INTERMEDIATE (IPC) COURSE

PRACTICE MANUAL

PAPER : 3

COST ACCOUNTING AND FINANCIAL MANAGEMENT

Part – 1 : Cost Accounting

BOARD OF STUDIES
THE INSTITUTE OF CHARTERED ACCOUNTANTS OF INDIA

This Practice Manual has been prepared by the faculty of the Board of Studies. The objective of the Practice Manual is to provide teaching material to the students to enable them to obtain knowledge in the subject. In case students need any clarifications or have any suggestions to make for further improvement of the material contained herein, they may write to the Director of Studies.

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A WORD ABOUT PRACTICE MANUAL

The Board of Studies has undertaken the step of developing Practice Manuals of all subjects to help the students with better understanding of the subject through a mode of questions and answers on different important topics and problems. Practice Manual and Study Material of a subject complements each other and all the students are expected to make holistic study of both to gain maximum benefit and acquire in-depth knowledge of the subject. The Practice Manual in the subject of “Cost Accounting” has been developed taking primary input from question papers of Institute’s earlier examinations over a number of years. It has been divided into thirteen chapters, keeping close correspondence with the chapters of the Study Material so as to make it an effective guidance material by providing clarification / solution to very important topics / issues, both theoretical and practical, of different chapters.

The Practice Manual will serve as revision help book towards preparing for Intermediate (IPC) examination of the Institute and help the students in identifying the gaps in the preparation of the examination and developing plan to make it up. The Practice Manual contains solutions to the questions which will act as a guide towards developing the skill of students on framing appropriate answer to a question and thereby to help them to improve their performance in the examination. The Practice Manual of “Cost Accounting” has been thoroughly updated to cater the need of home study and distance learning approach in Chartered Accountancy course. We would like to highlight some of the unique features of the Practice Manual in the subject of “Cost Accounting”.

- This Practice Manual is divided into thirteen chapters.
- This Practice Manual has more than 200 practical questions. These 200 practical questions have been compiled in such a manner that it will cover basic concepts, practical concepts and all kind of adjustments required to solve a numerical & their solutions for extensive revision of the students of intermediate (IPC) level of Chartered Accountancy course.
- Important definitions, equations, formulae etc. has been given at the beginning of each chapter for a quick recapitulation.
- Solutions in this Practice Manual have been given step by step so that students can understand each problem with the help of self study.
- Each chapter of the Practice Manual has been divided into two sections i.e. Section A: Theory Questions and Section B: Practical Questions.

- ❖ Presentation is the hallmark of this Practice Manual. Questions and solutions thereof have been presented in a students' friendly approach.
- ❖ Matrix of chapter-wise marks distribution in the past examinations has been added in this Practice Manual.

Practice Manual is prepared by the Board of Studies of Institute (ICAI) with a viewpoint to assist Chartered Accountancy students in their education. Some time solution may have been provided keeping certain assumptions in mind where alternative views are also possible.

In this Practice Manual formats of Financial Statements (i.e. Balance Sheet, Income Statements etc) and financial terms used are for illustrative purpose only. For appropriate format and applicability of various Standards, students are advised to refer the study material of appropriate subject(s).

For any further clarification/ guidance, students are requested to send their queries at nnsengupta@icai.in; deepak.gupta@icai.in; sanjit.sharma@icai.in.

Happy Reading and Best Wishes!

PAPER – 3: COST ACCOUNTING AND FINANCIAL MANAGEMENT

Statement showing topic-wise distribution of Examination Questions along with Marks

Topics		Term of Examination																Total Marks	Avg. Marks
		May 2012		Nov. 2012		May 2013		Nov. 2013		May 2014		Nov. 2014		May 2015		Nov. 2015			
		Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M	Q	M		
PART-I : COST ACCOUNTING																			
Chapter-1	Basic Concepts	5(b)	4	5(a)	4	5(a)	4	-	-	5(a) 5(b)	4 4	5(a)	4	5(a) 7(a)	4 4	5(a)	4	**36**	**4.50**
Chapter-2	Material	7(e)	4	1(d)	5	7(a)	4	1(a)	5	2(a)	8	1(a)	5	-	-	7(e)	2	**33**	**4.125**
Chapter-3	Labour	3(a)	8	1(b)	5	2(b)	6	3(a)	8	-	-	7(e)	4	-	-	1(a)	5	**36**	**4.50**
Chapter-4	Overheads	1(b)	5	2(a)	8	5(b)	4	6(a)	8	7(a)	4	5(b)	4	6(a)	8	2(a) 5(b) 7(a)	8 4 4	**57**	**7.125**
Chapter-5	Non Integrated Accounts	5(a)	4	6(b)	8	7(b)	4	1(b)	5	1(b)	5	4(a)	8	7(b)	4	-	-	**38**	**4.75**
Chapter-6	Job Costing & Batch Costing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0**	**0.00**
Chapter-7	Contract Costing	2(a)	8	3(b)	4	-	-	7(e) (ii)	2	6(a)	8	2(a)	8	5(b)	4	6(a)	8	**42**	**5.25**
Chapter-8	Operating Costing	-	-	5(c)	4	-	-	2(a)	8	7(e) (ii)	2	-	-	3(a)	8	-	-	**22**	**2.75**
Chapter-9	Process & Operation Costing	6(a)	8	5(b)	4	3(a)	10	5(a)	4	3(a)	8	6(b)	8	-	-	4(a)	8	**50**	**6.25**

Chapter-10	Joint Products & By Products	-	-	-	-	4(a)	8	-	-	-	-	-	-	4(a)	8	-	-	**16**	**2.00**
Chapter-11	Standard Costing	4(a)	8	4(a)	6	1(a)	5	4(a)	8	4(a)	8	-	-	2(a)	8	7(b)	4	**47**	**5.875**
Chapter-12	Marginal Costing	7(c)(ii) 7(d)	2 4	6(a)	8	1(b)	5	5(b) 7(a)	4 4	1(a)	5	1(b)	5	1(a)	5	1(b)	5	**47**	**5.875**
Chapter-13	Budget and Budgetary Control	1(a)	5	7(b)	4	6(a)	7	7(b)	4	7(d)	4	3(a)	8	1(b)	5	3(a)	8	**45**	**5.625**

Note: 'Q' represents question numbers as they appeared in the question paper of respective examination. M represents the marks which each question carries.
The question papers of all the past attempts of Intermediate/ IPCC can be accessed from the BOS Knowledge Portal on the Institute's website www.icai.org.

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COST ACCOUNTING

1 Basic Concepts

Basic Concepts

Meaning of Cost, Costing and Cost Accounting	***Cost:*** The amount of expenditure (actual or notional) incurred on or attributable to a specified article, product or activity. *(as a noun)* To ascertain the cost of a specified thing or activity. (*as a verb*) ***Costing:*** Costing is the technique and process of ascertaining costs. ***Cost Accounting:*** The process of accounting for cost which begins with the recording of income and expenditure or the bases on which they are calculated and ends with the preparation of periodical statements and reports for ascertaining and controlling costs.
Cost Units	It is a unit of product, service or time (or combination of these) in relation to which costs may be ascertained or expressed.
Cost Centres	It is defined as a location, person or an item of equipment (or group of these) for which cost may be ascertained and used for the purpose of Cost Control. *Types of Cost Centres:* (i) **Personal Cost Centre**: It consists of a person or group of persons (ii) **Impersonal Cost Centre**: It consists of a location or an item of equipment (or group of these)
Cost Objects	Cost object is anything for which a separate measurement of cost is required. Cost object may be a product, a service, a project, a customer, a brand category, an activity, a department or a programme etc*:*
Cost Drivers	A Cost driver is a factor or variable which effect level of cost. Generally it is an activity which is responsible for cost incurrence. Level of activity or volume of production is the example of a cost driver. An activity may be an event, task, or unit of work etc.
Objectives of Cost Accounting	(i) Ascertainment of cost (ii) Determination of selling price (iii) Cost control (iv) Cost reduction

	(v) Ascertainment of profit for each activity. (vi) Assisting management in decision making
Cost Control	It is a process to ensure that appropriate action is taken if costs exceed a pre-set allowance (as budgeted/ estimated) or actions to be taken if costs are expected to exceed the expected levels.
Cost Reduction	It 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.
Advantages of a Cost Accounting System	The Important advantages of a Cost Accounting system may include (i) Cost Determination (ii) Helping in Cost Reduction (iii) Product Profitability Analysis (iv) Provide information relevant for decision making (v) Determination of Selling price (vi) Cost Control and Variance Analysis (vii) Cost Comparison and Benchmarking (viii) Compliances with statutory requirements (ix) Identification of lacunae (x) Helpful in strategic decision making (xi) Helpful in solving linear programming problems
Limitations of a Cost Accounting System	(i) It may be expensive to set a proper cost accounting system (ii) Reconciliation is required to verify the results of both financial accounts and cost accounts. (iii) The same data are recorded for both cost accounting and financial reporting purpose. Hence duplication work is carried out. (iv) Cost accounting system is not a complete solution itself to control costs but its efficacy depends on its usage.
Factors to be considered before Installation of a Cost Accounting System	Before installing a cost accounting system, knowledge of the followings are desirable. (i) Know the objective of the organization to install cost accounting system (ii) Know the nature of the products and the industry in which the organization is operating. (iii) Know the organization hierarchy and their needs of information. (iv) Know the production process

	(v) Synchronization of information required in different departments. (vi) Methods of maintenance of cost records. (vii) Statutory compliances and audit.
Classification of Costs	(i) By Nature or element : (a) Material Cost (b) Labour Cost and (c) Other Expenses (ii) By Functions : (a) Prime Cost (b) Factory/ Works Cost (c) Cost of Production (d) Cost of Goods Sold (e) Cost of Sales. (iii) By Behaviour : (a) Fixed Cost (b) Variable Cost and (c) Semi-variable Cost. (iv) By Controllability : (a) Controllable and (b) Uncontrollable. (v) By Normality : (a) Normal and (b) Abnormal. (vi) By Managerial decision making
Marginal Cost	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.
Differential Cost	It represents the change (increase or decrease) in total cost (variable as well as fixed) due to change in activity level, technology, process or method of production, etc.
Imputed Cost	These costs are notional costs which do not involve any cash outlay. Interest on capital, the payment for which is not actually made, is an example of imputed cost. These costs are similar to opportunity costs.
Product Costs	These are the costs which are associated with the purchase and sale of goods (in the case of merchandise inventory). In the production scenario, such costs are associated with the acquisition and conversion of materials and all other manufacturing inputs into finished product for sale. Hence, under marginal costing, variable manufacturing costs and under absorption costing, total manufacturing costs (variable and fixed) constitute inventoriable or product costs.
Period Costs	These are the costs, which are not assigned to the products but are charged as expenses against the revenue of the period in which they are incurred. All non-manufacturing costs such as general and administrative expenses, selling and distribution expenses are recognised as period costs.
Opportunity Cost	This cost refers to the value of sacrifice made or benefit of opportunity foregone in accepting an alternative course of action.
Sunk Cost	Historical costs incurred in the past are known as sunk costs. They play no role in decision making in the current period.
Discretionary	Such costs are not tied to a clear cause and effect relationship

