. 16339.4

Secondary Distribution Summary

Particulars	P_1	P_2	P_3
Allocated and Apportioned overheads as per primary distribution	46,175	48,650	63,208
S_1	8,003	12,004	16,006
S_2	6,536	3,268	4,902
	60,714	63,922	84,116

Overhead rate per hour

	P_1	P_2	P_3
Total overheads cost	Rs. 60,714	Rs. 63,922	Rs. 84,119
Production hours worked	6,225	4,050	4,100
Rate per hour (Rs.)	Rs. 9.75	Rs. 15.78	Rs. 20.52

Cost of Product X	(Rs.)
Direct material	625.00
Direct labour	375.00
Prime cost	1,000.00
Production on overheads	
P1 5 hours x Rs. 9.75 = 48.75	
P2 3 hours x Rs. 15.78 = 47.34	
P3 4 hours x Rs. 20.52 = 82.08	178.17
Factory cost	1,178.17

Problem -57

PH Ltd. is a manufacturing company having three production departments, 'A', 'B' and 'C' and two service departments 'X' and 'Y'. The following is the budget for December, 2008:

	Total Rs.	A Rs.	B Rs.	C Rs.	X Rs.	Y Rs.
Direct Materials		1,000	2,000	4,000	2,000	1,000
Direct Wages		5,000	2,000	8,000	1,000	2,000
Factory Rent	4,000					
Power	2,500					
Depreciation on Machines	1,000					
Other Overhead	9,000					
Additional Information						
Area (Sq. ft.)		500	250	500	250	500
Capital value of Machines (Rs. in lakh)		20	40	20	10	10

Machine Hours	1,000	2,000	4,000	1,000	1,000
Horse Power of Machines	50	40	20	15	25

A technical assessment for the apportionment of service departments is as under :

	A	*B*	*C*	*X*	*Y*
	%	*%*	*%*	*%*	*%*
Service Deptt. 'X'	45	15	30	–	10
Service Deptt. 'Y'	60	35	–	5	–

Required:

I. A statement showing distribution of overheads to various departments.

ii. A statement showing re-distribution of service departments expenses to production departments.

iii. Machine hour rate of the production departments 'A', 'B' and 'C'.

Solution:

Overheads Distribution Sheet

Particulars	**Basis**	**Production Department (Rs.)**			**Service Department (Rs.)**	
		A	**B**	**C**	**X**	**Y**
Primary Distribution Direct Material Direct Wages Factory rent Power (50:80:80:15:25) Depreciation Other Overheads	 Area (50:25:50:25:50) Machine Hrs. x H.P. of machine Cap. Value Machine Hrs.	 1000 500 200 1000	 500 800 400 2000	 1000 800 200 4000	2000 1000 500 150 100 100	1000 200 1000 250 100 1000
Total Cost of Service Department Secondary Distribution X Department	 (45:15:30:10)	 2138	 712	 1425	4750 (4750)	5350 475
Y Department	(60:35:5)	3495	2030	-	0 291	5825 (5825)
X Department	(45:15:30:10)	131	44	87	291 (291)	0 29
Y Department	(60:35)	18	11	-	0 -	29 (29)
		8482	6505	7512		0
Machine hours		1000	2000	4000		
Machine hr. rate		Rs. 8.48	Rs. 3.25	Rs. 1.88		

Problem -58

The ABC company has the following account balances and distribution of direct charges on 31st march 2009:

	Total	Production departments		Service departments	
		Machine shop	Packing	General plant	Stores and maintenance
Indirect labour	14,650	4,000	3,000	2,000	5,650
Maintenance material	5,020	1,800	700	1,020	1,500
Misc. supplies	1,750	400	1,000	150	200
Superintendent salary	4,000	-	-	4,000	-
Cost and payroll salary	10,000	-	-	10,000	-

Overheads to be apportioned:

Power	8,000
Rent	12,000
Fuel and heat	6,000
Insurance	1,000
Excise-taxes	2,000
Depreciation	1, 00,000

The following data were compiled by means of the factory survey made in the previous year:

	Floor space	Radiator sections	No. of employees	Investment (value of machinery)	H.P. (hours)
Machine shop	2,000 sq. ft.	45	20	6,40,000	3,500
Packing	800 sq. ft.	90	10	2,00,000	500
General plant	400 sq. ft.	30	3	10,000	-
Stores and maintenance	1,600 sq. ft.	60	5	1,50,000	1,000

Expenses charged to the stores and maintenance departments are to be distributed to the other departments by the following %:

Machine shop	50%
Packing	20%
General plant	30%

General plant overheads are distributed on the basis of number of employees:

1. Prepare an overhead distribution statement with supporting schedule to show computations and basis of distribution including distribution of the service department expenses to production department.

2. Determine the service department distribution by the method of continued distribution .Carry through three cycles. Show all calculations to the nearest rupee.

Solution:

(a) Overhead Distribution Statement

	Production Departments		Service Departments	
	Machine Shop	Packing	General Plant	Stores & Maintenance
Allocated Expenses:	Rs.	Rs.	Rs.	Rs.
Indirect labour	4,000	3,000	2,000	5,650
Maintenance material	1,800	700	1,020	1,500
Superintendent's salary	-	-	4,000	-
Misc. supplies	400	1,000	150	200
Cost & payroll salaries	-	-	10,000	-
Total	6,200	4,700	17,170	7,350
Apportioned expenses (See schedule below)	77,720	25,800	2,830	22,650
Total	83,920	30,500	20,000	30,000

Schedule of Apportioned Expenses

Item	Basis	Machine Shop	Packing	General Plant	Stores & Maintenance
		Rs.	Rs.	Rs.	Rs.
Power	Horse Power Hrs.	5,600	800	-	1,600
Rent	Floor Space	5,000	2,000	1,000	4,000
Fuel & Heat	Radiator Secs.	1,200	2,400	800	1,600
Insurance	Investment	640	200	10	150
Taxes	Investment	1,280	400	20	300
Depreciation	Investment	64,000	20,000	1,000	15,000
Total		77,720	25,800	2,830	22,650

(b) Distribution of Service Department Expenses

	Production Departments		Service Departments	
	Machine	Packing	General Plant	Stores & Maintenance
	Rs.	Rs.	Rs.	Rs.
Total Expense [as per (a)]	83,920	30,500	20,000	30,000
Transfer from Stores & Maintenance	15,000	6,000	9,000	(30,000)
Transfer from General Plant	16,571	8,286	(29,000)	4,143
Transfer from Stores & Maintenance	2,072	829	1,242	(4143)
Transfer from General Plant	710	355	(1,242)	177
Transfer from Stores & Maintenance	88	36	53	(177)
Transfer from General Plant	35	18	(53)	----
Total	1,18,396	46,024	-----	-----

Problem -59

A Company has three production departments and two service departments. Distribution summary of overheads is as follows:

	Production Departments
A	Rs. 13,600
B	Rs. 14,700
C	Rs. 12,800
	Service Departments
X	Rs. 9,000
Y	Rs. 3,000

The expenses of service departments are charged on a percentage basis which is as follows:

	A	B	C	X	Y
X Deptt.	40%	30%	20%	-	10%
Y Deptt.	30%	30%	20%	20%	-

Apportion the cost of Service Departments by using the Repeated Distribution method.

Solution:

Statement of apportionment of Service Department Overhead to Production Departments under Repeated Distribution Method:

Particulars	Production Dept. (Rs.)			Service Dept. (Rs.)	
	A	B	C	X	Y
Overheads as distributed	13,600	14,700	12,800	9,000	3,000
Dept 'X': Overheads apportioned to A, B, C & Y in ratio of 4:3:2:1	3,600	2,700	1,800	(9,000)	900
				Nil	3,900
Dept 'Y': Overheads apportioned to A, B, C & X in ratio of 3:3:2:2	1,170	1,170	780	780	(3,900)
				780	Nil
Dept 'X': Overheads apportioned to A, B, C & Y in ratio of 4:3:2:1	312	234	156	(780)	78
				Nil	78
Dept 'Y': Overheads apportioned to A, B, C & X in ratio of 3:3:2:2	23	23	16	16	(78)

				16	Nil
Dept 'X': Overheads apportioned to A, B, C & Y in ratio of 4:3:2:1	6	5	3	(16)	2
				Nil	2
Dept 'Y': Overheads apportioned to A, B, C in ratio of 3:3:2	1	1	----	----	(2)
				Nil	Nil
	18,712	18,833	15,555	Nil	Nil

CONCEPT NO 9:- DETTERMINATION OF VARIABLE & FIXED COST

Problem -60

The following information is available:

	1st April, 2008 to 30th June, 2008	**1st July, 2008 to 31st March, 2009**
Output	10,000 units	35,000 units
Total Overheads	Rs.40,000	Rs.1,35,000

You are required to calculate the amount of variable overhead per unit and amount of total fixed overheads for whole the year 2008-09.

Solution:

Let, Variable Overhead per unit is 'x' and Fixed Overhead per month is 'y'.

Total Overheads:

For first 3 months: 10,000x + 3y = 40,000 ……(i)

For last 9 months: 35,000x + 9y = 1,35,000 …… (ii)

(i) multiply by 3 and minus from (ii) 30,000x _ 9y = 1,20,000 …… (iii)

5,000x = 15,000

Or x = Rs. 3

y = 40,000 – 10,000 x 3 / 3

= Rs. 10,000 / 3

Thus, the Variable Overhead per unit is Rs. 3
Total Fixed overhead for the year is Rs. 10,000/3 x 12 = Rs. 40,000

Problem -61

B & Co. has recorded the following date in the two most recent periods:

Total cost of production Rs.	Volume of production (units)
14,600	800
19,400	1,200

What is the best estimate of the firm's fixed costs per period?

Solution

We know that in a given scale of operation change in total cost is brought about by change in total variable cost. Hence,

$$\text{Variable Cost per unit} = \frac{\text{Change in Total Cost}}{\text{Change in production}} = \frac{\text{Rs. } 19{,}400 - 14{,}600}{1{,}200 \text{ units} - 800 \text{ units}} = \frac{4{,}800}{400}$$

= Rs. 12 per unit

Total variable Cost for 1200 units = 1200 units x Rs. 12 = Rs. 14,400
Total Fixed Cost = Total Cost - Total Variable Cost
= 19,400 - 14,400
= Rs. 5,000

CONCEPT NO 7:- ABSORPTION OF OVERHEADS

Problem -62

Atlas Engineering Ltd. accepts a variety of jobs which require both manual and machine operations. The budgeted Profit and Loss Account for the period 1996-97 is as follows:

	(In lakh of rupees)	
Sales		75
Cost:		
Direct Material	10	
Direct Labour	5	
Prime Cost	15	
Production Overheads	30	
Production Cost	45	

Administrative, Selling and Distribution Overhead	15	-60
Profit		15

Other Budgeted Data:

Labour hours for the period	2,50,000
Machine hours for the period	1,50,000
No. of jobs for the period	30,000

An enquiry has been received recently from a customer and the production department has prepared the following estimate of the prime cost required for the job:

Direct Material	**Rs.** 2,500
Direct labour	2,000
Prime Cost	4,500

Labour hours required = 800
Machine hours required = 500
You are required to:
(a) Calculate by different methods, five overhead absorption rates for absorption of production overhead and comment on the suitability of each.
(b) Calculate the production overhead cost of the order based on each of the above rates.

Absorption of Overheads - Machine Hour Rate

Solution
(a) Direct Material Cost Rate

$$= \frac{\text{Budgeted Factory O/H}}{\text{Material Cost}} \times 100 = \frac{30}{10} \times 100 = 300\%$$

(b) Direct Labour Cost Rate

$$= \frac{\text{Budgeted Factory O/H}}{\text{Labour Cost}} \times 100 = \frac{30}{5} \times 100 = 600\%$$

(c) Prime Cost Rate

$$= \frac{\text{Budgeted Factory O/H}}{\text{Prime Cost}} \times 100 = \frac{30}{15} \times 100 = 200\%$$

(d) Labour Hrs. Rate

$$= \frac{\text{Budgeted Factory O/H}}{\text{Labour Hrs.}} = \frac{3000000}{250000} \quad \text{Rs.12 per labour hr.}$$

(e) Machine Hrs. Rate

$$= \frac{\text{Budgeted Factory O/H}}{\text{Machine Mrs.}} = \frac{3000000}{150000} \quad = \text{Rs.20 per Machine Hr.}$$

(b) Computation of Production O/H Cost of the order & Total Cost

	Material Cost Rate	**Labour Cost Rate**	**Prime Cost Rate**	**Labour Hours Rate**	**Machine Hours Rate**

Direct Material Direct Labour	2500 2000	2500 2000	2500 2000	2500 2000	2500 2000
Prime Cost (+) Overheads	4500 7500	4500 12000	4500 9000	4500 9600	4500 10000
Cost	12000	16500	13500	14100	14500

CONCEPT NO 7:- MACHINE HOUR RATE

Problem -63

Calculate the machine-hour rate to recover the overhead expenses indicated below:

	Per hour	**Per annum**
Electric Power	75 P	
Steam	10 P	
Water	2 P	
Repairs		Rs.530
Rent		Rs.270
Running hours		2,000
Original cost	Rs 12,500	
Book value	Rs 2,870	
Present replacement value	Rs 11,500	
Depreciation(on original cost)	7.5 % per annum	

Solution

Computation of Machine Hour Rate

Fixed Charges:	
— Repairs	530
— Rent	270
— Depreciation (12,500 x 7.5%)	937.5
Total Fixed Charges	17.37.5
Effective hrs.	2,000
Fixed Charges per hr.	0.87
(+) Variable charges per hr.	
— Steam	0.10
— Water	0.02
— Power	0.75
Machine Hour Rate	1.74

Problem -64

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

Expected life of the machine – 10 years, Scrap value at the end of the life – Rs. 5,000

Repairs and maintenance for the machine during the year Rs. 2,000 , Expected number of working hours of the machine per year 4,000,Insurance premium annually for all machines Rs. 4,500 ,Power consumption for the machine per hour @ Rs. 3 @ per unit = 25 units ,Area occupied by the machine – 100 sq feet,Area occupied by other machines – 1,500 sq. feet ,Rent per month of the department Rs. 800

Lighting charges for 20 points for the whole department out of which three points are for the new machine – Rs.120 per month Compute the machine hour rate for the machine hour rate for the new machine on the basis of the data given above .

Solution

Computation of Machine Hour Rate

Fixed Charges:	**Rs (p.a.)**	**Rs. (Per Hour)**
Insurance Premium (WN: 2)	300	
Repair and Maintenance	2,000	
Rent (WN: 3)	600	
Light Charges (WN: 4)	216	
Total Fixed Charges	3,116	
Hourly Rate for Fixed Charges (Rs. 52,616/4,000 hours)		0.779
Variable Charges:		
Depreciation (WN: 1) (Rs. 49,500/4,000 hours)		12,375
Electricity Consumption: 25 units per hour @ 0.75 p. per unit		18,750
Machine Hour Rate		31,904

Working Notes:

1. Depreciation of Machine:

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

Life of the machine 10 years

Depreciation per annum = $\frac{\text{Rs. } 4,95,000}{10 \text{ years}}$ = 49,500

2. Insurance for the Machine:

Total Cost of all the machines	75,00,000
Total insurance premium paid for all the machines	4,500

Total annual insurance premium of the new machine = $\frac{\text{Rs. } 4,500 \times \text{Rs. } 5,00,000}{\text{Rs. } 75,00,000}$

= Rs. 300

3. Rents for the Machine:

Rent paid per annum = Rs 9,600

Total area occupied = 1,600 sq. ft

Rent for the area occupied by the new machine (100 sq. ft.) = $\frac{\text{Rs. 9,600 x 100 sq. ft.}}{\text{Rs.1,600 sq.ft.}}$

= Rs. 600

4. Lighting charges for the Machine:

Total annual light charges of 20 points for the whole department is Rs. 1,440.

Light charges for the machine p.a. = $\frac{\text{Rs. 1,440 x 3 points}}{\text{20 points}}$ = Rs. 216

Problem -65

A machine costing Rs. 10,000 are expected to run for 10 yeaRs. At the end of this period its scrap value is likely to be Rs. 900. Repairs during the whole life of the machine are expected to be Rs. 18,000 and the machine is expected to run 4,380 hours per year on the average. Its electricity consumption is 15 units per hour, the rate per unit being 5 paisa. The machine occupies one-fourth of the area of the department and has two points out of a total of ten for lighting. The foreman has to devote about one-sixth of his time to the machine. The monthly rent of the department is Rs. 300 and the lighting charges amount to Rs. 80 per month. The foreman is paid a monthly salary of Rs. 960. Find out the machine hour rate, assuming insurance is 1% p.a. and the expenses on oil, etc. are Rs. 9 p.m.

Solution:

Computation of Machine Hour Rate

	Rs.	Rs.
Fixed Charges: Rent (one fourth of the total)		75.00
Lighting (one fifth of the total)		16.00
Foreman's salary (one sixth of the total)		160.00
Sundry expenses-oil, waste etc.		9.00
Insurance (1% on the value of the machine per year)		8.33
Total Fixed expenses per month		268.33
Total number of hours per annum	4,380	
Total number of hours per month	365	
Fixed expenses per hour Rs. 268.33/365 hrs.		0.735
Variable Charges per hour:		
Depreciation: Cost of the machine	10,000	
Less: Scrap value	900	
	9,100	
Depreciation per annum	910	
Depreciation per hour: 910/4,380 hrs.		0.208
Repairs for the whole life	18,000	
for one hour Rs. 18,000/4,380 x 10 years		0.411
Electricity for one hour: 15 units @ 0.05 P		0.750

Machine hour rate:		2,104

Problem -66

A manufacturing company uses two identical large and four identical small machines. Each large machine occupies one quarter of the workshop and fully employs three workers; each small machine occupies half the space of a large machine and fully employs two workers. The workers are paid by piece work. Each of the six machines is estimated to work 1,440 hours per year, while the effective working life is taken as 12,000 working hours for each large machine and 9,000 working hours for each small machine. Large machines cost Rs. 20,000 each, and small machines Rs. 4,000 each. Scrap values are Rs. 4,000 and Rs, 100 respectively.

Repairs, maintenance and oil are estimated to cost for each large machine Rs. 4,000 and each small machine Rs. 1,200, during its effective life. Power consumption costs 5 P. per unit, and amounts for a large machine to 20 units per hour, and for a small machine to 2 units per hour.

The manager is paid Rs. 4,800 a year, and the workshop supervision occupies half his time which is divided equally among the six machines. Details of other expenses are: Rent and rates of the workshop: Rs. 6,400 a year.

Lighting (to be apportioned in the ratio of workers employed) Rs. 1,820 a year.

Taking a period of three months as a basis, calculate the machine hour rate for a large machine and a small machine respectively.

Solution:

Particulars			Large Machine	Small Machine
Fixed Charges:			Rs.	Rs.
Lighting (according to workers employed)			97.50	65.00
Rent and Rates (according to space occupied)			400.00	200.00
Supervision (equally per machine)			100.00	100.00
			597.50	365.00
Hourly rate of Fixed Charges (being divided by 360)			1.66	1.01
Variable Charges:				
Depreciation	Large	Small		
	Rs.	Rs.		
Cost	20,000	4,000		
Scrap Value	4,000	100		
	16,000	3,900		
Hourly Rate	16,000	3,900	1.33	0.43
	12,000	9,000		

Repairs, Maintenance and Oil: Rs. 4,000 divided by 12,000 Rs. 1,200 divided by 9,000	0.33	0.13
Power Consumption: 20 units at 5 p. per unit 2 units at 5 p. per unit	1.00	0.10
Machine Hour Rate	4.32	1.67

Problem -67

Calculate machine hour rate for recovery of overheads for a machine from the following information:

Cost of machine is Rs. 25,00,000 and estimated salvage value is Rs. 1,00,000. Estimated working life of the machine is 10 years. /Annual working hours are 3,000 in the factory. The machine is required 400 hours per annum for repairs and maintenance. Setting-up time of the machine is 156 hours per annum to be treated as productive time. Cost of repairs and maintenance for whole working life of the machine is Rs. 3,50,000. Power used 15 units per hour at a cost of Rs. 5 per unit. No power is consumed during maintenance and setting-up time. A chemical required for operating the machine is Rs. 9,880 per annum. Wages of an operator is Rs. 4,000 per month. The operator, devoted one-third of his time to the machine. Annual insurance charges 2 per cent of cost of machine.

Light charges for the department is Rs. 2,500 per month, having 48 points in all, out of which only 8 points are used at this machine. Other indirect expenses are chargeable to the machine are Rs.6,500 per month.

(

Solution: **Computation of Machine Hour Rate**
Running Hours (3,000 – 400) = 2,600 per annum (Rs.)

Particulars	Total amount	Rate per hour
Fixed Charges (Fixed Charges): Operator's wages: Rs. 4,000x12/3	16,000	
Insurance: 2% of Rs. 25,00,000	50,000	
Light charges: Rs. 2,500x12x8/48	5,000	
Other indirect expenses: Rs. 6,500 x 12	78,000	
Total Fixed charges	1,49,000	
Hourly rate for fixed charges: Rs. 1,49,000/2,600		57.31
Variable Expenses (Machine Expenses) per hour Depreciation: Rs. 25,00,000 – Rs. 1,00,000 / 10x2,600		92.31
Repairs and Maintenance: Rs. 3,50,000/10x2,600		13.46
Power: Rs. 5 x 15 x 2,444 / 2,600		70.50
Chemical: Rs. 9,880 / 2,600		3.80

Machine Hour Rate		237.38

Note: Depreciation has been taken as variable expense alternatively it may be taken as fixed expense.

Problem -68

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

(a) Budgeted working hours are 2,592 based on 8 hours per day for 324 days. This includes 300 hours for plant maintenance and 92 hours for setting up of plant.
(b) Estimated cost of maintenance of the machine is Rs. 25,000 (p.a.)
(c) The machine require a special chemical solution, which is replaced at the end of each week (6 days in a week) at a cost of Rs. 400 each time.
(d) Four operators control operation of 8 machines and the average wages per person amounts to Rs. 420 per week plus 15% fringe benefits.
(e) Electricity used by the machine during the production is 16 units per hour at a cost of Rs. 3 per unit. No current is taken during maintenance and setting up.
(f) Departmental and general works overhead allocated to the operation during last year was Rs. 50,000. During the current year it is estimated to increase 10% of this amount.
Calculate machine hour rate, if (a) setting up time is unproductive; (b) setting up time is productive.

Solution:

Computation of Machine hour Rate	Per year	Per hour (unproductive)	Per hour (productive)
Fixed charges:			
Operators wages			
4 x 420 x 54	90,720		
Add: Fringe Benefits 15%	13,608		
	1,04,328		
Departmental and general overhead			
(50,000 + 5,000)	55,000		
Total Fixed Charges for 8 machines	1,59,328		
Cost per Machine 1,59,328/8	19,916		
Cost per Machine hour		9.05	
19,916/2,200			
19,916/2,292			8.69
Machine hours:			
Setting time unproductive (2,592-300-92) = 2200			
Setting time productive (2,592-300) = 2,292			
Variable Charges:			
Depreciation (12,70,000-70,000)/(12x2,200)		45.45	
(12,70,000-70,000)/(12x2,292)			43.63

Electricity (16x3)	48.00	
(16x3x2,200)/2,292		46.07
Special chemical solution (400x54)/2,200	9.82	
(400 x 54)/2,200		9.42
Maintenance (25,000/2,292)	11.36	
(25,000/2,292)		10.91
Machine Hour Rate	123.68	118.72

Blanket Overheads Absorption Rate V/s Departmental Rate

Problem -69

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

Department	Direct materials Rs.	Direct wages Rs.	Factory overheads Rs.	Direct labour Hour	Machine hours
Budget					
Machining	6,50,000	80,000	3,60,000	20,000	80,000
Assembly	1,70,000	3,50,000	1,40,000	1,00,000	10,000
Packing	1,00,000	70,000	1,25,000	50,000	....
Actuals					
Machining	7,80,000	96,000	3,90,000	24,000	96,000
Assembly	1,36,000	2,70,000	84,000	90,000	11,000
Packing	1,20,000	90,000	1,35,000	60,000	.....