Costs	between inputs and outputs. They usually arise from periodic decisions regarding the maximum outlay to be incurred.
Explicit Costs	These costs are also known as out of pocket costs and refer to costs involving immediate payment of cash. Salaries, wages, postage and telegram, printing and stationery, interest on loan etc. are some examples of explicit costs involving immediate cash payment.
Implicit Costs	These costs do not involve any immediate cash payment. They are not recorded in the books of account. They are also known as economic costs.
Methods of Costing	(i) Job Costing (ii) Batch Costing (iii) Contract Costing (iv) Single or Output Costing (v) Process Costing (vi) Operating Costing (vii) Multiple Costing
Job Costing	In this method of costing, cost of each job is ascertained separately. It is suitable in all cases where work is undertaken on receiving a customer's order like a printing press, motor workshop, etc.
Batch Costing	It is the extension of job costing. A batch may represent a number of small orders passed through the factory in batch. Each batch here is treated as a unit of cost and thus costing is done separately. Here cost per unit is determined by dividing the cost of the batch by the number of units produced in the batch.
Contract Costing	Here the cost of each contract is ascertained separately. It is suitable for firms engaged in the construction of bridges, roads, buildings etc.
Single or Output Costing	Here the cost of a product is ascertained, the product being the only one produced like bricks, coals, etc.
Process Costing	Here the cost of completing each stage of work is ascertained, like cost of making pulp and cost of making paper from pulp. In mechanical operations, the cost of each operation may be ascertained separately; the name given is operation costing.
Operating Costing	It is used in the case of concerns rendering services like transport, supply of water, retail trade etc.
Multiple Costing	It is a combination of two or more methods of costing outlined above. Suppose a firm manufactures bicycles including its components; costing of the parts will be done by the system of job

	or batch costing but the cost of assembling the bicycle will be computed by the Single or output costing method. The whole system of costing is known as multiple costing.
Techniques of Costing	(i) Uniform Costing (ii) Marginal Costing (iii) Standard Costing and Variance Analysis (iv) Historical Costing (v) Direct Costing (vi) Absorption Costing
Uniform Costing	When a number of firms in an industry agree among themselves to follow the same system of costing in detail, adopting common terminology for various items and processes they are said to follow a system of uniform costing.
Marginal Costing	It is defined as the ascertainment of marginal cost by differentiating between fixed and variable costs. It is used to ascertain effect of changes in volume or type of output on profit.
Standard Costing and Variance Analysis	It is the name given to the technique whereby standard costs are pre-determined and subsequently compared with the recorded actual costs. It is thus a technique of cost ascertainment and cost control. This technique may be used in conjunction with any method of costing. However, it is especially suitable where the manufacturing method involves production of standardised goods of repetitive nature.
Absorption Costing	It is the practice of charging all costs, both variable and fixed to operations, processes or products. This differs from marginal costing where fixed costs are excluded.
Coding System	A system of symbols designed to be applied to a classified set of items to give a brief account reference, facilitating entry collation and analysis. Hence cost classification forms the basis of any cost coding. It helps us understand the characteristic of any cost through a short symbolized form.

Question-1

Enumerate the main objectives of introduction of a Cost Accounting System in a manufacturing organization

Solution:

The main objectives of introduction of a Cost Accounting System in a manufacturing organization are as follows:

(i) Ascertainment of cost

(ii) Determination of selling price

(iii) Cost control and cost reduction

(iv) Ascertainment of profit of each activity

(v) Assisting in managerial decision making

Question-2

Write short notes on any two of the following?

(i) Conversion cost (ii) Sunk cost (iii) Opportunity cost

Solution:

(i) 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.

(ii) Sunk cost: Historical costs or the costs incurred in the past are known as sunk cost. They play no role in the current decision making process and are termed as irrelevant costs. For example, in the case of a decision relating to the replacement of a machine, the written down value of the existing machine is a sunk cost, and therefore, not considered.

(iii) Opportunity cost: It refers to the value of sacrifice made or benefit of opportunity foregone in accepting an alternative course of action. For example, a firm financing its expansion plan by withdrawing money from 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.

Question-3

What is meant by cost centre?

Solution:

It is defined as a location, person or an item of equipment (or group of these) for which cost may be ascertained and used for the purpose of Cost Control.

Cost Centres are of two types,

- **Personal Cost Centre:** It consists of a person or group of persons e.g. Mr. X, supervisor, foreman, accountant, engineer, process staffs, mining staffs, doctors etc.
- **Impersonal Cost Centre:** It consists of a location or an item of equipment (or group of these) e.g. Ludhiana branch, boiler house, cooling tower, weighing machine, canteen, and generator set etc.

In a manufacturing concern there are two types of cost centres viz., Production and Service cost centres.

Question-4

Discuss cost classification based on variability and controllability.

Solution:

Cost classification based on variability

(a) **Fixed Costs** – These are the costs which are incurred for a period, and which, within certain output and turnover limits, tend to be unaffected by fluctuations in the levels of activity (output or turnover). They do not tend to increase or decrease with the changes in output. For example, rent, insurance of factory building etc., remain the same for different levels of production.

(b) **Variable Costs** – These costs tend to vary with the volume of activity. Any increase in the activity results in an increase in the variable cost and vice-versa. For example, cost of direct labour, etc.

(c) **Semi-variable Costs** – These costs contain both fixed and variable components and are thus partly affected by fluctuations in the level of activity. Examples of semi variable costs are telephone bills, gas and electricity etc.

Cost classification based on controllability

(a) **Controllable Costs** - Cost that can be controlled, typically by a cost, profit or investment centre manager is called controllable cost. Controllable costs incurred in a particular responsibility centre can be influenced by the action of the executive heading that responsibility centre. For example, direct costs comprising direct labour, direct material, direct expenses and some of the overheads are generally controllable by the shop level management.

(b) **Uncontrollable Costs** - Costs which cannot be influenced by the action of a specified member of an undertaking are known as uncontrollable costs. For example, expenditure incurred by, say, the tool room is controllable by the foreman in-charge of that section but the share of the tool-room expenditure which is apportioned to a machine shop is not to be controlled by the machine shop foreman.

Question-5

Discuss the essential features of a good cost accounting system?

Solution:

The essential features, which a good Cost Accounting System should possess, are as follows:

(a) **Informative and Simple:** Cost Accounting System should be tailor-made, practical, simple and capable of meeting the requirements of a business concern. The system of costing should not sacrifice the utility by introducing meticulous and unnecessary details.

(b) **Accuracy:** The data to be used by the Cost Accounting System should be accurate; otherwise it may distort the output of the system and a wrong decision may be taken.

(c) **Support from Management and subordinates:** Necessary cooperation and participation of executives from various departments of the concern is essential for developing a good system of Cost Accounting.

(d) **Cost-Benefit:** The Cost of installing and operating the system should justify the results.

(e) **Procedure:** A carefully phased programme should be prepared by using network analysis for the introduction of the system.

(f) **Trust:** Management should have faith in the Costing System and should also provide a helping hand for its development and success.

Question-6

Explain:

(i) Pre-production Costs

(ii) Research and Development Costs

(iii) Training Costs

Solution:

(i) **Pre-production Costs:** These costs forms the part of development cost, incurred in making a trial production run, preliminary to formal production. These costs are incurred when a new factory is in the process of establishment or a new project is undertaken or a new product line or product is taken up, but there is no established or formal production to which such costs may be charged.

(ii) **Research and Development Costs:** Research costs are the costs incurred for the original and planned investigation undertaken with a prospect of gaining new scientific or technical knowledge and understanding.

Development costs are the cost incurred in applying research findings or other knowledge to a plan or design for the production of new or substantially improved materials, devices, products, processes, systems or services prior to the commencement of commercial production or use.

(iii) **Training Costs:** Costs which are incurred in and in relation to providing training to the workers, apprentices, executives etc. Training cost consists of wages and salaries paid to new trainees, fees paid to trainers, cost of materials and properties used to train the trainees, costs associated with training centre, loss suffered due to lower production and extra spoilage etc. The total cost of training section is thereafter apportioned to production centers.

Question-7

Enumerate the factors which are to be considered before installing a system of cost accounting in a manufacturing organization.

Solution:

Before installation of a system of cost accounting in a manufacturing organisation the under mentioned factors should be studied:

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

(b) Nature of Business or Industry: The Industry in which business is operating. Every business industry has its own peculiar feature and costing objectives. According to its cost information requirement cost accounting methods are followed. For example Indian Oil Corporation Ltd. has to maintain process wise cost accounts to find out cost incurred on a particular process say in crude refinement process etc.

(c) Organisational Hierarchy: Costing system should fulfill the requirement of different level of management. Top management is concerned with the corporate strategy, strategic level management is concerned with marketing strategy, product diversification, product pricing etc. Operational level management needs the information on standard quantity to be consumed, report on idle time etc.

(d) Knowing the product: Nature of product determines the type of costing system to be implemented. The product which has by-products requires costing system which account for by-products as well. In case of perishable or short self- life, marginal costing method is required to know the contribution and minimum price at which it can be sold.

(e) Knowing the production process: A good costing system can never be established without the complete knowledge of the production process. Cost apportionment can be done on the most appropriate and scientific basis if a cost accountant can identify degree of effort or resources consumed in a particular process. This also includes some basic technical know-how and process peculiarity.

(f) Information synchronisation: Establishment of a department or a system requires substantial amount of organisational resources. While drafting a costing system, information needs of various other departments should be taken into account. For example in a typical business organisation accounts department needs to submit monthly stock statement to its lender bank, quantity wise stock details at the time filing returns to tax authorities etc.

(g) Method of maintenance of cost records: The manner in which Cost and Financial accounts could be inter-locked into a single integral accounting system and in which results of separate sets of accounts, cost and financial, could be reconciled by means of control accounts.

(h) Statutory compliances and audit: Records are to be maintained to comply with statutory requirements, standards to be followed (Cost Accounting Standards and Accounting Standards).

(i) **Information Attributes**: Information generated from the Costing system should be possess all the attributes of an information i.e. complete, accurate, timeliness, confidentiality etc. This also meets the requirements of management information system.

Question-8

You have been asked to install a costing system in a manufacturing company. What practical difficulties will you expect and how will you propose to overcome the same?

Solution:

The practical difficulties with which one usually confronted with while installing a costing system in a manufacturing company are as follows:

(i) **Lack of top management support:** Installation of a costing system does not receive the adequate support of top management. They consider it as interference in their work. They believe that such, a system will involve additional paperwork. They also have a misconception in their minds that the system is meant for keeping a check on their activities.