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

Job No. CW 7083

Department	Direct materials Rs.	Direct wages Rs.	Direct labour Hours	Machine hours
Machining Assembly	1,200	240	60	180
Packing	600	360	120	30
	300	60	40	...

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

Required:

(i) Calculate the overhead absorption rate as per the Current policy of the company and determine the selling price of the Job No. CW 7083.

(ii) Suggest any suitable alternative method(s) of absorption of the factory overheads and calculate the overhead recovery rates based on the method(s) so recommended by you.

(iii) Determine the selling price of Job CW 7083 based on the overhead application rates calculated in (ii) above,

(iv) Calculate the department wise and total under or over recovery of overheads based company's current policy and the method(s) recommended by you.

Solution

Calculation of Overhead Recovery Rates as per the Current Policy i.e., Single Blanket rate based on percentage of Factory Overhead to Total Factory wages:

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

$$\text{Blanket Overhead Recovery Rate} = \frac{\text{Total Overheads (Budgeted)}}{\text{Total Direct Wages (Budgeted)}} \times 100$$

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

Selling Price of Job No. CW 7083:	**Rs.**
Direct Materials (1200 + 600 + 300)	2,100.00
Direct Wages (240 + 360 + 60)	660.00
Prime Cost	2,760.00
Add: Overheads: @125% of Direct Wages i.e., 660 x 125%	825.00
Factory/Works Cost	3,585.00
Add: Administrative/Selling Overheads and Profits @ 30% on works cost i.e., 3,585 x 30%	1,075.50
Selling Price	4,660.50

(ii) Recommended Methods of absorption of factory overheads:

Single Blanket Overhead Recovery Rates could be used in places where work performed in each department is fairly uniform or standardised. But here in the given problem we can observe that among the three Departments, Machining Department is basically a machine intensive department whereas the Assembly & Packing Departments are Labour Intensive Departments. Hence application of Single Blanket rate common to all the departments may not be suitable. Instead of applying Blanket Recovery Rates we may recommend different rates for different departments as under:

Machining Department:

Since, machine is the pre-dominant factor of production in this department, hence machine hour rate should be used to recover overheads:

$$\text{Machine Hour Rate} = \frac{\text{Budgeted Factory Overhead}}{\text{Budgeted Machine Hour}}$$

$$= \frac{3,60,000}{80,000} = \text{Rs. 4.5 per machine hour}$$

Assembly Department:

Direct Labour being the predominant factor of production in this department, hence Direct Labour Hour rate should be used to recover overheads in this department.

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

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

= Rs.1.4 per Direct Labour Hour

Packing Department:

Again, here also labour being the most important factor of production Direct Labour Hour Rate should be used to recover overheads in this department.

Direct Labour Hour Rate = $\frac{\text{Budgeted factory overhead}}{\text{Budgeted Direct Labour Hour}}$

= $\frac{1,25,000}{50,000 \text{ Hours}}$

= Rs.2.5 per Direct Labour Hour

(iii) Selling Price of Job No. CW 7083 on the basis of overhead recovery rates recommended in (ii) above:

		Rs.
Direct Material (1200 + 600 + 300)		2,100
Direct Wages (240 + 360 + 60)		660
Prime Cost		2,760
Add: Factory Overheads:		
Machining Dept:		
(180 Machine Hour x 4.5 per Machine Hour)	810	
Assembly Dept.:		
(120 Direct Labour Hour x 1.40 per Direct Labour Hour	168	
Packing Dept.:		
(40 Direct Labour Hour x Rs.2.5 per Direct Labour Hour)	100	1,078
Works Cost		3,838
Add: Administrative Selling Overheads A Profit (3838 x 30%)		1,151.40
Selling Price		4,989.40

(iv) Under/Over Recovery of Overheads:

(a) Under Current Policy (i.e., Blanket Recovery Rates)

S. No.	Particulars	Departments (Rs.)			Total (Rs.)
		Machining	Assembly	Packing	
A.	Direct Wages (Actual) (Rs.)	96,000	2,70,000	90,000	
B.	Overheads Recovered as per Single Blanket Rate of 125% of Direct Wages [A x 125%]	1,20,000	3,37,500	1,12,500	5,70,000
C.	Actual Overheads Incurred (Rs.)	3,90,000	84,000	1,35,000	6,09,000
D.	(Under)/Over Recovery of Overheads [B - C]				

		(2,70,000)	2,53,500	(22,500)	(39,000)

(b) Under the Suggested Method:

S. No.	Particulars	Departments			Total
		Machining	Assembly	Packing	
A.	Overhead Recovery Method	Machine Hour Rate	Direct Labour Hour Rate	Direct Labour Hour Rate	
B.	Overhead Recovery Rates (Rs.)	Rs. 4.5 per Machine Hour	Rs. 1.4 per Direct Labour Hour	Rs. 2.5 per Direct Labour Hour	
C.	Machine Hours worked in Machining Dept. (Hours)	96,000	.....	.....	
D.	Labour Hours Worked in Assembly & Packing Department	—	90,000	60,000	
E.	Overheads Recovered: (Rs.)				
	Machining: [C x B]	4,32,000	.....	....	
	Assembly: [D x B]	.....	1,26,000	.....	
	Packing: [D x B]	.....	.....	1,50,000	
F.	Actual Overheads Incurred (Rs.)	3,90,000	84,000	1,35,000	7,08,000 6,09,000
G.	(Under)/Over Recovery of Overheads (Rs.) [E - F]	42,000	42,000	15,000	99,000

Miscellaneous Problems

Problem -70

Meerut Manufacturing Company makes several product lines which are processed through three production departments X, Y and Z.

The relevant data for a year are as follows :

Factory Overhead *Direct* *Direct*

	(including share of service department)	*Labour Hours*	*Labour Cost*
Department X	1,24,000	80,000	1,60,000
Department Y	2,30,000	1,15,000	2,41,500
Department Z	5,46,000	1,05,000	1,99,500

Production records at the end of the year indicated the following for the product line 'Krish'.

Units produced 20,000

	Deptt. X	*Deptt. Y*	*Deptt. Z*
Prime Cost	Rs.45,000	Rs.10,500	Rs.59,500
Direct Labour hours	10,000	5,000	30,000

You are required to :

a. Calculate the departmental and plant-wide, over-head rte based on direct labour hours;
b. Compute the cost of 'Krish' line for the year by using (i) Plant-wide rate and (ii) departmental rates; and
c. Comment on the results.

Solution

(a) Departmental Overheads Rates are calculated on the basis of direct labour hours:

Direct Labour Hour Rates for Departments = $\frac{\text{Overheads of the Department}}{\text{Direct labour Hours in the Department}}$

For X = $\frac{1,24,000}{80,000}$ = Rs, 1.55; for Y = $\frac{2,30,000}{1,15,000}$ = Rs. 2.00; for Z = $\frac{5,46,000}{1,05,000}$ = Rs.5.20.

Plant-wide overhead rate is based on total factory overheads and total direct labour hours for plant as a whole, i.e., for all the three departments together:

$$= \frac{\text{Aggregate Overheads}}{\text{Aggregate Direct Labour Hours}} = \frac{9,00,000}{3,00,000} = \text{Rs. } 3$$

(b) Cost of "Krish" Line Using Departmental Rates

Cost of Departments	X	y	Z	Total Cost
Prime Cost	Rs. 45,000	10,500	59,500	1,15,000
Add : Factory Overheads				
10,000 x Rs.1.55	15,500			
5,000 x Rs.2		10,000		
30,000 x Rs.5.20			1,56,000	1,81,500
Factory Cost	60,500	20,500	2,15,500	2,96,500

Computation of Cost of "Krish" Line using Plant- wide Rate:	**Rs.**
Prime Cost (Total)	1,15,000
Add: Factory overheads;	
(X 10,000 hrs + Y 5,000 hrs + Z 30,000 hrs) (i.e., 45,000 hrs. X Rs.3)	1,35,000
Factory Cost	2,50,000

Problem -71

. The Greatglass Corporation manufactures a complete line of fiberglass suitcases. The Sreatglass Corporation has three manufacturing departments moulding, component, and assembly) and two support departments (maintenance and power).

The sides of the cases are manufactured in the Moulding Department, The frames, hinges, locks and so forth are manufactured in the Component Department. The cases are completed in the Assembly Department. Varying amounts of materials, time, and effort are required for each of the various cases. The Maintenance Department and Power Department provide services to the three manufacturing departments.

The Greatglass Corporation has always used a plantwide manufacturing overhead rate. Direct manufacturing labour-hours are used to allocate the overhead to each product. The budgeted rate is calculated by dividing the company's total budgeted manufacturing overhead cost by the total budgeted direct manufacturing labour-hours to be worked in the three manufacturing departments.

Bharti Mittal, manager of Cost Accounting, has recommended that The Corporation use department overhead rates. Bharti has projected operating costs and production levels for the coming year. They are presented (in thousands) by department in the following table:

	Manufacturing Department		
	Moulding	**Component**	**Assembly**
Department Operating Data			
Direct manufacturing labour-hours	500	2,000	1,500
Machine-hours	875	125	....
Department Costs			
Direct manufacturing materials	Rs.12,400	Rs.30,000	Rs. 1,250
Direct manufacturing labour	3,500	20,000	12,000
Manufacturing overhead	21,000	16,200	22,600
Total department costs	Rs.36,900	Rs.66,200	Rs.35,850
Use of support departments			
Estimated usage of maintenance resources in labour-hours for coming year	90	25	10
Estimated usage of power (in kilowatt-hours) for coming year	360	320	120

Estimated costs are Rs.4,000 for the Maintenance Department and Rs.18,400 for the Power Department.

Required:

(i) Calculate the plantwide overhead rate for the Greatglass Corporation for the coming year using the same method as used in the past.

(ii) Bharti Mittal has been asked to develop department overhead rates for comparison with the plantwide rate. Follow these steps in developing the department rates:

a. Allocate the Maintenance Department and Power Department costs to the three manufacturing departments.

b. Calculate department overhead rates for the three manufacturing departments using a machine-hour allocation base for the Moulding Department and a direct manufacturing labour-hour allocation base for the Component Department and Assembly Department.

(iii) Should the Corporation use a plantwide rate or department rates to allocate overhead cost to its products? Explain your answer.

(iv) Under what conditions should Greatglass Corporation further subdivide the department cost pools into activity-cost pools?

Solution

(i) Plantwide Overheads rates

$$= \frac{21000 + 16200 + 22600 + 4000 + 18400}{500 + 2000 + 1500} = \text{Rs.20.55 per labour hrs.}$$

(ii) Overheads Distribution Sheet

	Basic	Manufacturing Department (Rs.)			Support Department (Rs.)	
		Moulding	Component	Assembly	Maintenance	Power
Manufacturing O/H	90:25:10	21000	16200	22600	4000	18400
Maintenance Cost	360:320:120	2880	800	320	(4000)	-
Power Cost		8280	7360	2760		(18400)
Total Cost		32160	24360	25680		
Machine Hrs.		875	-	-		
Labour Hrs.		-	2000	1500		
O/H Absorption Rate		Rs.36.75 per m.hrs.	per l. hrs.	Rs.17.12 per labour hrs.		

(iii) Departmental Rates should be used as are better than Blanket rate.

(iv) ABC is a best method if significant costs are incurred on different activities.

Problem -72

PQR Ltd. has its own power plant, which has two users, Cutting Department and Welding Department. When the plans were prepared for the power plant, top management decided that its practical capacity should be 1,50,000 machine houRs. Annual budgeted practical capacity fixed costs are Rs.9,00,000 and budgeted variable costs are Rs.4 per machine-hour. The following data are available :

	Cutting Department	*Welding Department*	*Total*
A ctual Usage in 2002-03 (machine hours)	60,000	40,000	1,00,000

Practical capacity for each department (machine hours)	90,000	60,000	1,50,000

Required :

(i) Allocate the power plant's cost to the cutting and the welding department using a single rate method in which the budgeted rate is calculated using practical capacity and costs are allocated based on actual usage.