(ii) **Resistance from cost accounting departmental staff:** The staff resists because of fear of loosing their jobs and importance after the implementation of the new system.

(iii) **Non co-operation from user departments:** The foremen, supervisor and other staff members may not co-operate in providing requisite data, as this would not only add to their responsibilities but will also increase paper work of the entire team as well.

(iv) **Shortage of trained staff:** Since cost accounting system's installation involves specialised work, there may be a shortage of trained staff.

To overcome these practical difficulties, necessary steps required are:

- To sell the idea to top management – To convince them of the utility of the system.
- Resistance and non co-operation can be overcome by behavioral approach. To deal with the staff concerned effectively.
- Proper training should be given to the staff at each level
- Regular meetings should be held with the cost accounting staff, user departments, staff and top management to clarify their doubts / misgivings.

Question-9

Distinguish between controllable & uncontrollable costs?

Solution:

Controllable costs and Uncontrollable costs*:* Cost that can be controlled, typically by a cost, profit or investment centre manager is called controllable cost. Controllable costs incurred in a particular responsibility centre can be influenced by the action of the executive heading that responsibility centre.

Costs which cannot be influenced by the action of a specified member of an undertaking are known as uncontrollable costs.

Question-10

Define Explicit costs. How is it different from implicit costs?

Solution:

Explicit costs: 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 of 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 costs 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 courses of action.

Question-11

Discuss the four different methods of costing alongwith their applicability to concerned industry?

Solution:

Four different methods of costing along with their applicability to concerned industry have been discussed as below:

1. *Job Costing:* The objective under this method of costing is to ascertain the cost of each job order. A job card is prepared for each job to accumulate costs. The cost of the job is determined by adding all costs against the job it is incurred. This method of costing is used in printing press, foundries and general engineering workshops, advertising etc.
2. *Batch Costing:* This system of costing is used where small components/ parts of the same kind are required to be manufactured in large quantities. Here batch of similar products is treated as a job and cost of such a job is ascertained as discussed under (1), above. If in a cycle manufacturing unit, rims are produced in batches of 2,500 units each, then the cost will be determined in relation to a batch of 2,500 units.
3. *Contract Costing:* If a job is very big and takes a long time for its completion, then method used for costing is known as Contract Costing. Here the cost of each contract is

ascertained separately. It is suitable for firms engaged in the construction of bridges, roads, buildings etc.

4. *Operating Costing:* The method of Costing used in service rendering undertakings is known as operating costing. This method of costing is used in undertakings like transport, supply of water, telephone services, hospitals, nursing homes etc.

Question-12

Distinguish between Marginal Costing and Differential Costing

Solution:

Marginal Costing and Differential Costing

Marginal Costing is defined as the 'Ascertainment of marginal costs and of the effect on profit of changes in volume or type of output by differentiating between fixed costs and variable costs'.

Differential Costing is defined as the technique of costing which uses differential costs and/or differential revenues for ascertaining the acceptability of an alternative. The technique may be termed as incremental costing when the difference is increase in costs and decremental costing when the difference is decrease in costs. The main points of distinction between marginal costing and differential costing are as below:

(a) The technique of marginal costing requires a clear distinction between variable costs and fixed costs whereas no such distinction is made in the case of differential costing.

(b) In marginal costing, margin of contribution and contribution ratio are the main yard sticks for performance evaluation and for decision making whereas under differential costs analysis, differential costs are compared with the incremental or decremental revenue (as the case may be) for arriving at a decision.

(c) Differential cost analysis is possible in both absorption costing and marginal costing, where as marginal costing in itself is a distinct technique.

(d) Marginal cost may be incorporated in the cost accounting system whereas differential costs are worked out separately.

Question-13

Answer any the following:

(i) Explicit and Implicit Costs

(ii) Period Costs and Discretionary Costs

Solution:

(i) Explicit and Implicit cost:

Explicit costs, which are also known as out of pocket costs, refer to costs involving immediate payment of cash. Salaries, wages, interest on loan etc. are examples of explicit costs. They can be easily measured.

The main points of difference between explicit and implicit costs are:

– Implicit costs do not involve immediate cash payment.

– They are not recorded in the books of account.

– They are also known as economic costs.

(ii) Period and Discretionary costs

There are the costs, which are not assigned to the products but are charged as expenses against the revenue of the period in which they are incurred. All non-manufacturing costs such as general and administrative expenses, selling and distribution expenses are period costs.

Discretionary costs are not tied to a clear cause and effect relationship between inputs and outputs. They arise from periodic decisions regarding the maximum outlay to be incurred. Examples are – advertising, public relations, training etc.

Question-14

Explain Profit centres and investment centres.

Solution:

Profit Centres and Investment Centres:

Profit Centres are the part of a business which is accountable for both cost and revenue. These are responsible for generating and maximizing profits. Performance of these centres is measured with the volume of profit it earns.

Investment Centres are the profit centres with additional responsibility for capital investment and possibly for financing. These centres are concerned with earning an adequate return on investment as performance is measured by its returns on investment.

Question-15

Briefly discuss how the synergetic effect helps in reduction in costs.

Solution:

Where two or more products which are following the same production pattern, consumes same materials and same set of labour skills are produced and managed together. This manufacturing synchronisation gives better efficiency in usage, production and handling of these products. Due to this synergetic effect idle time is reduced, effort is saved and in turn associated costs can also be saved.

Question-16

Discuss briefly the relevant costs with examples.

Solution:

Relevant costs may be understood as expected future costs which are essential but differ for alternative course or action. Relevant costs are affected by the decision being taken by the management. A cost is relevant when it satisfies two conditions i.e. it should occur in future and it should differ among the alternative courses of action. For example, while considering a proposal for plant replacement by discarding the existing plant, the original cost and the present depreciated book value of the old plant are irrelevant as they have no impact on the decision for replacement just going to be taken place. However the expected sales value of the discarded plant is relevant, as it just goes to reduce the amount of investment to be made in the new plant and so it has an influence on the decision. Moreover, outcome of the investment is also taken into consideration for decision making.

Question-17

State the method of costing and the suggestive unit of cost for the following industries

(a) Transport

(b) Power

(c) Hotel

(d) Hospital

(e) Steel

(f) Coal

(g) Bicycles

(h) Bridge Construction

(i) Interior Decoration

(j) Advertising

(k) Furniture

(l) Brick-works

(m) Oil refining mill

(n) Sugar company having its own sugarcane fields

(o) Toy making

(p) Cement

(q) Radio assembling

(r) Ship building

Solution:

	Industry	Method of Costing	Suggestive Unit of Cost
(a)	Transport	Operating Costing	Passenger k.m. or tonne k.m.
(b)	Power	Operating Costing	Kilo-watt (kw) hours
(c)	Hotel	Operating Costing	Room day
(d)	Hospital	Operating Costing	Patient-day
(e)	Steel	Process Costing/ Single Costing	Tonne
(f)	Coal	Single Costing	Tonne
(g)	Bicycles	Multiple Costing	Number
(h)	Bridge Construction	Contract Costing	Project/ Unit

(i)	Interior Decoration	Job Costing	Assignment
(j)	Advertising	Job Costing	Assignment
(k)	Furniture	Job Costing	Number
(l)	Brick Works	Single Costing	1000 units/ units
(m)	Oil refining mill	Process Costing	Barrel/ Tonne/ Litre
(n)	Sugar company having its own sugarcane field	Process Costing	Tonne
(o)	Toy Making	Batch Costing	Units
(p)	Cement	Single Costing	Tonne/ per bag
(q)	Radio assembling	Multiple Costing	Units
(r)	Ship Building	Contract Costing	Project/ Unit

Question-18

State the types of cost in the following cases:

(i) Interest paid on own capital not involving any cash outflow.

(ii) Withdrawing money from bank deposit for the purpose of purchasing new machine for expansion purpose.

(iii) Rent paid for the factory building which is temporarily closed

(iv) Cost associated with the acquisition and conversion of material into finished product.

Solution:

Type of costs

(i) Imputed Cost

(ii) Opportunity Cost

(iii) Shut Down Cost

(iv) Product Cost

Question-19

Distinguish between product cost and period cost.

Solution:

Product Cost vis-à-vis Period cost

Product costs are those costs that are identified with the goods purchased or produced for resale. In a manufacturing organisation they are attached to the product and that are included in the inventory valuation for finished goods, or for incompleted goods. Product cost is also known as inventoriable cost. Under absorption costing method it includes direct material, direct labour, direct expenses, directly attributable costs (variable and non variable) and other production (manufacturing) overheads. Under marginal costing method Product Costs includes all variable production costs and the all fixed costs are deducted from the contribution.

Periods costs are the costs, which are not assigned to the products but are charged as expense against revenue of the period in which they are incurred. General Administration, marketing, sales and distributor overheads are recognized as period costs.

Question-20

Define the following:

(a) Imputed cost

(b) Capitalised cost

Solution:

(a) *Imputed Cost:* These costs are notional costs which do not involve any cash outlay. Interest on capital, the payment for which is not actually made, is an example of Imputed Cost. These costs are similar to opportunity costs.

(b) *Captialised Cost*: These are costs which are initially recorded as assets and subsequently treated as expenses.

Question-21

What is Cost accounting? Enumerate its important objectives.

Solution:

Cost Accounting is defined as "the process of accounting for cost which begins with the recording of income and expenditure or the bases on which they are calculated and ends with the preparation of periodical statements and reports for ascertaining and controlling costs."

The main objectives of the cost accounting are as follows:

(a) *Ascertainment of cost*: There are two methods of ascertaining costs, viz., Post Costing and Continuous Costing. Post Costing means, analysis of actual information as recorded in financial books. Continuous Costing, aims at collecting information about cost as and when the activity takes place so that as soon as a job is completed the cost of completion would be known.

(b) *Determination of selling price*: Business enterprises run on a profit making basis. It is thus necessary that the revenue should be greater than the costs incurred. Cost accounting provides the information regarding the cost to make and sell the product or services produced.

(c) *Cost control and cost reduction*: To exercise cost control, the following steps should be observed:

 (i) Determine clearly the objective.

(ii) Measure the actual performance.

(iii) Investigate into the causes of failure to perform according to plan;

(iv) Institute corrective action.

(d) *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."

(e) *Ascertaining the profit of each activity*: The profit of any activity can be ascertained by matching cost with the revenue of that activity. The purpose under this step is to determine costing profit or loss of any activity on an objective basis.

(f) *Assisting management in decision making*: Decision making is defined as a process of selecting a course of action out of two or more alternative courses. For making a choice between different courses of action, it is necessary to make a comparison of the outcomes, which may be arrived under different alternatives.

Question-22

Cost of a product or service is required to be expressed in suitable cost unit. State the cost units for the following industries:

(i) Steel

(ii) Automobile

(iii) Transport

(iv) Power

Solution:

Industry	Cost Unit
(i) Steel	Tonne
(ii) Automobile	Numbers
(iii) Transport	Passenger Kilo-meter/ Tonne Kilo-meter
(iv) Power	Kilo-watt hour (Kwh)

Question-23

Distinguish between cost control and cost reduction.