(ii) Allocate the power plant's cost to the cutting and welding departments, using the dual-rate method in which total fixed costs are allocated based on practical capacity and variable costs are allocated based on actual usage.

(iii) Allocate the power plant's cost to the cutting and welding departments using the dual-rate method in which the fixed-cost rate is calculated using practical capacity, but fixed costs are allocated to the cutting and welding department based on actual usage. Variable costs are allocated based on actual usage.

(iv) Comment on your results in requirements (i), (ii) and (iii).

Solution

Working notes:

1. Fixed practical capacity cost per machine hour:

Practical capacity (machine hours)	1, 50,000
Practical capacity fixed costs (`)	9, 00,000
Fixed practical capacity cost per machine hour (` 9, 00,000 / 1, 50,000 hours)	` 6

2. Budgeted rate per machine hour (using practical capacity):

= Fixed practical capacity cost per machine hour + Budgeted variable cost per Machine hour

= ` 6 + ` 4 = ` 10

(i) **Statement showing Power Plant's cost allocation to the Cutting & Welding departments by using single rate method on actual usage of machine hours.**

	Cutting Department `	Welding Department `	Total `
Power plants cost allocation by using actual usage (machine hours) (Refer to working note 2)	6,00,000 (50,000 hours × ` 10)	4,00,000 (40,000 hours × ` 10)	10,00,000

(ii) **Statement showing Power Plant's cost allocation to the Cutting & Welding departments by using dual rate method.**

	Cutting Department `	Welding Department `	Total `
Fixed cost (allocated on practical capacity for each department)	5,40,000	3,60,000	9,00,000

(90,000 hours : 60,000 hours)			
Variable cost (based on actual usage of machine hours)	2,40,000 (60,000 hours x 4)	1,60,000 (40,000 hours x 4)	4,00,000
Total cost	7,80,000	5,20,000	13,00,000

(iii) **Statement showing Power Plant's cost allocation to the Cutting & Welding Departments using dual rate method**

	Cutting Department `	Welding Department `	Total `
Fixed cost (allocation of fixed cost on actual usage basis (W.N.1)	3,60,000 (60,000 hours x 6)	2,40,000 (40,000 hours x 6)	6,00,000
Variable cost (based on actual usage of machine hours)	2,40,000 (60,000 hours x 4)	1,60,000 (40,000 hours x 4)	4,00,000
Total cost	6,00,000	4,00,000	10,00,000

(iv) **Comments:**
Under dual rate method, under (iii) and single rate method under (i), the allocation of fixed cost of practical capacity of plant over each department are based on single rate.
The major advantage of this approach is that the user departments are allocated fixed capacity costs only for the capacity used. The unused capacity cost ` 3, 00, 00 (` 9, 00,000 – ` 6, 00,000) will not be allocated to the user departments. This highlights the cost of unused capacity.
Under (ii) fixed cost of capacity are allocated to operating departments on the basis of practical capacity, so all fixed costs are allocated and there is no unused capacity
Identified with the power plant.

CONCEPT NO 9:- ACCOUNTING TREATMENT OF UNDER & OVER RECOVERY OF OVERHEDS

Problem -73

ABC Ltd. manufactures a single product and absorbs the production overheads at a pre-determined rate of Rs. 10 per machine hour.
At the end of financial year 1998-99, it has been found that actual production overheads incurred were Rs. 6,00,000. It included Rs. 45,000 on account of written off obsolete stores and Rs. 30,000 being the wages paid for the strike period under an award.
The production and sales data for the year 1998-99 is as under:

Production:

Finished goods	20,000 units
Work-in-progress	8,000 units
(50% complete in all respects)	

Sales :

Finished goods	18,000 units

The actual machine hours worked during the period were 48,000. It has been found that one-third of the under- absorption of production overheads was due to lack of production planning and the rest was attributable to normal increase in costs.

You are required to :

(a) Calculate the amount of under-absorption of production overheads during the year1998-99.

(b) Show the accounting treatment of under-absorption of production overheads.

Solution

Actual overheads incurred during the Current year Less: Loss of obsolescence written- off Less: Wages paid for strike	6,00,000 (45,000) (30,000)
Actual overheads comparable in Cost A/c's Absorbed overheads (48000 x Rs.10)	5,25,000 (4,80,000)
Underabsorbed overheads	45,000
The overheads underabsorbed incurred due to lack of planning should be charged to costing P&L A/c (1/3)	15,000
Overheads incurred due to increase in Cost	30,000
Output (Equivalent Units) [20,000 + 4,000] Supplementary Rate Amount to be charged to - Cost of Sales (18,000 x 1.2) - WIP (4,000 x 1.25) - Finished Goods (2,000 x 1.25)	24,000 Rs.1.25 per units = 22,500 = 5,000 = 2,500

Problem -74

Total overheads of a factory are Rs.4,46,380. Based on normal working of the factory, overheads were recovered from production at Rs.1.25 per hour. The actual hours worked were 2,93,104. How would you proceed to close the books of accounts when 7800 units were produced of which 7,000 units were sold and in addition 200 equivalent units were in work-in-progress ?

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

Solution 37

Calculation of Unabsorbed Overheads	Rs.
Actual Overheads Incurred	4,46,380
Less: Overheads Absorbed: (Overhead Recovery Rs. per hour x Actual Hrs. worked) = (Rs. 1.25 x 2,93,104 Hrs)	3,66,380
Unabsorbed Overheads	80,000
Unabsorbed Overhead on account of increase in cost of Indirect Materials & Labour (80,000 x 50%)	40,000
Unabsorbed Overheads on account of factory in efficiency = 80,000 x 50%	40,000
	80,000

Treatment of Unabsorbed Overhead & its implication on profit:

(i) The unabsorbed overhead on account of increase in cost of Indirect Material & Labour of Rs.40,000, should be adjusted in the cost books by applying Positive Supplementary Rates.

$$\text{Supplementary Rate} = \frac{\text{Unabsorbed Overhead}}{\text{Equivalent Completed units of Production}}.$$

where, Equivalent Completed units is as under:

Units Sold 7,000	
Units in Closing Stock of finished Goods (7,800 - 7,000)	800
Equivalent WIP units	200
Total Equivalent Completed Units	8,000

$$\text{Supplementary Rate} = \frac{\text{Rs.40,000}}{8,000} = \text{Rs. 5 per equivalent completed units}$$

The unabsorbed overhead of Rs.40,000 should be applied by using Supplementary Rate of Rs.5 per equivalent completed unit proportionately on the basis of equivalent completed unit among Cost of Sales A/C, Stock of Finished Goods A/C, and WIP account as under:

	Equivalent Completed Units	**Rate (Rs.)**	**Share of Unabsorbed Overhead (Rs.)**
Cost of Sales A/c	7,000	5	35,000
Stock of Finished Goods A/c	800	5	4,000
WIP A/c	200	5	1,000
			40,000

The above treatment of unabsorbed overhead will reduce the profit by Rs.35,000, the amount by which the Cost of Sales has been increased. Moreover the value of stock of finished Good & WIP increase by Rs.4,000 & 1,000 respectively.

(ii) The unabsorbed overhead of Rs.40,000 due to factory in efficiency being in the nature of abnormal loss should be charged to Costing Profit & Loss Account and there by the profit would be reduced by Rs.40,000.

Problem -75

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

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

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

Solution

Calculation of Under absorbed Overheads:	**Rs.**
Overhead actually incurred	1,70,000
Less: Overhead absorbed	(1,50,000)
Overhead Under absorbed	20,000

Method of Disposal of overheads & its impact on profit:

(i) Applying Supplementary Rates:

Since, the overheads are under absorbed so we have to apply positive supplementary rates per unit to adjust the cost of production by the under absorbed amount. Now, here the cost of production has been distributed under 3 accounts i.e., Cost of 6oods Sold Account, Stock of finished goods account & WIP account, hence we have to apportion the total under absorbed overheads to the above accounts in the rates of their amounts to adjust the cost books by the amount of under absorbed overheads.

Apportionment of under absorbed Overheads:

Account	**Amount (Rs.)**	**Share of Under Absorbed Overhead (in the ratio of their amount (Rs.)**	**Revised Amount (Rs.)**
Cost of Goods Sold	3,36,000	14,000	3,50,000
Stock of finished goods	96,000	4,000	1,00,000
WIP	48,000	2,000	50,000
	4,80,000	20,000	5,00,000

Impact on Profit - On application of above rate profit would be reduced by Rs.14,000

(ii) Writing off to Costing P/L:

The amount of under absorbed overhead of Rs.20,000 could be written off to Costing P/L & hence the profit would be reduced by Rs.20,000

Problem -76

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PRO manufacturers - a small scale enterprise produces a single product and has adopted a policy to recover the production overheads of the factory by adopting a single blanked rate based on machine hours. The budgeted production overheads of the factory are Rs.10,08,000 and budgeted machine hours are 96,000.

For the period first six month of the financial year 2007-2008, following information were extracted from the books:

Actual production overheads	Rs.6,79,000
Amount included in the production overheads;	
Paid as per court's order	Rs.45,000
Expenses of previous year booked in current year	Rs.10,000
Paid workers for strike period under an award	Rs.42,000
Obsolete stores written off	Rs.18,000

Production and sales data of the concern for the first six months are as under:

Production:	
Finished goods	22,000 units
Work-in-progress (50% complete in every respect)	16,000 units
Sale: Finished goods	18,000 units

The actual machine hours worked during the period were 48,000 hours. It is revealed from the analysis of information that 1/4 of the under-absorption was to defective production policies and the balance was attributable to increase in costs. You are required:

(i) to determine the amount of under absorption of production overheads for the period,

(ii) to show the accounting treatment of under-absorption of production overheads, and

(iii) to apportion the unabsorbed overheads over the items.

(CA PE II May 2008)

Solution

(i) Amount of under absorption of production overheads during the period of first six months of the year 2007-2008:

		Amount (Rs.)
Total production overheads actually incurred during the period		6,79,000
Less: Amount paid to worker as per court order		45,000
Expenses of previous Year booked in the current year		10,000
Wages paid for the strike period under an award	42,000	
Obsolete material written off	18,000	(1,15,000)
		5,64,000
Less: Production overheads absorbed as per machine (48,000 hours * Rs10.5) hour rate	5,04,000	
Amount of under absorbed production overheads		60,000

Budgeted machine hours rate = $\frac{\text{Rs.10,08,000}}{\text{96,000 hours}}$ = Rs.10.50 per hour

(ii) Accounting treatment of under absorbed production overheads:

As, one fourth of the under absorbed overheads were due to defective production policies, this being abnormal, hence should be debited to profit and loss account. Amount to be distributed = (60,000 * 1/4) = Rs.45,000.

$$\text{Supplementary rate} = \frac{\text{Rs.45,000}}{\text{30,000 units}} = \text{Rs.1.50 per unit}$$

(iii) Apportionment of under absorbed production overheads over WIP, finished goods and cost of sales:

	Equivalent completed units	Amount (in Rs.)
Work-in progress (16,000 units * 50%* 1.50)	8,000	12,000
Finished goods (4,000 units * 1.50)	4,000	6,000
Cost of sales (18,000 units * 1.50)	18,000	27,000
Total	30,000	45,000

Problem -77

Job No. 198 was commenced on October 10, 1998 and completed on November 1, 1998. Materials used were Rs.600 and labour charged directly to the job was Rs.400. Other information is as follows:

Machine No. 215 used for 40 hours, the machine hour rate being Rs. 3.50.
Machine No. 160 used for 30 hours, the machine hour rate being Rs. 4.00. 6 welders worked on the job for five days of 8 hours each : the Direct labour hour rate per welder is 20 P.
Expenses not included for calculating the machine hour or direct labour hour rate totaled Rs. 2,000, total direct wages for the period being Rs. 20,000. Ascertain the works costs of job No. 198.