Solution:

Difference between Cost Control and Cost Reduction

Cost Control	Cost Reduction
1. Cost control aims at maintaining the costs in accordance with the established standards.	1. Cost reduction is concerned with reducing costs. It challenges all standards and endeavours to better them continuously
2. Cost control seeks to attain lowest possible cost under existing conditions.	2. Cost reduction recognises no condition as permanent, since a change will result in lower cost.
3. In case of Cost Control, emphasis is on past and present	3. In case of cost reduction it is on present and future.
4. Cost Control is a preventive function	4. Cost reduction is a corrective function. It operates even when an efficient cost control system exists.
5. Cost control ends when targets are achieved	5. Cost reduction has no visible end.

Question-24

Explain the following:

(i) Explicit costs (ii) Engineered costs

Solution:

(i) **Explicit Costs -** These costs are also known as out of pocket costs and refer to costs involving immediate payment of cash. Salaries, wages, postage and telegram, printing and stationery, interest on loan etc. are some examples of explicit costs involving immediate cash payment.

(ii) **Engineered Costs -** These are costs that result specifically from a clear cause and effect relationship between inputs and outputs. The relationship is usually personally observable. Examples of inputs are direct material costs, direct labour costs etc.

Question-25

Identify the methods of costing for the following:

(i) Where all costs are directly charged to a specific job.

(ii) Where all costs are directly charged to a group of products.

(iii) Where cost is ascertained for a single product.

(iv) Where the nature of the product is complex and method cannot be ascertained.

Solution:

Sl. No.	Method of Costing
(i)	Job Costing
(ii)	Batch Costing
(iii)	Unit Costing or Single or Output Costing
(iv)	Multiple Costing

Question-26

What is a Cost Driver? Give one example of cost drivers for each of the following business functions:

(i) Procurement

(ii) Research and Development

(iii) Customer service

Solution:

A cost driver is a factor or variable which effect the level of cost. In other words, it is an activity which is responsible for cost incurrence. In the context of Activity Based Costing (ABC) a cost driver denotes the factor which links activity resource consumption to the product output.

Examples of cost drivers in the business functions in the value chain are:

(i) Procurement: Number of Purchase Order, Number of Suppliers, Number of items procured and volume of purchases (in quantitative terms)

(ii) Research and development : Number of research projects, personnel hours on a project, technical complexities of the projects.

(iii) Customer service: Number of service calls, number of products serviced, hours spent in servicing of products.

2 Material

Basic Concepts

Materials	The general meaning of material is all commodities/ physical objects supplied to an organisation to be used in producing or manufacturing of finished or intermediate goods.
Bill of Material	It is a materials specification list or simply materials list. It is a schedule of standard quantities of materials required for any job or other unit of production. The materials specification list is prepared by the Engineering or Planning Department in a standard form.
Material Requisition Note	It is also known as material requisition slip; It is the voucher of the authority regarding issue of materials for use in the factory or in any of its departments. Generally it is prepared by the production department and materials are withdrawn on the basis of material requisition list or bill of materials.
Purchase Requisition	A purchase requisition is a form used for making a formal request to the purchasing department to purchase materials. This form is usually filled up by the store keeper for regular materials and by the departmental head for special materials (not stocked as regular items).
Purchase Order	It is a written request to the supplier to supply certain specified materials at specified rates and within a specified period.
Tender	This is a formal notification inviting interested vendors to submit their bid/ quotation for the specified material or service. This is a process to govern the opening, evaluation and selection of the vendors for the required material under specified terms and conditions, so that fairness of the selection can be ensured.
Request for Proposal (RFP)	Like tender this is also a selection process among the eligible vendors. This is a process of gathering information about the rate, quantity, technology, services and support etc., from the selected

	vendors who may be interested in supplying required material/ service under specified terms and conditions.
Quotation	This is a formal statement of promise made by an interested vendor in response to a tender notification to supply the goods or services required by a buyer at specified description and terms & conditions.
Good Received Note	This is a confirmation note prepared by the department who receives the goods or entitled to receive the goods (usually stores department), stating the quantity and description of goods received by it.
Material Returned Note	This is a note prepared by the department who receives the goods or entitled to receive the goods (usually stores department), stating the quantity and description of goods which are returned by it.
Bin Cards	Bin refers to a box/ container/ space where materials are kept. Card is placed with each of the bin (space) to record the details of material like receipt, issue and return.
Stock Control Card	It is a record keeping document maintained by stores department for every item of material. Recording includes receipt, issue, return, in hand and order given.
Stores Ledger	Stores Ledger is a collection of cards or loose leaves specially ruled for maintaining a record of both quantity and cost of stores received, issued and those in stock. It being a subsidiary ledger to the main cost ledger, it is maintained by the Cost Accounting Department.
Economic Oder Quantity (E.O.Q)	The size of the order for which both ordering and carrying cost are at minimum is known as economic order quantity or E.O.Q. E.O.Q is used in an optimizing stock control system
Ordering Costs	The costs which are associated with the purchasing or ordering of material. It includes costs of tender invitation, preparation of purchase orders and other expenses which are incurred for this purpose.
Carrying Costs	The costs for holding the inventories. It includes the cost of capital invested in inventories, cost of storage, insurance cost etc.
Re-order Stock Level	This level lies between minimum and the maximum levels in such a way that before the material ordered is received into the stores, there is sufficient quantity on hand to cover both normal and

	abnormal consumption situations. In other words, it is the level at which fresh order should be placed for replenishment of stock.
Minimum Stock Level	It indicates the lowest figure of inventory balance, which must be maintained in hand at all times, so that there is no stoppage of production due to non-availability of inventory.
Maximum Stock Level	It indicates the highest level of inventory which should not be exceeded at any time.
Average Inventory Level	This is the average of both minimum stock level and maximum stock level held by an organization.
Lead Time	This is the time interval between ordering and receipt of goods or the time interval between starting of production and its completion.
Lead Time Consumption	Materials consumed during the lead time are called lead time consumption.
Danger Stock Level	The stock level which is generally fixed below the minimum stock level. When the stock reaches this point immediate action is required to obtain fresh materials. At this level normal issues of the raw material inventory are stopped and emergency issues are only made.
Buffer Stock*	Stock of materials maintained to avoid any contingent interruption in supply of materials to the user department.
Safety Stock*	Stock of materials that are carried in excess of the expected lead time consumption of materials. It is kept as cushion against the unexpected demand for the material. ** Safety stock and Buffer stock are some time used interchangeably*
Stock-out	This is a situation where requirement for the material exceeds its availability of stock.
ABC Analysis	It is a system of inventory control. It exercises discriminating control over different items of stores classified on the basis of the investment involved. Items are classified into the following categories: A Category : Quantity less than 10 % but value more than 70% B Category : Quantity less than 20 % but value about 20 % C Category : Quantity about 70 % but value less than 10%

Two Bin System	Under this system each bin is divided into two parts - one, smaller part, should stock the quantity equal to the minimum stock or even the re-ordering level, and the other to keep the remaining quantity. Issues are made out of the larger part; but as soon as it becomes necessary to use quantity out of the smaller part of the bin, fresh order is placed.
System of Budget	The exact quantity of various types of inventories and the time when they would be required can be known by studying carefully production plans and production schedules. Based on this, inventories requirement budget can be prepared. Such a budget will discourage the unnecessary investment in inventories.
Perpetual Inventory Records	Perpetual inventory represents a system of records maintained by the stores department. It in fact comprises: (i) Bin Cards, and (ii) Stores Ledger.
Continuous Stock Verification	Continuous stock taking means the physical checking of those records (which are maintained under perpetual inventory) with actual stock.
Slow and Non-moving Inventories	The item of material inventory which are no more required by the production or other user department is called non-moving inventories. The inventory which is not required frequently or has fewer requirements is called slow moving inventories.
Input Output Ratio	Inventory control can also be exercised by the use of input output ratio analysis. Input-output ratio is the ratio of the quantity of input of material to production and the standard material content of the actual output.
Inventory Turnover Ratio	Computation of inventory turnover ratios for different items of material and comparison of the turnover rates provides a useful guidance for measuring inventory performance. High inventory turnover ratio indicates that the material in the question is a fast moving one. A low turnover ratio indicates over-investment and locking up of the working capital in inventories
First-in-First-out (FIFO) Method	The materials received first are to be issued first when material requisition is received. Materials left as closing stock will be at the price of latest purchases.
Last-in-Last-out (LIFO) Method	The materials purchased last are to be issued first when material requisition is received. Closing stock is valued at the oldest stock price.

Simple Average Price Method	Under this method, materials issued are valued at average price, which is calculated by dividing the total of all units rate by the number of unit rate. Material Issue Price = $\frac{\text{Total of unit price of each purchase}}{\text{Total numbers of purchases}}$
Weighted Average Price Method	This method gives due weights to quantities purchased and the purchase price, while, determining the issue price. The average issue price here is calculated by dividing the total cost of materials in the stock by total quantity of materials prior to each issue. Material Issue Price = $\frac{\text{Total Cost of materials in stock}}{\text{Total quantity of materials}}$
Standard Price Method	Under this method, materials are priced at some predetermined rate or standard price irrespective of the actual purchase cost of the materials.
Replacement Price Method	Under this method, materials issued are valued at the replacement cost of the items. This method pre-supposes the determination of the replacement cost of materials at the time of each issue; viz., the cost at which identical materials could be currently purchased.
Waste	The portion of basic raw materials lost in processing having no recoverable value. Waste may be visible remnants of basic raw materials or invisible.
Scrap	It has been defined as the incidental residue from certain types of manufacture, usually of small amount and of low value, recoverable without further processing.
Spoilage	It is the term used for materials which are badly damaged in manufacturing operations, and they cannot be rectified economically and hence taken out of process to be disposed off in some manner without further processing
Defectives	It signifies those units or portions of production which can be rectified and turned out as good units by the application of additional material, labour or other service.