Solution **Job No. 198 Cost Sheet**

Material Used	600
Labour cost	400
Prime cost	1,000
Factory Overheads:	
Machine No. 215 (40 hr x Rs. 3.5)	140
Machine No. 160 (30hr x Rs. 4)	120
Salaries of welders (6 x 5 x 8 x N2)	48
Total Cost	1,308
Add: under absorbed Overhead (2,000 x 400/20,000)	40
	1,348

Problem -78

A light engineering factory fabricates machine parts to customers. The factory commenced fabrication of 12 Nos. machine parts to customers' specifications and the expenditure incurred on the job for the week ending 21st August 1998 is given below:

	Rs.	Rs.
Direct materials (all items)		78.00
Direct labour (manual) 20 hours @ Rs. 1.50 per hour		30.00
Machine facilities:		
Machine No. I : 4 hours @ Rs. 4,50	18.00	
Machine No. II: 6 hours @ Rs. 6.50	39.00	57.00
Total		165.00
Overheads @ Rs. 0.80 per hour on 20 manual hours		16.00
Total cost		181.00

The overhead rate of Re. 0,80 per hour is based on 3,000 man hours per week:, similarly, the machine hour rates are based on the normal working of Machine Nos. I and II for 40 hours out of 45 hours per week.

After the close of each week, the factory levies a supplementary rate for the recovery of full overhead expenses on the basis of actual hours worked during the week. During the week ending 21st August, 1998. The total labour hours worked was 2,400 and Machine Nos. I and II had worked for 30 hours and 32½ hours respectively.

Prepare a Cost Sheet for the job for the fabrication of 12 Nos. machine parts duly levying the supplementary rates.

Solution

Fabrication of 12 Nos. Machine Parts (Cost Sheet for week ending August 21st 1998

	Rs.	**Rs.**
Materials		78.00
Labour 20 hours @ Rs.1.50		30.00
Machine facilities:		
Machine No. I : 4 hours @ Rs.4.50	18.00	
Machine No. II : 6 hours @ Rs.6.50	39.00	57.00
Overheads 20 hours @ 0.80 P. per hour		16.00
		181.00
Supplementary Rates		
Overheads 20 hours @ 20 P. per hour	4.00	
Machine facilities:		
Machine No. I : 4 hours @ Rs.1.90	6.00	
Machine No. II : 6 hours @ Rs.1.50	9.00	19.00
		200.00

Working Notes;- Assuming all overheads are fixed overheads
Budgeted overheads = 3000 hours x Rs.0,8 = Rs.2,400
Actual overheads = Rs.2,400
Absorbed overheads = 2,400 hours x Rs.0.8 = Rs.1,920
Under absorbed overheads = Rs.2,400 - Rs.1,920 = Rs.480
Supplementary rate = Rs.480 /2,400 hrs. = Rs.0.2 per hour

Machine facilities :	**Machine No. I**	**Machine No, II**
Budgeted/actual overheads	Rs.180 (40 hours x Rs.4.5)	Rs.260 (40 hours x Rs.6.5)
Absorbed overheads	Rs.135 (30 hours x Rs.4.5)	Rs.211.25 (32.5 hours x Rs.6.5)
Under absorbed overheads	Rs.45	Rs.48.75
Supplementary rate	Rs.1.5 (Rs.45/30 hours)	Rs.1.5 (Rs.48.75/32.5 hours)

Secondary Step Distribution, Departmental Absorption Rates & Under/ Overabsorbed Overhead

Problem -79

An organization has budgeted for the following production overheads for its production and service cost centres for the coming year:

Cost centre	**Rs.**
Machining	180,000
Assembly	160,000
Paint Shop	130,000
Engineering shop	84,000
Stores	52,000
Canteen	75,000

The product passes through the machining, assembly and paint shop cost centres and the following data relates to the cost centres:

	M/c	**Assembly**	**Paint shop**	**Eng shop**	**Stores**
No. of employees	81	51	39	30	24
Eng shop - service hrs	18,000	12,000	10,000	-	-
Stores (orders)	180	135	90	45	-

The fallowing budgeted data relates to the production cost centres:

	M/c	**Assembly**	**Paint shop**
M/c hours	9,200	8,100	6,600
Lab hours	8,300	11,250	9,000
Lab cost	Rs.40,000	Rs.88,000	Rs.45,000

Required:

a) Apportion the production overhead costs of the service cost centres to the production cost centres and determine predetermined overhead absorption rates for the 3 production cost centres on the following basis:
   Machining - machine hours
   Assembly - labour hours
   Paint shop - labour costs.

b) Actual results for the production cost centres were:

	M/c	Assembly	Paint shop
M/c hours	10,000	8,200	6,600
Labour hours	4,500	7,800	6,900
Labour cost	Rs.25,000	Rs.42,000	Rs.35,000
Actual Overheads	Rs.290,000	Rs.167,000	Rs.155,000

Prepare a statement showing the under/over-absorption per cost centre for the period under review.

c) Explain why overheads need to be absorbed upon pre-determined bases such as the above. Consider whether these bases for absorption are appropriate in the light of changing technology, suggesting any alternative bases that you consider appropriate.

Solution

Overheads Distribution Sheet

	Basis	Production Department (Rs.)			Service Department (Rs.)		
		Machinery	Assembly	Paint Shop	Canteen	Stores	Engineering Shop
Factory O/H Canteen	No. of employee 81:51:39:24:30	180000 27000	160000 17000	130000 13000	75000 (75000)	52000 8000	84000 10000
Stores	Orders 180:135:90:45	24000	18000	12000	-	60000 (60000)	94000 6000
Engineering Shop	Service Hrs. 18:12:10	45000	30000	25000	-	-	100000 (100000)
Total Cost Machine hrs. Labour Hrs. Labour Cost O/H Absorption Rate		276000 9200 - - Rs.30 per Machine Hr,	225000 - 1125 - Rs.20 per Labour Hr.	180000 - _ 45000 400%			-

(b)

	Machinery	Assembly	Paint Shop
Machine Hrs.	1000	-	-
Labour Hrs.	-	7800	3500
Labour Cost	-	-	400%
O/H Distribution Rate	Rs.30	Rs.20	140000
Absorbed O/H	300000	156000	(155000
Actual O/H	(290000)	(167000)	15000
Under/ Over absorbed	10000 [Over absorbed]	11000 [Under absorbed]	[Under absorbed]

(c) Activity Based Costing is a better method.

CONCEPT NO 9:-DISTRIBUTION OF SALES OVERHEADS

Problem -80

A company which sells four products, some of them unprofitable, proposes discontinuing the sale of one of them. The following information is available regarding income, costs and activity for the year ended 31st March, 1998.

Products	**A**	**B**	**C**	**D**
Sales (Rs.)	3,00,000	5,00,000	2,50,000	4,50,000
Cost of sales (Rs.)	2,00,000	4,50,000	2,10,000	2,25,000
Area of storage (Sq. ft.)	50,000	40,000	80,000	30,000
Number of parcels sent	1,00,000	1,50,000	75,000	1,75,000
Number of invoices sent	80,000	1,40,000	60,000	1,20,000

Selling and Distribution overheads and the basis of allocation are :

	Rs.	**Basis of allocation**
Fixed Costs:		
Rent & Insurance	30,000	Sq. ft.
Depreciation	10,000	Parcel
Salesmen's salaries & expenses	60,000	Sales Volume
Administrative wages and salaries	50,000	No. of invoices
Variable Costs:		
Packing wages & materials	20 paise per parcel	
Commission	4% of sales	
Stationery 10 P. per invoice		

You are required to prepare Profit & Loss Statement, showing the percentage of profit or loss to sales for each product.

Solution

Statement of Profit or Loss on Various products during the year ended March 31, 1998.

	Total Rs.	**A Rs.**	**B Rs.**	**C Rs.**	**D Rs.**
Sales	15,00,000	3,00,000	5,00,000	2,50,000	4,50,000
Variable costs					
Cost of sales	10,85,000	2,00,000	4,50,000	2,10,000	2,25,000
Commissions 4% of sales	60,000	12,000	20,000	10,000	18,000
Packing wages d materials @ 20 P. per parcel	1,00,000	20,000	30,000	15,000	35,000
Stationery @ 10 P. per invoice	40,000	8,000	14,000	6,000	12,000
Total variable costs	12,85,000	2,40,000	5,14,000	2,41,000	2,90,000
Contribution (Sales-variable	2,15,000	60,000	-14,000	9,000	1,60,000

cost)					
Fixed Costs	30,000	7,500	6,000	12,000	4,500
Rent & Insurance					
Depreciation	10,000	2,000	3,000	1,500	3,500
Salesmen's salaries & expenses	60,000	12,000	20,000	10,000	18,000
Administrative wages & Salaries	50,000	10,000	17,500	7,500	15,000
Total Fixed costs	1,50,000	31,500	46,500	31,000	41,000
Profit or (Loss)	65,000	28,500	-60,500	-22,000	1,19,000
Percentage of Profit or Loss on sales	4.3%	9.5%	-12.1%	-8.8%	26.4%

Problem -81

A company is making a study of the relative profitability of the two products— A and B. In addition to direct costs, indirect selling and distribution costs to be allocated between the two products are as under:

	Rs.
Insurance charges for inventory (finished)	78,000
Storage costs	1,40,000
Packing and forwarding charges	7,20,000
Salesmen salaries	8,50,000
Invoicing costs	4,50,000

Other details are :

		Product A	Product B
Selling price per unit	(Rs.)	500	1,000
Cost per unit (exclusive of indirect selling and distribution costs)	(Rs.)	300	600
Annual sales	(units)	10,000	8,000
Average inventory	(units)	1,000	800
number of invoices		2,500	2,000

One unit of product A requires a storage space twice as much as product B. The cost to pack and forward one unit is the same for both the products. Sales men are paid salary plus commission @ 5% on sales and equal amount of efforts are put forth on the sales of each of the products.

Required :

(i) Set up a schedule showing the apportionment of the indirect selling and distribution costs between the two products.
(ii) Prepare a statement showing the relative profitability of the two products.

Solution

Statement of Apportionment of Indirect Selling & Distribution Cost:

Particulars	Basis of Apportionment	Total	Product	
		Rs.	'A' Rs.	'B' Rs.
Insurance Charges of Finished inventory	Average Inventory Value (1,000 x Rs. 500) : (800 x Rs. 1,000)	78,000	30,000	48,000
Storage Cost	Average Inventory Storage Space (1,000 x 2): (800 x 1)	1,40,000	1,00,000	40,000
Packing & forwarding Charges	Actual Sales units (10,000 : 8,000)	7,20,000	4,00,000	3,20,000
Salesmen salaries	Efforts of Salesman (1 : 1)	8,50,000	4,25,000	4,25,000
Invoicing Costs	No. of Invoices (2,500:2,000)	4,50,000	2,50,000	2,00,000
Salesman Commission [{(500 x 10,000) + (1,000 x 8,000)} x 5%]	Annual Sales Value (500 x 10,000) : (1,000 x 8,000)	6,50,000	2,50,000	4,00,000
		28,88,000	14,55,000	14,33,000

(ii) Statement of Relative Profitability:

Particulars	Product (Rs.)	
	'A'	'B'
Annual Sale Value (Units Sold x Price/unit) (10,000 units x Rs. 500)/(8,000 units x Rs. 1,000)	50,00,000	80,00,000
Less: Cost (Units Sold x Cost/unit): (10,000 x 300)/(8,000 x 600)	30,00,000	48,00,000
Gross profit	20,00,000	32,00,000
Less: Indirect Selling A Distribution Cost	14,55,000	14,33,000
Profit	5,45,000	17,67,000
Profit as a percentage of sales (Profit /sales value x 100)	10.90%	22.09%

Problem -82

A cement factory sells cement in four zones – North, South, East and West. Below is the information relating to sales, transportation and stock of cement.

Zones	*Sales (Rs. in Crore)*	*No. of Salesmen*	*Per salesman Distance (kms.)*	*Advertisement Budget (%)*	*Average Stock (Rs. in Crore)*
North	10	50	1,000	30%	3
South	5	20	2,000	25%	1
East	6	30	2,500	25%	2
West	4	20	1,500	20%	1

Expenses incurred during the previous year are as follows :

Salaries of sales representatives	56,00,000
Travelling allowances of sales representatives	1,95,000
Advertisement cost	5,00,000
Godown rent at out-station	3,50,000
Insurance on out-station stocks	70,000
Commission on sales	25,00,000
Carriage outward	4,10,000
Total selling distribution overheads	Rs. 96,25,000

Distribute different selling and distribution overheads to each zone on appropriate basis and compute selling overhead rate as a percentage to sales for each zone.

Not for exams:- Traditional Costing System V/s ABC System

Solution

Particulars	Basis of Apportionment	Total	North	South	East	West
Sales establishment Salaries and expenses	Sales (10.5:6:4)	50,00,000	20,00,000	10,00,000	12,00,000	8,00,000
Salaries of sales Representatives	Number of salesmen (5:2:3:2)	6,00,000	2.50,000	1,00,000	1,50,000	1,00,000
Travelling allowances	Salesmen x Kms. (10 : 8 : 15 : 6)	1,95,000	50,000	40,000	75,000	30,000
Advertisement cost	Given share (6 :5 :5 :4)	5,00,000	1,50,000	1.25,000	1,25,000	1,00,000
Godown rent at out-station	Stock value (3:1:2:1)	3.50,000	1,50,000	50,000	1,00,000	50,000
Insurance on stocks	Stock value (3:1:2:1)	70,000	30,000	10,000	20,000	10,000
Commission on sales	Sales (10 : 5 : 6 : 4)	25,00,000	10,00,000	5,00,000	6.00.000	4,00,000
Carriage outward	Sales x Kms. (10:10:15:6)	4,10,000	1,00,000	1,00,000	1,50,000	60,000
	Total	96,25,000	37,30,000	19,25,000	24.20,000	15,50,000
Selling Overheads as % to sales = Apportioned overheads / Zonal Sales x 100			3.73%	3.85%	4.03%	3.875%

Problem -83

A company manufacturing two products furnishes the following data for a year.

Product	Annual Output (Units)	Total Machine hours	Total number of purchase orders	Total number of set-ups
A	5,000	20,000	160	20
B	60,000	1,20,000	384	44
The annual overheads are as under:	Rs.			
Volume related activity	5,50,000			

costs	Rs.			
Set up related costs	8,20,000			
Purchase related costs	Rs.			
	6,18,000			

You are required to calculate the cost per unit of each Product A and B based on:
(i) Traditional method of charging overheads
(ii) Activity based costing method.

Solution

(i) Traditional method of charging overheads: Computation of Machine hour rate

$$\text{Machine Hour Rate} = \frac{\text{Total Overheads}}{\text{No. of Machine hours}} = \frac{19,88,000}{1,40,000} = \text{Rs. } 14.20 \text{ per hr.}$$

Statement showing computation of Cost Per Unit of Product A & B

Particulars	A	B
Total Machine hours	20,000	1,20,000
X Machine hour rate	X 14.20	X 14.20
Total Overheads	2,84,000	17,04,000
Output	5,000	60,000
Cost Per Unit	Rs. 56.8	Rs. 28.4

(ii) Activity Based Method

Statement showing computation of cost driver rate.

Types of cost	Amount of cost	Cost driver	Units of cost driver	Cost driver rate
Volume related /Activity costs	5,50,000	Machine Hours	1,40,000	Rs.3.93 per Hr.
Set up related costs	8,20,000	No. of set ups	64	Rs. 12812.5 per set up
Purchase related costs	6,18,000	No. of Purchase orders	544	Rs. 1136.03 per order

Statement showing computation of cost per unit of A & B based on ABC method

	A		B	
Volume related Activity Costs	(20,000 x 3.93)	78,600	(120000 x 3.93)	4,71,600
Set up related costs	(20 x 12812.5)	2,56,250	(44 x 12812.5)	5,63,750
Purchase related costs	(160 x 1136.03)	1,81,765	(384 x 1136.03)	4,36,235
Total		5,16,615		1,471,585
Output		5000		60000
Cost per unit		103.32		24.53

Q.1. Write short notes on the following :
(i) Standard Cost; (ii) Standard Costing; (iii) Variance Analysis.

Ans.: (i) Standard Cost :

It means the pre-determined cost of future, *i.e.* what should be the cost in future period under a given set of operating conditions. Standard cost is important because it is the ideal cost to be incurred and it is also the base for comparison with actual cost. The comparison of standard cost with actual cost is essential because it helps us to ascertain the difference between the expected cost and actual cost so that appropriate corrective actions can be taken in future to prevent such difference.

(ii) Standard Costing :

In the meaning of standard costing, following elements are included :

a) Determine of standard cost for each elements of costs (Materials, Labour and Overheads).
b) Comparison of actual cost with the standard cost, the difference between the two is termed as variance.
c) Analysis of variances to ascertain the reason of variances.
d) Presentation of information to the appropriate level of management so that remedial steps may be taken.

(iii)Variance Analysis :

It is a process of analyzing, variances by sub-dividing total variances in such a way that the management can assign responsibility for below standard performance.

Variance analysis is very important because with the help of it, we can ascertain those variance which are controllable and steps can be taken to reduce such variations. A detailed analysis of controllable variances are helpful to ascertain :

1. the amount of variance
2. the causes of variance
3. the person responsible for variance; and
4. the corrective action to be taken.

Q.2. Distinguish between standard cost and estimated cost.

Ans.: (1) Estimated cost is in the nature of cost '*will be*' whereas standard cost is in the nature of cost '*should be*;'

(2) Estimated costs are calculated by adjusting past figures to possible future changes. Standard costs are however calculated on scientific basis.

(3) Standard cost are meant for control purposes which is not the case with estimated costs.

(4) Standard costing is used by a firm which has adopted standard costing system, whereas estimated cost is used by a firm which has adopted historical system of ascertaining costs.

Q.3. Distinguish between Standard Costing and Budgetary Control.

Ans. (1) Budget is a projection of financial accounts whereas standard cost is a projection of *Cost Account.*

(2) Budget covers the operations of the business as a whole and, therefore, it is extensive in nature.

(3) Budgets are prepared for different functions of business, *e.g.* Sales, Production, Purchase, *etc.* whereas standard costs are ascertained for each elements of cost. *E.g.* Material, Labour and Overheads.

(4) Budgets are meant to be used for forecasting requirement of financing , material, labour *etc.* Standards on the other hands, tells what the costs '*should be*'.

(5) Budgetary control is possible in parts whereas standard costing technique has to be applied in full.

Besides above mentioned joints of differences, there are some principles which are common to both standard costing and budgetary control. They are :

1. Setting up the target performance
2. Measurement of actual performance
3. Comparison of actual performance with the target performance
4. Analysis of variances between actual and standard performance
5. Taking corrective actions, wherever necessary.

Q.4. Briefly explain various types of standards.

Ans.: 1. Basic Standard : These are long term standards and remains unchanged for a long period of time.

2. Ideal Standards : These are the standards to be attained under the most favourable conditions possible.

3. Normal Standards : Such standards are based on average performance in the past. They are attainable under the normal conditions.

4. Attainable Standards : These are the standards which can be achieved with reasonable efforts. They are based on practical considerations and they are also called the expected or practical standards.

5. Loose or Lax Standards : When the standards are deliberately set below efficiency level to show favourable variances, they are called the loose or lax standards.

6. Revised Standards : When the standards are changed to correspond with the current conditions, they are called the revised standards.
7. Current Standards : Standards set for the current period are known as current standard.

Q.5. What are the major factors to be kept in view in deciding whether or not to investigate variances in budgetary control and standard cost systems ?

Ans.: 1. Cost Benefit Analysis : Investigation involves some costs of its own and a decision to investigate can be taken only when it is found that the financial benefits is more than the cost of investigation.

2. Amount of Variance : A limit can be set which will decide whether variance should be investigated or not. *For example*, a variance of 5% of Rs.5,000 may be considered worthy of investigation.

3. Controllability : Uncontrollable variances need not be investigated. *For example*, a material price variance due to imposition of additional taxes by Govt. need not be investigated. On the other hand, the controllable variances should be fully investigated if the amount of variance is above the limits prescribed.

Q.6. "Calculation of variances in standard costing is not an end in itself, but a means to an end". Discuss.

Ans.: It is generally understood that the purpose of standard costing is to compute the variances. In fact, the computation of variances can be termed as first step and the main purpose of management starts after computation of these variances. The management should act as early as possible to investigate the causes of variances. It is necessary because of following reasons :

1. It helps the management to place responsibilities for variances
2. Waste, scrap and losses, if not corrected immediately, continue to increase.
3. It prevents of re-occurrence of variances
4. To scientifically plan and take various important decisions for future course of business operation.

Hence, the end is the control aspect and the computation of variances is only a means to achieve this end.

CONCEPT 1: MATERIAL COST, PRICE & USAGE VARIANCE

Q.1.

RS Ltd. has adopted standard costing furnishes the following information

Standard :

Material for 7 kg. of Finished Products	10 kgs.
Price of materials	Rs. 10 per kg.

Actual :

Output	21,000 kgs.
Material used	28,000 kgs.
Cost of materials	Rs. 2,52,000

Calculate :

(a) Material Usage Variance :
(b) Material Price Variance :
(c) Material Cost Variance :

Ans. i. Rs. 48,000 (F), ii, Rs. 20,000 (F) iii, Rs. 28,000 (F)

Q. 2

SK Ltd. presents the following information for November 2008 :

Budget production of product P = 200 units.

Standard consumption of Raw materials = 2 kg per unit of P.

Standard price of material A = Rs. 6 per kg.

Actually, 250 units of P were produced and material A was purchased at Rs. 8 per kg and consumed at 1.8 kg per unit of P. Calculate the material cost variances.

Ans. i. 600 (A), ii, 900 (A) iii, 300 (F)

CONCEPT NUMBER 2:- MATERIAL MIX & YIELD VARIANCE

Q.3

PS Ltd. has established the following standard mix for producing 9 tonnes of product Z.:

	Rs.
5 tonnes of material A at Rs. 7 per tones	35.
3 tonnes of material B at Rs. 5 per tones	15
2 tonnes of material C at Rs. 2 per tones	4
	Rs. 54

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

53,000 tonnes of material A at Rs. 7 per tonnes.

28,000 tonnes of material B at Rs. 5.30 per tones.

19,000 tonnes of material C at Rs. 2,20 per tonnes.

Actual output for a period was 92,700 tonnes of product Z.

Compute :

(i) Material Mix Variance :

(ii) Material Yield Variance.

Ans. i. 9,000 (A), ii. 16,200 (F) iii, 16,200 (F)

Q.4

YK Ltd. manufactures BXE by mixing three raw materials. For every batch of 100 kgs. of BXE, 125 kgs. of raw materials are used. In April 2007, 60 batches were prepared to produce an output of 5,600 kgs. of BXE. The standard and actual particulars for April 2006 are as under :

Raw material	Standard		Actual		Quantity Purchased
	Mix	Price Per Kg.	Mix	Price per Kg.	
	%	Rs,	%	Rs.	Kg.
A	50	20	60	21	5,000
B	30	10	20	8	2,000
C	20	5	20	6	1,200

Calculate all Material variances.

Ans. i. Rs. 17,500 (A), ii. Rs. 3,000 (A) iii, Rs. 14,500 (A) iv, Rs. 7,500 (A)

v. Rs. 7,000 (A)

Q.5

80 kgs. of material a at a standard price of Rs. 2 per kg. and 40 kgs of material B at a standard price of Rs. 5 per kg. were to be used to manufacture 100 kgs. of a chemical.

During a month, 70 kgs. of material A priced at Rs. 2.10 per kg. and 50 kgs. of material B priced at Rs. 4.50 per kg. were actually used and the output of the chemical was 102 kgs.

Find out the material variances.

Ans. i. 4,80 (A), ii. 18 (F) iii, 22,80 (A) iv, 30 (A) v. 7,20 (F)

Q. 6

Nescafe Ltd. produces an article by blending two basic raw materials. The following standards have been set up for raw materials :

Material	Standard Mix	Standard Price per kg.
A	40%	Rs. 4.00
B	60%	Rs. 3.00

The standard loss in processing is 15%. During September, 1990, the company produced 1,700 kg. of finished output.