Basic Formulae

Maximum Stock Level	Re-order level + Re-order quantity – (Minimum consumption × Minimum re-order period)

Minimum Stock Level	Re-order level – (Average lead time × Average consumption)
Average Stock Level	$\frac{\text{Maximum Stock Level} + \text{Minimum Stock Level}}{2}$ Or Minimum Stock Level + ½ Re-order Quantity
Re-order Level	Maximum Re-order period × Maximum consumption Or (Normal Usage × Average Delivery Time) + Minimum Stock Level Or Safety Stock + Lead Time Consumption
Danger Level	Minimum Consumption × Emergency Delivery Time
Economic Order Quantity (E.O.Q)	$= \sqrt{\frac{2 \times \text{Annual Consumption} \times \text{Cost of placing an order}}{\text{Cost of carrying per unit per annum}}}$
Inventory Turnover Ratio	$= \frac{\text{Material Consumed}}{\text{Average Inventory}}$
Inventory Turnover Period	365 ÷ Inventory Turnover Ratio
Safety Stock	$\frac{\text{Annual Demand}}{365} \times$ (Maximum lead time – Average lead time)
Total Inventory Cost	Ordering Cost + Carrying Cost + Purchase Cost Ordering Cost = $\frac{\text{Annual consumption} \times \text{Cost of placing an order}}{\text{Quantity Ordered}}$ Carrying Cost = $\frac{\text{Quantity ordered}}{2}$ × Price per unit × Carrying Cost expressed as % of average inventory *Note: For calculation of total inventory carrying cost, average inventory should be taken as half of EOQ. Average inventory cost is normally given as a percentage of cost per unit.* *Note: To decide whether discount on purchase of material should be availed or not, compare total inventory cost before discount and after discount. Total inventory cost will include ordering cost, carrying cost and purchase cost.*

SECTION-A

Question-1

How normal and abnormal loss of material arising during storage treated in Cost Accounts?

Solution:

Treatment of normal and abnormal loss of material arising during storage in Cost Accounts.

The difference between the book balance and actual physical stock, which may either be gain or loss, should be transferred to Inventory Adjustment Account pending scrutiny to ascertain the reason for the difference.

If on scrutiny, the difference arrived at is considered as normal, then such a difference should be transferred to overhead control account and if abnormal, it should be debited to costing profit and loss account.

In the case of normal losses, an alternative method may be used. Under this method the price of the material issued to production may be inflated so as to cover the normal loss.

Question-2

Distinguish clearly Bin cards and Stores Ledger.

Solution:

Both bin cards and stores ledger are perpetual inventory records. None of them is a substitute for the other. These two records may be distinguished from the following points of view:

(i) Bin cards are maintained by the store keeper, while the stores ledger is maintained by the cost accounting department.

(ii) Bin card is the stores recording document whereas the stores ledger is an accounting record.

(iii) Bin card contains information with regard to quantities i.e. their receipt, issue and balance while the stores ledger contains both quantitative and value information in respect of their receipts, issue and balance.

(iv) In the bin card entries are made at the time when transaction takes place. But in the stores ledger entries are made only after the transaction has taken place.

(v) Inter departmental transfer of materials appear only in stores ledger.

(vi) Bin cards record each transaction but stores ledger records the same information in a summarized form.

Question-3

Discuss the accounting treatment of defectives in Cost Accounts.

Solution:

Accounting treatment of defectives in cost accounts:

Defectives refer to those units or portions of production, which do not meet the prescribed specifications. Such units can be reworked or re-conditioned by the use of additional material, labour and /or processing and brought to the point of either standard or sub-standard units.

The possible way of treating defectives in Cost Accounts are as below:

1. When defectives are normal and it is not beneficial to identity them job-wise, then the following methods may be used.
   (a) Charged to good products: The cost of rectification of normal defectives is charged to good units. This method is used when defectives rectified are normal.
   (b) Charged to general overheads. If the department responsible for defectives cannot be identified, the rework costs are charged to general overheads.
   (c) Charged to departmental overheads: If the department responsible for defectives can be correctly identified, the rectification costs should be charged to that department.
2. When normal defectives are easily identifiable with specific job the rework costs are debited to the identified job.
3. When defectives are abnormal and are due to causes within the control of the organization, the rework cost should be charged to the Costing Profit and Loss Account.

Question-4

Explain the concept of "ABC Analysis" as a technique of inventory control.

Solution:

ABC Analysis: It is a system of selective inventory control whereby the measure of control over an item of inventory varies with its usage value. It exercises discriminatory control over different items of stores grouped on the basis of the investment involved. Usually the items of material are grouped into three categories viz; A, B and C according to their use value during a period. In other words, the high use value items are controlled more closely than the items of low use value.

(i) 'A' Category of items consists of only a small percentage i.e., about 10 % of the total items of material handled by the stores but require heavy investment i.e., about 70% of inventory value, because of their high prices and heavy requirement.

(ii) 'B' Category of items comprises of about 20% of the total items of material handled by stores. The percentage of investment required is about 20% of the total investment in inventories.

(iii) 'C category of items does not require much investment. It may be about 10% of total inventory value but they are nearly 70% of the total items handled by stores.

'A' category of items can be controlled effectively by using a regular system, which ensures neither over- stocking nor shortage of materials for production. Such a system plans its total material requirements by making budgets. The stocks of materials are controlled by fixing certain levels like maximum level, minimum level and re-order level. A reduction in inventory management costs is achieved by determining economic order quantities after taking into account ordering cost and carrying cost. To avoid shortages and to minimize heavy investment of funds in inventories, the techniques of value analysis, variety reduction, standardization etc. are used along with aforesaid techniques.

In the case of 'B' category of items, as the sum involved is moderate, therefore, the same degree of control as applied in 'A' category of items is not warranted. The order for the items, belonging to this category may be placed after reviewing their situation periodically. This category of items can be controlled by routine control measures.

For 'C' category of items, there is no need of exercising constant control. Orders for items in this group may be placed either after six months or once in a year, after ascertaining consumption requirements.

Question-5

Distinguish between Re-order level and Re-order quantity

Solution:

Re-order level & Re-order quantity: Re-order level is defined as that *level of an inventory* item where a fresh order for its replenishment is placed. Mathematically it can be determined by using the following formulae:

Re-order level (ROL) = [Maximum consumption × Maximum re-order period]

Alternatively: $= \text{Minimum level} + \left(\begin{array}{c}\text{Average rate of}\\ \text{consumption}\end{array} \times \begin{array}{c}\text{Average}\\ \text{re-order period}\end{array}\right)$

Re-order quantity (ROQ) is defined as that *quantity of an inventory* item for which order is placed again and again. Economic order quantity is a re-order quantity but not vice-a-versa. It can be determined by using the following mathematical expression:

$$\text{EOQ} = \text{ROQ} = \sqrt{\frac{2 \times \text{Annual requirement of inventory item in units} \times \text{Cost of placing an order}}{\text{Annual carrying cost per unit per annum}}}$$

Thus, Re-order level is the level of stock which indicates the order for the further materials and on the other hand ROQ is the quantity of material that should be ordered.

Question-6

How is slow moving and non-moving item of stores detected and what steps are necessary to reduce such stocks?

Solution:

Detection of slow moving and non-moving item of stores:

The existence of slow moving and non-moving item of stores can be detected in the following ways.

(i) By preparing and *perusing periodic reports* showing the status of different items or stores.

(ii) By calculating the *inventory turnover period* of various items in terms of number of days/ months of consumption.

(iii) By computing *inventory turnover ratio* periodically, relating to the issues as a percentage of average stock held.

(iv) By implementing the use of a well designed information system.

Necessary steps to reduce stock of slow moving and non-moving item of stores:

(i) Proper procedure and guidelines should be laid down for the disposal of non-moving items, before they further deteriorates in value.

(ii) Diversify production to use up such materials.

(iii) Use these materials as substitute, in place of other materials.

Question-7

Explain the advantages that would accrue in using the LIFO method of pricing for the valuation of raw material stock.

Solution:

LIFO- Last-in-first-out: A method of pricing for the valuation of raw material stock. It is based on the assumption that the items of the last batch (lot) purchased are the first to be issued. Therefore, under this method, the price of the last batch (lot) of raw material is used for pricing raw material issues until it is exhausted. If, however, the quantity of raw material issued is more than the quantity of the latest lot, the price of immediately preceding lot and so on will be taken for pricing the raw material issues.

The advantages that would accrue from the use of LIFO method of pricing the valuation of raw materials are as follows:

(i) The cost of materials used is nearer to the current market price. Thus the cost of goods produced depends upon the trend of the market price of materials. This enables the matching of cost of production with current sales revenues.

(ii) Use of LIFO during the period of rising prices does not depict unnecessarily high profit in the income statement; compared to the first-in-first-out (FIFO) or average price methods. The profit shown by the use of LIFO is relatively lower, because the cost of production takes into account the rising trend of material prices.

(iii) When price of materials fall, the use of LIFO method accounts for rising the profits due to lower material cost. In spite of this finished product appears to be more competitive and at market prices.

(iv) Over a period, the use of LIFO will iron out the fluctuations in profit.

(v) During inflationary period, the use of LIFO will show the correct profit and thus avoid paying unduly high taxes to some extent.

Question-8

Discuss briefly the considerations governing the fixation of the maximum and minimum levels of inventory.

Solution:

(a) Considerations for the fixation of maximum level of inventory.

Maximum level of an inventory item is its maximum quantity held in stock at any time. The mathematical formula used for its determination is as follows:

Maximum level = Re-order level – (Min. Consumption × Min. Re-order period) + Re-order quantity

The important considerations which should govern the fixation of maximum level for various inventory items are as follows:

(1) The fixation of maximum level of an inventory item requires information about re-order level. The re-order level itself depends upon its maximum rate of consumption and maximum delivery period. It in fact is the product of maximum consumption of inventory item and its maximum delivery period.

(2) Knowledge about minimum consumption and minimum delivery period for each inventory item should also be known.

(3) The determination of maximum level also requires the figure of re-order quantity or economic order quantity. Economic order quantity means the quantity of inventory to be ordered so that total ordering and storage cost is minimum.

(4) Availability of funds, storage capacity, nature of items and their price also are important for the fixation of maximum level.

(5) In the case of important materials due to their irregular supply, the maximum level should be high.

Considerations for the fixation of minimum level of inventory

Minimum level indicates the lowest figures of inventory balance, which must be maintained in hand at all times, so that there is no stoppage of production due to non-availability of inventory. The formula used for its calculation is as follows:

Minimum level of inventory = Re-order level – (Average consumption × Average delivery time).

The main considerations for the fixation of minimum level of inventory are as follows:

1. Information about maximum consumption and maximum delivery period in respect of each item to determine its re-order level.
2. Average rate of consumption for each inventory item.
3. Average delivery period for each item. The period can be calculated by averaging the maximum and minimum period.

Question-9

What is material handling cost? How will you deal it in cost account?

Solution:

Material handling cost: It refers to the expenses involved in receiving, storing, issuing and handling materials. To deal with this cost in cost accounts there are two prevalent approaches as under:

First approach suggests the inclusion of these costs as part of the cost of materials by establishing a separate material handling rate e.g., at the rate of percentage of the cost of material issued or by using a separate material handling rate which may be established on the basis of weight of materials issued.

Under another approach these costs may be included along with those of manufacturing overhead and be charged over the products on the basis of direct labour or machine hours.

Question-10

At the time of physical stock taking, it was found that actual stock level was different from the clerical or computer records. What can be possible reasons for such differences? How will you deal with such differences?