The position of stock and purchases for the month of September, 1990 is as under :

Material	Stock on 1.9.90	Stock on 30.9.90	Purchased during September, 90	
	Kg.	Kg.	Kg.	Cost Rs.
A	35	5	800	3,400
B	40	50	1,200	3,000

Calculate the following variances :

(a) Material price variance
(b) Material usage variance.
(c) Material yield variance
(d) Material mix variance
(e) Total material cost variance.

Assume first in first out method for the issue of material. The opening stock is to be valued at standard price.

Ans. i. Rs. 198.75 (Adverse) ii. Rs. 90 (A) iii, xxx iv, Rs. 22 (A)
v. Rs. 286.25 (Favourable) 286.25 (F) 90 (A)

Q. 7

Tide Chemical Industries provide the following information from their records :-

For making 10 kgs. of GEMCO, the standard material requirements is

Material	Quantity	Rate per kg.

	Kgs.	Rs.
A	8	Rs. 6.00
B	4	Rs. 4.00

During April 1988, 1000 kgs. of GEMCO were produced. The actual consumption of materials is as under :-

Material	Quantity Kgs.	Rate per kg. Rs.
A	750	Rs. 7.00
B	500	Rs. 5.00

Calculate :

(a) Material Cost Variance
(b) Material Price Variance.
(c) Material Usage Variance
(d) Material Mix Variance
(e) Material Yield Variance.

Ans. i. Rs. 1,350 (A) ii. Rs. 1,250 (A) iii, Rs. 100 (A) iv, Rs. 166.67 (F)
v. Rs. 266.67 (A)

Q. 8

Calculate from the following data :-

(a) The Material Price Variance
(b) The Material Mix Variance.
(c) The Material Yield Variance
(d) The Material Usage Variance
(e) The Material Cost Variance.

Material	Standard Price per lb.	Standard Weight per unit of output (lbs.)	Actual Usage for output of 36 units (lbs.)	Actual Price per lb.
	Rs.			Rs.
A	10	2	72	12
B	1	4	108	1
C	5	3	126	4

Ans. i. Rs. 18 (Average) ii. Rs. 132 (A) iii, xxx iv, Rs. 54 (A) v. 72 (A)

Q. 9

One kilogram of product 'K' requires two chemicals A and B. The following were the details of product 'K" for the month of June 2007 :

(a) Standard mix Chemical 'A" 50% and chemical 'B' 50%.
(b) Standard price per kilogram of Chemical 'A" Rs. 12 and chemical 'B' Rs. 15.
(c) Actual input of chemical 'B' 70 kilograms.
(d) Actual price per kilogram of Chemical 'A' Rs. 15.
(e) Standard normal loss 10% of total input.
(f) Materials cost variance total Rs. 650 adverse.
(g) Materials yield variance total Rs. 135 adverse.
(h) Actual output is 90 kg.

You are required to calculate :

(I) Material mix variance
(II) Materials usage variance
(III) Materials price variance
(IV) Actual loss of actual input
(V) Actual input of Chemical 'A'
(VI) Actual price per kilogram of Chemical 'B'.

Ans. i. 45 (A) ii. Rs. 180 (A) iii, Rs. 470 (A) iv, 20 kg.

Q. 10

Compute the missing data indicated by the Question Marks from the following :

Particulars	A	B
Standard Price/Unit	Rs. 12	Rs. 15
Actual Price/Unit	Rs. 15	Rs. 20
Standard Input (kgs)	50	?
Actual Input (kgs.)	?	70

Material Price Variance	?	?
Mutual Usage Variance	?	Rs. 300 Adverse
Material Cost Variance	?	?

Material mix variance for both products together was Rs. 45 Adverse.

Ans. i. Rs. 120 (A) ii. Nil iii, Rs. 650 (A)

CONCEPT NUMBER 3:- QUESTIONS BASED ON LABOUR VARIANCE

Q. 11

Standard Cost specification for a Product

Time 15 hours per unit

Cost Rs. 3 per unit

Actual Performance in a Cost Period

Production 500 units

Hours taken	Production	7,800 hours
	Idle Time	200 hours
	Total Time	8,000 hours

Payment made Rs. 24,800 (average per hour Rs. 3.10) Calculate labour variances.

Ans. i. Rs. 800 (A) ii. Rs. 900 (A) iii, Rs. 600 (A) iv. Rs. 2,300 (A), Rs. 2,300 (A)

Q. 12.

The Standard cost on 'Material' and 'Labour' for the making of one unit of Product Z is estimated as under :

Material 80 kg at Rs. 1.50 per kg.

Labour 18 hours at Rs. 1.25 per hr.

On completion of production of one unit of Product Z, it was found that 75 kg. of material costing Rs. 1.75 per kg. has been consumed and that the time taken was 16 hours, the wage rate being Rs. 1.50 per hour. You are required to analyse material and labour variances.

Ans. i. 11.25 (A) 1.5 (A) ii. 18.75 (A), 4 (A) iii, 7.50 (F), 2.5 (F)

Q. 13.

The standard output of product 'EXE' is 25 units per hour in manufacturing department of a company employing 100 workers. The standard wage rate per labour hour is Rs. 6.

In a 42 hour week, the department produced 1,040 units of 'EXE' despite 5% of the time paid was lost due to an abnormal reason. The hourly wage rate actually paid were Rs. 6.20, Rs. 6 and Rs. 5.70 respectively to 10, 30 and 60 of the workers. Compute labour cost, rate, efficiency & idle time variances.

Ans. i. Rs. 432 (F) ii. Rs. 672 (F), iii, Rs. 1,020 (F) iv. Rs. 1,260 (F)

Q. 14.

Vim Ltd. turns out only one article, the prime cost standards for which have been established as follows :

		Per Completed Piece
Material 5 lbs.	@ Rs. 4.20	Rs. 21
Labour 3 Hour	@ Rs. 3.00	Rs. 9

The production schedule for the month of July 1998 required completion of 5,000 pieces. However 5,120 pieces were actually completed.

Purchases for the month of July 1998 amounted to 30,000 lbs. of material at the total invoice price of Rs. 1,35,000. Production records for the month of July, 1998 showed the following actuals results :

Material requisitioned and used	25,700 lbs
Direct labour 3 hours 15,150 hours	Rs. 48,480

Calculate appropriate material and labour variances.

Ans. i. 8,130 (A) 2,400 (A) ii. 7,710 (A), 3,030 (A) iii, 420 (A) 630 (F)

Q. 15.

100 skilled workmen, 40 semi-skilled workmen and 69 unskilled workmen were to work for 30 weeks to get a contract job completed. The standard weekly wages were Rs. 60, Rs. 36 and Rs. 24 respectively. The job was actually completed in 32 weeks by 80 skilled, 50 semi-skilled and 70 unskilled workmen who were paid Rs. 65, Rs. 40 and Rs. 20 respectively as weekly wages. Find out the labour cost variance, labour rate variance, labour mix variance and labour effectively variance.

Ans. i. Rs. 8,800 (A) ii. Rs. 10,240 (A), iii, 1,440 (F) iv 19,200 (F) v. 17,760 (A)

vi. Rs. 8,800 (A) vii. Rs. 1,440 (F)

Q. 16.

Calculate the labour variances from the following information :

Standard wages :

Grade X : 90 Labourers at Rs. 2 per hour

Grade Y : 60 Labourers at Rs. 3 per hour

Actual Wages :

Grade X : 80 Labourers at Rs. 2,50 per hour

Grade Y : 70 Labourers at Rs. 2.00 per hour

Budgeted Hours 1,000 : Actual Hours 900

Budgeted Gross Production 5,000 units.

Standard Loss 20%; Actual loss 900 units.

Ans. i. Rs. 64,000 (F) ii. Rs. 27,000 (F), iii, Rs. 36,000 (F) iv Rs. 9,000 (A)

v. Rs. 45,000 (F) vi. Rs. 45,000 (F) vii. Rs. 63,000 (F) viii. Rs. 36,000 (F)

Q. 17.

A gang of workers usually consists of 10 men, 5 women and 5 boys in a factory. They are paid at standard hourly rates of Rs. 1.25, Re. 0.80 and Re. 0.70 respectively. In a normal working week of 40 hours the gang is expected to produce 1,000 units of output.

In a certain week, the gang consisted of 13 men, 4 women and 3 boys. Actual wages were paid at the rates of Rs. 1.20, Re. 0.85 and Re. 0.65 respectively. Two hours were lost due to abnormal idle time and 960 units of output were produced. Calculate various labour variances.

Ans. i. Rs. 70 (A) ii. Rs. 24 (F) iii, Rs. 50.90 (A) iv Rs. 43.10 (A) v. Rs. 5.90 (A)

vi. Rs. 8 (F) vii. Rs. 70 (A) viii. Rs. 50.90 (A)

Q. 18.

Direct Materials	Rs.
2 units of A at Rs. 4 per unit	8.00
3 units of B at Rs. 3 per unit	9.00
15 units of C at Re. 1 per unit	15.00
	32.00
Direct Labour 3 hrs. @ Rs. 8 per hour	24.00
Total Standard Prime Cost	56.00

The company manufactured and sold 6,000 units of the product during the year. Direct Material Costs were as follows :-

12,500 units of A at Rs. 4.40 per unit.

18,000 units of B at Rs. 2.80 per unit.

88,500 units of C at Rs. 1.20 per unit

The company worked 17,500 direct labour hours during the year. For 2,500 of these hours the company paid at Rs. 12 per hour while for the remaining the wages were paid at the standard rate. Calculate the Materials Cost, Price and usage variances and Labour Cost, Rate and Efficiency Variances.

Ans. i. 19,600 (A) ii. 19,100 (A), iii, Rs. 500 (A) iv. xxx v Rs. 10,000 (A) vi. Rs. 4,000 (Favourable)

Q. 19.

From the particulars given below, compute : Material Price variance, Material Usage Variance, Labour Rate Variance, Idle Time Variance and Labour Efficiency Variance with full working details :

1 tonne of material input yield a standard output of 1,00,000 units. The standard price of material is Rs. 20 per kg. Number of employees engaged is 200. The standard wage rate per employee per day is Rs. 6. The standard daily output per employee is 100 units. The actual quantity of material used is 10 tonnes and the actual price paid is Rs. 21 per kg. Actual output obtained is 9,00,000 units. Actual number of days worked is 50 and actual rate of wages paid is Rs. 6.50 per day. Idle time paid for and included in above time is ½ day.

Ans. i. Rs. 10,000 (A) ii. Rs. 20,000 (A), iii, Rs. 5,000 (A) iv. Rs. 600 (A)

v Rs. 5,400 (A)

Q. 20.

During a period 850 assemblies were made with a nil rate variance and a Rs. 4,400 adverse efficiency variance. If the standard labour hours per assembly are 24 with a Rs. 8 per hour standard labour cost, how many actual labour hours were worked?

Ans. i. 20,950 hrs.

Q. 21.

During a period 25,600 labour hours were worked at a standard rate of Rs. 7.50 per hour. The direct labour efficiency variance was Rs. 8,250 (A). How many standard hours were produced?

(a) 24,500 (b) 25,000 (c) 24,000 (d) 25,500

Variable Overheads Variances

Q. 22.

Actual variable overhead	Rs. 10,000
Budgeted variable overhead	Rs. 12,000
Budgeted production	500 units
Actual production	450 units
Actual hours	200
Standard time for 1 unit	30 minutes

Ans. i. Rs. 800 (F) ii. Rs. 400 (A), iii, Rs. 1,200 (F)

Q. 23.

From the following data, calculate Fixed Overheads Expenditure and Volume Variances :

Fixed overhead budget for November	Rs. 1,00,000
Budgeted production for the month (1 hour per unit)	50,000 units

Actual production for the month	54,000 units
Actual fixed overhead incurred	Rs. 1,20,000

Ans. i. 20,000 (A) ii. 8,000 (F)

Q. 24.

The following information was obtained from the records of a manufacturing unit using Standard Costing System.

	Standard	Actual
Production	4,000 units	3,800 units
Working Days	20	21
Fixed Overheads	40,000	39,000

You are required to calculate the following Fixed Overheads Variances :

(i) Cost Variance, (ii) Expenditure Variance, (iii) Volume Variance,
(iv) Efficiency Variance, (v) Capacity Variance

Ans. i. 1,000 (A) ii. 1,000 (F), iii, 2,000 (A) iv. 4,000 (A) v. Rs. 2,000 (F)

Q. 25.

In Department A the following data is submitted for the week ended 31st October :-

Standard output for 40 hours per week	1,400 Units
Standard Fixed Overhead	Rs. 1,400
Actual output	1,200 Units
Actual hours worked	32 hours
Actual fixed overhead	Rs. 1,500

Ans. i. 300 (A) ii. 100 (A), iii, 200 (A) iv. 80 (F) v. 280 (A) vi. 280 (A)
v Rs. 5,400 (A)

Q. 26.

R. Ltd. has furnished you the following data :

	Budget	Actual
		July 2007
No. of working days	25	27
Production in units	20,000	22,000
Fixed overheads	Rs. 30,000	31,000

Budgeted fixed overhead rate is Rs. 1 per hour. In July, 2007 the actual hours worked were 31,500. Calculate the following variances :

1. Fixed O/H Cost Variance 2. Fixed O/H Exp. Variance 3. Fixed O/H Vol. Variance

4. Fixed O/H Eff. Variance 5. Fixed O/H Cap. Variance 6. Fixed O/H Cal. Variance

7. Fixed O/H Rev. Variance

Ans. i. Rs. 2,000 (F) ii. 1,000 (A), iii, 3,000 (F) iv. 1,500 (F) v. 1,500 (F) vi. 2,400 (F) vii. 900 (A)

Q. 27.

A company has a normal capacity of 120 machines, working 8 hours per4 day of 25 days in a month. The fixed overheads are budgeted at Rs. 1,44,000 per month. The standard time required to manufacture one unit of product is 4 hours.

In April, 1998, the company worked 24 days of 840 machine hours per day and produced 5,305 units of output. The actual fixed overheads were Rs. 1,42,000.

Compute : (1) Efficiency variance (2) Capacity variance (3) Calendar variance
(4) Expense variance (5) Volume variance (6) Total fixed overheads cost variance

Ans. i. Rs. 1,4680 (A) ii. 2,000 (F), iii, Rs. 16,680 (A) iv. 6,360 (F) v. 23,040 (A) vi. 5,760 (A) vii. 17,280 (A)

Q. 28.

A Cost Accountant of a Company was given the following information regarding the overheads for February 2007 :

(a) Overheads cost variance Rs. 1,400 Adverse.

(b) Overheads volume variance Rs. 1,000 Adverse.

(c) Budgeted hours for February 2007 1,200 hours.

(d) Budgeted overheads for February 2007 Rs. 6,000.

(e) Actual rate of recovery of overheads Rs. 8 per hour.

You are required to assist him in computing the following for February 2007 :

(1) Overheads expenditure variance (2) Actual overheads incurred.

(3) Actual hours for actual production (4) Overheads capacity variance

(5) Overheads efficiency variance. (6) Standard hours for actual production.

Ans. i. Rs. 400 Adverse. ii. Rs. 6,400 (A), iii, xxx iv. Rs. 2,000 Adverse.
v Rs. 1,000 (F) or Rs. 1,000 (F) vi. xxx

Q. 29.

The budgeted and the actual sales for a period in respect of three products are given below :

Budgeted figures

Product	Quantity	Price Rs.	Value Rs.
A	1,000	5	5,000
B	750	10	7,500
C	500	15	7,500
	2,250		20,000

Actual

Product	Quantity	Price Rs.	Value Rs.
A	1,200	6	7,200
B	700	9	6,300
C	600	14	8,400

	2,500		21,900

Calculate sales variances.

Ans. i. Rs. 1,900 (F) ii. Rs. 100 (A), iii, Rs. 2,000 (F) iv. Rs. 222 (A) v. Rs. 2,22 (F)

Q. 30.

PR Ltd. furnishes the following information relating to budgeted sales and actual sales for April 2007 :

	Product	Sales quantity units	Selling price per unit Rs.
Budgeted sales			
	A	1200	15
	B	800	20
	C	2000	40
Actual sales			
	A	880	18
	B	880	20
	C	2640	38

Calculate the following variances :

(i) Sales Value Variance (ii) Sales Volume Variance (iii) Sales Price Variance
(iv) Sales Mix Variance (v) Sales Qty. Variance.-

Ans. i. Rs. 19,760 (F) ii. Rs. 22,400 (F), iii, Rs. 2,640 (A) iv. Rs. 11,000 (F)

v. Rs. 11,400 (F)

Q. 31. SQC Ltd. provides the following data for the month of October, 1999 :

Budget			
Product	Budgeted Sales Quantity	Budgeted Selling Price per Unit (Rs.)	Standard Cost Per Unit (Rs.)

A	2,160	12	9
B	1,440	5	3

Actuals			
Product	Actual Sales Quantity	Actual Selling Price per Unit (Rs.)	Actual Cost Per Unit (Rs.)
A	2,240	11	8
B	960	6	5

You are required to compute :

(i) Sales margin quantity variance (ii) Sales margin mix variance

(iii) Sales margin volume variance (iv) Sales margin price variance

(v) Sales margin total variance.

Ans. i. 2,000 (A) ii. 720 (A), iii, 1,280 (A) iv. 320 (F) v. 1,040 (A)

All Variances

Q. 32.

The details regarding a food products manufactured by XYZ Co. for the last one week are as follows :

Standard Cost (For one unit)		Rs.
Direct Materials	10 units @ Rs. 1.50	15
Direct Wages	5 hours @ Rs. 8	40
Production Overheads	5 hours @ Rs. 10	50
		105

Actuals (For whole activity)

Direct Materials Rs. 6,435

Direct Wages Rs. 16,324

Analysis of Variances :

Direct Materials

Price Rs. 585 (A)

Usage Rs. 375 (F)

Direct Wages (Labour)

Rate	Rs.	636	(F)
Efficiency	Rs.	360	(A)
Production Overheads			
Expenditure	Rs.	400	(F)
Volume	Rs.	750	(F)

You are required to calculate (i) Actual output units; (ii) Actual price of material per unit; (iii) Actual wage rate per labour hour; (iv) The amount of production overhead incurred and (v) The production overhead efficiency variance.

Ans. i. 415 units ii. Rs. 19,600 , iii, Rs. 450 (A)

Q. 33.

The following information is available from the cost records of a Company for February 2007 :

	Rs.	
Materials purchased : 20,000 pieces		88,000
Materials consumed 19,000 pieces		
Actual wages paid for 4,950 hours	24,750	
Factory Overheads Incurred	44,000	
Factory Overheads Budgeted	40,000	

Units produced 1,800

Standard Rates and prices are :

Direct Material Rates Rs. 4 per piece.

Standard Input 10 pieces per unit.

Direct Labour Rate Rs. 4 per hour.

Standard requirement 2.5 hours per unit.

Overhead Rs. 8 per labour hour.

Required

(a) Show the Standard Cost Card.

(b) Compute all material, labour and overhead variances for February, 2007.

Ans. i. Rs. 11,600 (A) ii. Rs. 7,600 (A), iii, Rs. 4,000 (A) iv. Rs. 6,750 (A)
v. Rs. 4,950 (A), vi. Rs. 1,800 (A), (vii) Rs. 8,000 (A)
viii. Rs. 4,000 (A) (ix) Rs. 3,600 (A) (x) Rs. 400 (A)

Q. 34. X Pvt. Ltd., operates a system of standard costs. Following information is available :

Actuals	Rs.
Materials Consumed (3,600 units at Rs. 52.50 per unit)	1,89,000
Direct Wages	22,100
Fixed Expenses	1,88,000
Variable Expenses	62,000

Output during the period was 3,500 units of finished product.

For the above period, the standard production capacity was 4,800 units and the break-up of standard cost per unit was as under :

	Rs.
Materials (1 unit @ Rs. 50 per unit)	50
Direct Wages	6
Fixed Expenses	40
Variable Expenses	20
Total standard expenses cost per unit	116

The standard wages per unit is based on 9,600 hours for the above period at a rate of Rs. 3.00 per hour. 6,400 hours were actually worked during the above period, and in addition, wages for 400 hours were paid to compensate for idle time due to breakdown of a machine, and overall wage rate was Rs. 3.25 per hour.

You are required to compute the following variances with appropriate workings :

(a) Direct Material Cost Variance (b) Material Price Variance
(c) Material Usage Variance (d) Direct Labour Cost Variance
(e) Wage Rate Variance (f) Labour Efficiency Variance
(g) Idle Time Variance (h) Variable Expenses Variance
(i) Fixed Expenses Expenditure Variance (j) Fixed Expenses Volume Variance
(k) Fixed Expenses Capacity Variance (l) Fixed Expenses Efficiency Variance
(m) Total cost variance.

Ans. i. Rs. 14,000 (Adverse) ii. Rs. 9,000 (Adverse), iii, Rs. 5,000 (Adverse)
iv. Rs. 1,100 (Adverse) v. Rs. 1,700 (Adverse) (vi) Rs. 1,800 (Favourable)

(vii) Rs. 1,200 (Adverse) (viii) Rs. 8,000 (Favourable) (ix) Rs. 4,000 (Favourable)
(x) 52,000 (A) (xi) Rs. 56,000 (Adverse) (xii) Rs. 4,000 (Favourable)
(xiii) Rs. 55,100 (A).

Q. 35.

ISPAT Pvt. Ltd. operates a system of standard costing in respect of one of its products which is manufactured within a single cost centre. The Standard Cost Card of a product is as under :

Standard		Unit Cost (Rs.)
Direct material	5 kgs @ Rs. 4.20	21.00
Direct labour	3 hours @ Rs. 3.00	9.00
Factory overhead	Rs. 1.20 per labour hour	3.60
	Total manufacturing cost	33.60

The production schedule for the month of June, 2007 required completion of 40,000 units. However 40,960 units were completed during the month without opening and closing work-in-process inventories.

Purchases during the month of June, 2007, 2,25,000 kgs of material at the rate of Rs. 4.50 per kg. Production and Sales records for the month showed the following actual results :

Material used 2,05,600 kgs.

Direct labour 1,21,200 hours cost incurred Rs. 3.87,840

Total factory overhead cost incurred Rs. 1,00,000

Sales 40,000 units

Selling price to be so fixed as to allow a mark-up of 20 per cent on selling price.

Required :

(i) Calculate material variances based on consumption of material.

(ii) Calculate labour variances and the total variance for factor overhead.

(iii) Prepare Income statement for June, 2007 showing actual gross margin.

(iv) An incentive scheme is in operation in the company whereby employees are paid a bonus of 50% of direct labour hour saved at standard direct labour hour rate. Calculate the Bonus amount.

Ans. i. Rs. 65,040 (A) ii. 3,060 (A), iii, 61,680 (A) iv. 19,200 (A)
v . 5,040 (F) vi. 24,240 (A) (vii) Rs. 47,456 (F)

Q. 36.

BETA Woven Ltd. has furnished the following information for the month ending 30th June, 2007 :

	Master Budgeted	Actual	Variance
Units produced and sold	80,000	72,000	
Sales (Rs.)	3,20,000	2,80,000	40,000 (A)
Direct material (Rs.)	80,000	73,600	6,400 (F)
Direct wages (Rs.)	1,20,000	1,94,800	15,200 (F)
Variable overheads (Rs.)	40,000	37,600	2,400 (F)
Fixed overhead (Rs.)	40,000	39,200	800 (F)
Total Cost	2,80,000	2,55,200	

The Standard costs of the products are as follows :

	Per unit (Rs.)
Direct materials (1 kg. at the rate of Re. 1 per kg.)	1.00
Direct wages (1 hour at the rate of Rs. 1.50)	1.50
Variable overheads (1 hour at the rate of Re. 50)	0.50

Actual results for the month showed that 78,400 kg. of material were used and 70,400 labour hours were recorded . Required :

(i) Prepare Flexible budget for the month and compare with actual results.

(ii) Calculate material, labour, sales price, variable overhead and fixed overhead expenditure variances and sales volume (profit) variance.

Ans. i. 8,000 (A) ii. 1,600 (A), iii, 6,400 (A) iv. 3,200 (F) v. 800 (F)

vi. 2,400 (F) vii. 1,600 (A) viii. 800 (F) ix. 4,000 (A)