Solution:

Possible reasons for differences arising at the time of physical stock taking may be as follows when it was found that actual stock level was different from that of the clerical or computer records:

(i) Wrong entry might have been made in stores ledger account or bin card,

(ii) The items of materials might have been placed in the wrong physical location in the store,

(iii) Arithmetical errors might have been made while calculating the stores balances on the bin cards or store-ledger when a manual system is operated,

(iv) Misappropriation of stock.

When a discrepancy is found at the time of stock taking, the individual stores ledger account and the bin card must be adjusted so that they are in agreement with the actual stock. For example, if the actual stock is less than the clerical or computer record the quantity and value of the appropriate store ledger account and bin card (quantity only) must be reduced and the difference in cost be charged to factory overhead account for stores losses.

Question-11

Write short notes on any three of the following:

(i) Re-order quantity

(ii) Re-order level

(iii) Maximum stock level

(iv) Minimum stock level

Solution:

(i) *Re-order quantity:* It refers to the quantity of stock for which an order is to be placed at any one point of time. It should be such that it minimises the combined annual costs of placing an order and holding stock. Such an ordering quantity in other words is known as economic order quantity (EOQ).

$$EOQ = \sqrt{\frac{2AO}{C \times i}}$$

A = Annual raw material usage quantity

O = Ordering cost per order

C = Cost per unit

i = Carrying cost percentage per unit per annum

(ii) *Re-order level:* It is the level at which fresh order should be placed for the replenishment of stock.

= Maximum re-order period × Maximum usage

$$= \text{Minimum level} + \left[\begin{array}{ccc}\text{Average} & \times & \text{Average time to} \\ \text{consumption} & & \text{obtain fresh supplies}\end{array}\right]$$

(iii) *Maximum stock level:* It indicates the maximum figure of stock held at any time.

$$= \begin{array}{c}\text{Re – order} \\ \text{Level}\end{array} + \begin{array}{c}\text{Re – order –} \\ \text{quantity}\end{array} \left[\begin{array}{ccc}\text{Minimum} & \times & \text{Minimum} \\ \text{consumption} & & \text{re – order} \\ & & \text{period}\end{array}\right]$$

(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.

$$= \begin{array}{c}\text{Re – order} \\ \text{level}\end{array} - \left[\begin{array}{ccc}\text{Average rate of} & \times & \text{Average time of} \\ \text{consumption} & & \text{stock delivery}\end{array}\right]$$

Question-12

Discuss the accounting treatment of spoilage and defectives in Cost Accounting.

Solution:

Accounting treatment of spoilage and defectives in Cost Accounting: Normal spoilage cost (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 overhead so that it is spread over all products. Any value realized from the sale of spoilage is credited to production order or production overhead account, as the case may be.

The cost of abnormal spoilage (i.e. spoilage arising out of causes not inherent in manufacturing process) is charged to the Costing Profit and Loss Account. When spoiled work is due to rigid specifications, the cost of spoiled 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 identified as normal can be recovered by using the following methods:

- Charged to good products
- Charged to general overheads

- Charged to department overheads
- Charged to identifiable job.

(ii) If defectives are abnormal and are due to causes beyond the control of organisation, the rework, cost should be charged to Costing Profit and Loss Account.

Question 13

Write short note on perpetual inventory control.

Solution:

Perpetual Inventory: It represents a system of records maintained by the stores in department. It in fact comprises of:

(i) Bin Cards, and

(ii) Stores Ledger

Bin Card maintains a quantitative record of receipts, issues and closing balances of each item of stores. Separate bin cards are maintained for each item. Each card is filled up with the physical movement of goods i.e. on its receipt and issue.

Like bin cards, the Stores Ledger is maintained to record all receipt and issue transactions in respect of materials. It is filled up with the help of goods received note and material requisitions.

A perpetual inventory is usually checked by a programme of continuous stock taking. Continuous stock taking means the physical checking of those records (which are maintained under perpetual inventory) with actual stock. Perpetual inventory is essentially necessary for material control. It incidentally helps continuous stock taking.

The success of perpetual inventory depends upon the following:

(a) The Stores Ledger-(showing quantities and amount of each item).

(b) Stock Control Cards (or Bin Cards).

(c) Reconciling the quantity balances shown by (a) & (b) above.

(d) Checking the physical balances of a number of items every day systematically and by rotation.

(e) Explaining promptly the causes of discrepancies, if any, between physical balances and book figures.

(f) Making corrective entries were called for after step (e) and

(g) Removing the causes of the discrepancies referred to step (e).

The main advantages of perpetual inventory are as follows :

(1) Physical stocks can be counted and book balances adjusted as and when desired without waiting for the entire stock-taking to be done.

(2) Quick compilation of Profit and Loss Accounts (for interim period) due to prompt availability of stock figures.

(3) Discrepancies are easily located and thus corrective action can be promptly taken to avoid their recurrence.

(4) A systematic review of the perpetual inventory reveals the existence of surplus, dormant, obsolete and slow-moving materials, so that remedial measures may be taken in time.

(5) Fixation of the various levels and check of actual balances in hand with these levels assist the Storekeeper in maintaining stocks within limits and in initiating purchase requisitions for correct quantity at the proper time.

Question-14

Explain Bin Cards and Stock Control Cards.

Solution:

Bin Cards and Stock control cards:

Bin Cards are quantitative records of the stores receipt, issue and balance. It is kept for each and every item of stores by the store keeper. Here, the balance is taken out after each receipt or issue transaction

Stock Control Cards are also similar to Bin Cards. Stock control cards contain further information as regards stock on order. These cards are kept in cabinets or trays or loose binders.

Question 15

Explain why the Last in First out (LIFO) has an edge over First in First out (FIFO) or any other method of pricing material issues.

Solution:

LIFO has following advantages:

(a) The cost of the material issued will be reflecting the current market price.

(b) The use of the method during the period of rising prices does not reflect undue high profit in the income statement.

(c) In the case of falling price, profit tend to rise due to lower material cost, yet the finished goods appear to be more competitive and are at market price.

(d) During the period of inflation, LIFO will tend to show the correct profit.

Question 16

Differentiate between “scrap” and ”defectives” and how they are treated in cost accounting.

Solution:

Scrap: Scrap is incidental residence from certain type of manufacture, usually of small amount and low value, recoverable without further processing.

The cost of scrap is borne by good units and income from scrap is treated as other income.

Defectives: Defectives are portion of production which can be rectified by incurring additional cost. Normal defectives can be avoided by quality control. Normal defectives are charged to good products.

Abnormal defectives are charged to Costing Profit and Loss Account

Question 17

Distinguish between Bill of Materials and Material Requisition Note.

Solution:

Bills of Material	Material Requisition Note
1. It is document or list of materials prepared by the engineering/ drawing department.	1. It is prepared by the foreman of the consuming department.
2. It is a complete schedule of component parts and raw materials required for a particular job or work order.	2. It is a document authorizing Store-Keeper to issue material to the consuming department.
3. It often serves the purpose of a Store Requisition as it shows the complete schedule of materials required for a particular job i.e. it can replace stores requisition.	3. It cannot replace a bill of material.
4. It can be used for the purpose of quotation.	4. It is useful in arriving historical cost only.
5. It helps in keeping a quantitative control on materials draw through Stores Requisition.	5. It shows the material actually drawn from stores.

Question 18

State whether the following statements are true. Give reasons:

(i) Safety stock increases as demand increases.

(ii) In ABC analysis high cost items are most likely to fall in category A, and least cost items are likely to fall in category C.

(iii) To protect against stock outs, a large batch size is a must.

(iv) E.O.Q. is based on a balancing between inventory carrying cost and shortage costs.

(v) Lead time is the time interval elapsing between the placement of a replenishment order and the receipt of last installment of goods against the order.

Solution:

Sl No.	True/ Not True	Reason
(i)	Not true	Safety stock is held for meeting the unpredictable fluctuation in the demand and supply. It varies with the fluctuations in demand and not with level of demand.
(ii)	Not true	The categorization of A, B and C is done on the basis of their annual usage value (Consumption value) and not on their cost X, Y and Z. Analysis is done on the basis of value of inventory stored.
(iii)	True	If the batch size is large, number of orders in a year will be lower. Hence stock moves to lowest point (re-order level) fewer times a year. Hence danger of stock out will be less. Thus to protect against stock out, a large batch size is a must.
(iv)	Not true	E.O.Q. is based on a balancing between ordering cost and carrying cost of inventory. It does not take into account the shortage cost.
(v)	Not true	Lead time is the time interval elapsing between the placement of a replenishment order and the receipt of first instalment of goods against the order.

Question 19

"Perpetual inventory system comprises Bin Card and Stores Ledger, but the efficacy of the system depends on continuous stock taking." Comment.

Solution:

Perpetual Inventory system represents a system of records maintained by the stores department. Records comprise of (i) Bin Cards and (ii) Stores Ledger. Bin Card maintains a quantitative record of receipts, issues and closing balances of each item of stores. Like bin cards, the Stores Ledger is maintained to record all receipt and issue transactions in respect of materials. It is filled up with the help of goods received note and material requisitions. But a perpetual inventory system's efficacy depends on the system of continuous stock taking.

Continuous stock taking means the physical checking of the records i.e. Bin cards and store ledger with actual physical stock. Perpetual inventory is essentially necessary for material control. It incidentally helps continuous stock taking.

The main advantages of continuous stock taking are as follows :

(1) Physical stocks can be counted and book balances adjusted as and when desired without waiting for the entire stock-taking to be done.

(2) Quick compilation of Profit and Loss Accounts (for interim period) due to prompt availability of stock figures.

(3) Discrepancies are easily located and thus corrective action can be promptly taken to avoid their recurrence.

(4) A systematic review of the perpetual inventory reveals the existence of surplus, dormant, obsolete and slow-moving materials, so that remedial measures may be taken in time.

(5) Fixation of the various levels and check of actual balances in hand with these levels assist the Storekeeper in maintaining stocks within limits and in initiating purchase requisitions for correct quantity at the proper time.

Question 20

Steel Heart Pvt. Ltd. Manufactures TMT bars from MS Ingots and MS Billets. After production of TMT bars, sorting is carried out to find any defects or units that do not match with standard specification. The products which do not match with the standard product specification are treated as scrap. You are required to state the treatment of the products which do not match with the product specifications in Cost Accounts.

Solution:

Scrap has been defined as the incidental residue from certain types of manufacture, usually of small amount and low value, recoverable without further processing.

Scrap may be treated in cost accounts in the following ways:-

(i) When the scrap value is negligible: It may be excluded from costs. In other words, the cost of scrap is borne by good units and income from scrap is treated as other income.

(ii) When the scrap value is not identifiable to a particular process or job: The sales value of scrap net of selling and distribution cost, is deducted from overhead to reduce the overhead rate. A variation of this method is to deduct the net realisable value from material cost.

(iii) When scrap is identifiable with a particular job or process and its value is significant: The scrap account should be charged with full cost. The credit is given to the job or process concerned. The profit or loss in the scrap account, on realisation, will be transferred to the Costing Profit and Loss Account.

SECTION-B

Inventory level, EOQ and Evaluation of offers

Question-1

A company uses three raw materials A, B and C for a particular product for which the following data apply :–

Raw Material	*Usage per unit of product (Kg.)*	*Re-order Quantity (Kg.)*	*Price per Kg. (₹)*	*Delivery period (in weeks)*			*Re-order level (Kg.)*	*Minimum level (Kg.)*
				Minimum	*Average*	*Maximum*		
A	*10*	*10,000*	*0.10*	*1*	*2*	*3*	*8,000*	*?*
B	*4*	*5,000*	*0.30*	*3*	*4*	*5*	*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:–

(i) Minimum Stock of A?

(ii) Maximum Stock of B?

(iii) Re-order level of C?

(iv) Average stock level of A?

Solution:

(i) Minimum stock of A

Re-order level – (Average consumption × Average time required to obtain delivery)

= 8,000 kg. – (200 units × 10 kg. × 2 weeks) = 4,000 kg.

(ii) Maximum stock of B

Re-order level – (Min. Consumption × Min. Re-order period) + Re-order quantity

= 4,750 kg. – (175 units × 4 kg. × 3 weeks) + 5,000 kg.

= 9,750 - 2,100 = 7,650 kg.

(iii) Re-order level of C

Maximum re-order period × Maximum Usage

= 4 weeks × (225 units × 6 kg.) = 5,400 kg.

OR

= Minimum stock of C + (Average consumption × Average delivery time)

= 2,000 kg. + [(200 units × 6 kg.) × 3 weeks] = 5,600 kg.

(iv) Average stock level of A

= Minimum stock level of A + $\frac{1}{2}$ Re-order quantity

= 4,000 kg. + $\frac{1}{2}$ 10,000 kg. = 4,000 + 5,000 = 9,000 kg.

OR

$$= \frac{\text{Minimum stock + Maximum stock}}{2} \text{ (Refer to Working Note)}$$

$$= \frac{4{,}000 + 16{,}250}{2} = 10{,}125 \text{ kg.}$$

Working note

Maximum stock of A = ROL + ROQ – (Minimum consumption × Minimum re-order period)

= 8,000 kg. + 10,000 kg. – [(175 units × 10 kg.) × 1 week] = 16,250 kg.

Question-2

A company has the option to procure a particular material from two sources:

Source I assures that defectives will not be more than 2% of supplied quantity.

Source II does not give any assurance, but on the basis of past experience of supplies received from it, it is observed that defective percentage is 2.8%.

The material is supplied in lots of 1,000 units. Source II supplies the lot at a price, which is lower by ₹ 100 as compared to Source I. The defective units of material can be rectified for use at a cost of ₹ 5 per unit.

You are required to find out which of the two sources is more economical.

Solution:

Comparative Statement of procuring material from two sources

	Material source I	**Material source II**
Defective (in %)	2	2.8
	(Future estimate)	(Past experience)
Units supplied (in one lot)	1,000	1,000
Total defective units in a lot	20	28
	(1,000 units × 2%)	(1,000 units ×2.8%)

Additional price paid per lot (₹) (A)	100	–
Rectification cost of defect (₹) (B)	100	140
	(20 units × ₹ 5)	(28 units × ₹ 5)
Total additional cost per lot (₹): [(A) + (B)]	200	140

On comparing the total additional cost incurred per lot of 1,000 units, we observe that it is more economical, if the required material units are procured from material source II.

Question-3

RST Limited has received an offer of quantity discount on its order of materials as under:

Price per ton	*Order Size (in ton)*
₹ 9,600	*Less than 50*
₹ 9,360	*50 and less than 100*
₹ 9,120	*100 and less than 200*
₹ 8,880	*200 and less than 300*
₹ 8,640	*300 and above*

The annual requirement for the material is 500 tons. The ordering cost per order is ₹ 12,500 and the stock holding cost is estimated at 25% of the material cost per annum.

Required

(i) Compute the most economical purchase level.

(ii) Compute EOQ if there are no quantity discounts and the price per ton is ₹ 10,500.

Solution:

(i)

Order size (Q) (Units)	***No. of orders $A \div Q$ (Units)**	**Cost of purchase A × cost per unit**	**Ordering cost $\frac{A}{Q}$ × ₹12500**	**Carrying cost $\frac{Q}{2}$ × C× 25%**	**Total cost (3+4+5)**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
40	12.5	₹48,00,000 (500 × ₹9,600)	₹ 1,56,250	₹ 48,000 $\left(\frac{40}{2}\times ₹9,600\times 0.25\right)$	₹ 50,04,250
50	10	₹46,80,000 (500 × ₹9,360)	₹1,25,000	₹58,500 $\left(\frac{50}{2}\times ₹9,360\times 0.25\right)$	₹48,63,500

100	5	₹45,60,000 (500 × ₹9,120)	₹62,500	₹1,14,000 $\left(\frac{100}{2}\times ₹9,120\times 0.25\right)$	₹47,36,500
200	2.5	₹44,40,000 (500 × ₹8,880)	₹31,250	₹2,22,000 $\left(\frac{200}{2}\times ₹8,880\times 0.25\right)$	₹46,93,250
300	1.67	₹43,20,000 (500 × ₹8,640)	₹20,875	₹3,24,000 $\left(\frac{300}{2}\times ₹8,640\times 0.25\right)$	₹46,64,875

A = Annual requirement

The above table shows that the total cost of 500 units including ordering and carrying cost is minimum (₹ 46,64,875) where the order size is 300 units. Hence the most economical purchase level is 300 units.

*(*Note: Practically number of orders should be rounded off to the nearest whole number)*

(ii) Calculation of Economic Order Quantity (EOQ), when no discount is available.

$$\text{EOQ} = \sqrt{\frac{2AO}{C\times i}} = \sqrt{\frac{2\times 500\,\text{tonne}\times ₹12,500}{₹10,500\times 25\%}} = 69 \text{ tonnes.}$$

Question-4

IPL Limited uses a small casting in one of its finished products. The castings are purchased from a foundry. IPL Limited purchases 54,000 castings per year at a cost of ₹ 800 per casting.

The castings are used evenly throughout the year in the production process on a 360-days-per-year basis. The company estimates that it costs ₹9,000 to place a single purchase order and about ₹300 to carry one casting in inventory for a year. The high carrying costs result from the need to keep the castings in carefully controlled temperature and humidity conditions, and from the high cost of insurance.

Delivery from the foundry generally takes 6 days, but it can take as much as 10 days. The days of delivery time and percentage of their occurrence are shown in the following tabulation:

Delivery time (days)	:	6	7	8	9	10
Percentage of occurrence	:	75	10	5	5	5

Required:

(i) Compute the economic order quantity (EOQ).

(ii) Assume the company is willing to assume a 15% risk of being out of stock. What would be the safety stock? The re-order point?

(iii) Assume the company is willing to assume a 5% risk of being out of stock. What would be the safety stock? The re-order point?

(iv) Assume 5% stock-out risk. What would be the total cost of ordering and carrying inventory for one year?

(v) Refer to the original data. Assume that using process re-engineering the company reduces its cost of placing a purchase order to only ₹ 600. In addition company estimates that when the waste and inefficiency caused by inventories are considered, the true cost of carrying a unit in stock is ₹ 720 per year.

(a) Compute the new EOQ.

(b) How frequently would the company be placing an order, as compared to the old purchasing policy?

Solution:

(i) Computation of economic order quantity (EOQ)

Annual requirement (A)	=	54,000 castings
Cost per casting (C)	=	₹ 800
Ordering cost (O)	=	₹ 9,000 per order
Carrying cost per casting p.a. (C × i)	=	₹ 300

$$EOQ = \sqrt{\frac{2AO}{C \times i}} = \sqrt{\frac{2 \times 54{,}000 \text{ units} \times ₹9{,}000}{₹300}} = 1{,}800 \text{ castings}$$

(ii) Safety stock (Assuming a 15% risk of being out of stock)

From the probability table given in the question, we can see that 85% certainty in delivery time is achieved when delivery period is 7days i.e. at 15% risk level of being out of stock, the maximum delivery period should not exceed 7 days.

$$\text{Safety stock} = \frac{\text{Annual demand}}{360 \text{ days}} \times (\text{Max. lead time} - \text{Avg. lead time})$$

$$= \frac{54{,}000 \text{ units}}{360 \text{ days}} \times (7 \text{ days} - 6 \text{ days})$$

= 150 castings

Re-order point (level) = Safety Stock + Average lead time consumption

= 150 units + (6 days × 150 units) = 1,050 castings.

(iii) Safety stocks *(Assuming a 5% risk of being out of stock)*

From the probability table given in the question, we can see that 95% certainty in delivery time is achieved when delivery period is 9 days i.e. at 5% risk level of being out of stock, the maximum delivery period should not exceed 9 days.

Safety stock = $\frac{\text{Annual demand}}{\text{360 days}} \times (\text{Max. lead time} - \text{Avg. lead time})$

= $\frac{\text{54,000 units}}{\text{360 days}} \times (\text{9 days} - \text{6 days})$ = 450 castings

Re-order point (level) = Safety Stock + Average lead time consumption

= 450 units + (6 days × 150 units) = 1,350 castings.

(iv) At 5% stock-out risk the total cost of ordering and carrying cost is as follows:

Total cost of ordering = $\frac{\text{Annual demand}}{\text{EOQ}} \times \text{Cost per order}$

= $\frac{\text{54,000 units}}{\text{1,800 units}} \times ₹\,9{,}000$ = ₹ 2,70,000

Total cost of carrying = (Safety Stock + ½ EOQ) × Carrying cost per unit p.a.

= (450 units + ½ × 1,800 units) ₹ 300 = ₹ 4,05,000

(v) (a) Computation of new EOQ:

$$\text{EOQ} = \sqrt{\frac{2 \times \text{54,000 units} \times ₹600}{₹720}} = \text{300 castings}$$

(b) Total number of orders to be placed in a year are $\frac{\text{54,000 units}}{\text{300 units}}$ = 180 times

Under new purchasing policy IPL Ltd. has to place order in every 2nd day, however under the old purchasing policy it was every 12th day.

Question-5

A company manufactures 5,000 units of a product per month. The cost of placing an order is ₹ 100. The purchase price of the raw material is ₹ 10 per kg. The re-order period is 4 to 8 weeks. The consumption of raw materials varies from 100 kg to 450 kg per week, the average consumption being 275 kg. The carrying cost of inventory is 20% per annum.

You are required to calculate

(i) Re-order quantity

(ii) Re-order level

(iii) Maximum level

(iv) Minimum level

(v) Average stock level

Solution:

(i)	**Reorder Quantity (ROQ)**	=	1,196 kg. *(Refer to working note)*
(ii)	**Reorder level (ROL)**	=	Maximum usage × Maximum re-order period
		=	450 kg. × 8 weeks = 3,600 kg.
(iii)	**Maximum level**	=	ROL + ROQ – (Min. usage × Min. re-order period)
		=	3,600 kg. + 1,196 kg. – (100 kg.× 4 weeks)
		=	4,396 kg.
(iv)	**Minimum level**	=	ROL – (Normal usage × Normal re-order period)
		=	3,600 kg. – (275 kg. × 6 weeks)
		=	1,950 kg.
(v)	**Average stock level**	=	$\frac{1}{2}$ (Maximum level + Minimum level)
		=	$\frac{1}{2}$(4,396 kg. + 1,950 kg.) = 3,173 kg.

OR

= Minimum level + $\frac{1}{2}$ ROQ

= 1,950 kg. + $\frac{1}{2}$ × 1,196 kg. = 2,548 kg.

Working Note

Annual consumption of raw material (A) =	(275 kg. × 52 weeks)	= 14,300 kg.
Cost of placing an order (O)		= ₹ 100
Carrying cost per kg. Per annum (c × i) =	₹ 10 × 20%	= ₹ 2

Economic order quantity (EOQ) = $\sqrt{\frac{2AO}{C \times i}}$

= $\sqrt{\frac{2 \times 14,300 \text{ kgs.} \times ₹\ 100}{₹ 2}}$ = 1,196 Kg. (Approx)

Question-6

A company manufactures a product from a raw material, which is purchased at ₹60 per kg. The company incurs a handling cost of ₹ 360 plus freight of ₹ 390 per order. The incremental carrying cost of inventory of raw material is ₹ 0.50 per kg. per month. In addition, the cost of working capital finance on the investment in inventory of raw material is ₹ 9 per kg. per annum. The annual production of the product is 1,00,000 units and 2.5 units are obtained from one kg of raw material.

Required

(i) Calculate the economic order quantity of raw materials.

(ii) Advise, how frequently should orders for procurement be placed.

(iii) If the company proposes to rationalize placement of orders on quarterly basis, what percentage of discount in the price of raw materials should be negotiated?

Solution:

Annual requirement of raw material in kg. (A) = $\frac{1,00,000 \text{ units}}{2.5 \text{ units per kg.}} = 40,000 \text{ kg.}$

Ordering Cost (Handling & freight cost) (O) = ₹ 360 + ₹ 390 = ₹ 750

Carrying cost per unit per annum i.e. inventory carrying cost + working capital cost (c × i)

= (₹ 0.5 × 12 months) + ₹ 9

= ₹ 15 per kg.

(i) E.O.Q. = $\sqrt{\frac{2 \times 40,000 \text{ kgs.} \times ₹\ 750}{₹\ 15}}$ = 2,000 kg.

(ii) Frequency of orders for procurement:

Annual consumption (A) = 40,000 kg.

Quantity per order (EOQ) = 2,000 kg.

No. of orders per annum ($\frac{A}{EOQ}$) = $\frac{40,000 \text{ kg.}}{2,000 \text{ kg.}}$ = 20 times

Frequency of placing orders (in months) = $\frac{12 \text{ months}}{20 \text{ orders}}$ = 0.6 months

Or, (in days) = $\frac{365 \text{ days}}{20 \text{ orders}}$ = 18 days (approx)

(iii) Percentage of discount in the price of raw materials to be negotiated:

	Quarterly order	EOQ
Size of the order	10,000 kg.	2,000 kg.

No. of orders	4	20
Cost of placing orders	₹3,000 (4 order × ₹ 750)	₹15,000 (20 orders × ₹ 750)
Inventory carrying cost	₹75,000 (10,000 kg. × ½ × ₹ 15)	₹15,000 (2,000 kg. × ½ × ₹ 15)
Total Cost	₹78,000	₹30,000

When order is placed on quarterly basis the ordering cost and carrying cost increased by ₹ 48,000 (₹78,000 - ₹30,000). This increase in total cost should be compensated by reduction in purchase price per kg. to make quarterly order placement rational.

Reduction per kg. in the purchase price of raw material $= \dfrac{\text{Increase in total cost}}{\text{Annual requirement}}$

$= \dfrac{₹\,48{,}000}{40{,}000\text{ units}} = ₹\ 1.2$ per kg.

Discount in the price of raw material to be negotiated $= \dfrac{₹\,1.20}{₹\,60} = 2\ \%$

Question-7

The quarterly production of a company's product which has a steady market is 20,000 units. Each unit of a product requires 0.5 kg. of raw material. The cost of placing one order for raw material is ₹ 100 and the inventory carrying cost is ₹ 2 per annum. The lead time for procurement of raw material is 36 days and a safety stock of 1,000 kg. of raw materials is maintained by the company. The company has been able to negotiate the following discount structure with the raw material supplier.

Order quantity (kg.)	*Discount (₹)*
Upto 6,000	*NIL*
6,001 – 8,000	*400*
8,001 – 16,000	*2,000*
16,001 – 30,000	*3,200*
30,001 – 45,000	*4,000*

You are required to

(i) Calculate the re-order point taking 30 days in a month.

(ii) Prepare a statement showing the total cost of procurement and storage of raw material after considering the discount of the company elects to place one, two, four or six orders in the year.

(iii) State the number of orders which the company should place to minimize the costs after taking EOQ also into consideration.

Solution:

Working notes

1. Annual production (20,000 units per quarter × 4 quarters) = 80,000 units
2. Raw material required for 80,000 units (80,000 units × 0.5 kg.) = 40,000 kg.
3. EOQ = $\sqrt{\frac{2 \times 40{,}000 \text{ kgs.} \times ₹\,100}{₹\,2}} = 2{,}000$ kgs.
4. Total cost of procurement and storage when the order size is equal to EOQ or 2,000 kg.

No. of orders (40,000 kg. ÷ 2,000 kg.)	= 20 times
Ordering cost (20 orders × ₹100)	= ₹ 2,000
Carrying cost (₹)(½ × 2,000 kg. × ₹ 2)	= ₹ 2,000
Total cost	₹ 4,000

(i) **Re-order point** = Safety stock + Lead time consumption

$= 1{,}000 \text{ kg.} + \frac{40{,}000 \text{ kg.}}{360 \text{ days}} \times 36 \text{ days}$

= 1,000 kg. + 4,000 kg. = 5,000 kg.

(ii) **Statement showing the total cost of procurement and storage of raw materials**

(after considering the discount)

Order size	No. of orders	Total cost of procurement	Average stock	Total cost of storage of raw materials	Discount	Total cost
Kg.		(₹)	Kg.	(₹)	(₹)	(₹)
(1)	(2)	(3)=(2)×₹100	(4)=½×(1)	(5)=(4)×₹2	(6)	(7)=[(3)+(5)– (6)]
40,000	1	100	20,000	40,000	4,000	36,100
20,000	2	200	10,000	20,000	3,200	17,000
10,000	4	400	5,000	10,000	2,000	8,400
6666.66	6	600	3,333	6,666	400	6,866

(iii) Number of orders which the company should place to minimize the costs after taking EOQ also into consideration is 20 orders each of size 2,000 kg. The total cost of procurement and storage in this case comes to ₹ 4,000, which is minimum.

(Refer to working notes 3 and 4)

Question-8

PQR Ltd., manufactures a special product, which requires 'ZED'. The following particulars were collected for the year 2013-14:

(i)	*Monthly demand of Zed*	:	*3,000 units*
(ii)	*Cost of placing an order*	:	*₹ 500*
(iii)	*Re-order period*	:	*5 to 8 weeks*
(iv)	*Cost per unit*	:	*₹ 60*
(v)	*Carrying cost p.a.*	:	*10%*
(vi)	*Normal usage*	:	*500 units per week*
(vii)	*Minimum usage*	:	*250 units per week*
(viii)	*Maximum usage*	:	*750 units per week*

Required:

(i) Re-order quantity.

(ii) Re-order level.

(iii) Minimum stock level.

(iv) Maximum stock level.

(v) Average stock level.

Solution:

(i) $\text{Re - order quantity} = \sqrt{\frac{2AO}{C \times i}}$

$$= \sqrt{\frac{2 \times 3{,}000\,\text{units} \times 12\,\text{months} \times ₹500}{₹60 \times 10\%}}$$

= 2,450 units (Approx)

(ii) Re-order level

= Maximum re-order period × Maximum usage

= 8 weeks × 750 units per week = 6,000 units

(iii) Minimum stock level

= Re-order level – {Normal usage × Normal re-order period}

= 6,000 units – (500 units × 6.5 weeks) = 2,750 units

(iv) Maximum stock level

= Re-order level + Re-order quantity – (Minimum usage × Minimum re-order period)

= 6,000 units + 2,450 units – (250 units × 5 weeks) = 7,200 units

(v) Average stock level

= ½ (Minimum stock level + Maximum stock level)

= ½ (2,750 + 7,200) = 4,975 units

Question 9

A Company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2013:

(i)	*Annual demand of Alpha*	*:*	*8,000 units*
(ii)	*Cost of placing an order*	*:*	*₹200 per order*
(iii)	*Cost per unit of Alpha*	*:*	*₹400*
(iv)	*Carrying cost % p.a.*	*:*	*20%*

The company has been offered a quantity discount of 4% on the purchase of 'Alpha', provided the order size is 4,000 components at a time.

Required:

(i) Compute the economic order quantity.

(ii) Advise whether the quantity discount offer can be accepted.

Solution:

(i) $\text{EOQ} = \sqrt{\frac{2\,\text{AO}}{\text{C} \times \text{i}}}$

$= \sqrt{\frac{2 \times 8{,}000\text{ units} \times ₹200}{₹400 \times 20\%}}$

= 200 units.

Calculation of total inventory cost p.a. at EOQ.

	(₹)
Purchase cost = 8,000 units × ₹400	32,00,000
Ordering cost $\left(\frac{A}{Q} \times O = \frac{8{,}000\text{ units}}{200\text{ units}} \times ₹200\right)$	8,000
Carrying cost $\left(\frac{Q}{2} \times C \times i = \frac{200\text{ units}}{2} \times ₹400 \times 20\%\right)$	8,000
	32,16,000

Calculation of total inventory cost p.a. with quantity discount

	(₹)
Purchase cost = 8,000 units × (₹400 – 4%)	30,72,000
Ordering cost $\left(\frac{A}{Q} \times O = \frac{8{,}000\text{ units}}{4{,}000\text{ units}} \times ₹200\right)$	400
Carrying cost $\left(\frac{Q}{2} \times C \times i = \frac{4{,}000\text{ units}}{2} \times ₹384 \times 20\%\right)$	1,53,600
	32,26,000

(ii) Quantity discount offered should not be accepted as it results in increase in total cost of inventory management by ₹ 10,000.

Question-10

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 ₹ 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 ₹ 40 per pack within a three days lead time. The ordering and related cost is ₹ 8 per order. The storage cost is 10% 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 maintain a safety stock and that the present inventory level is 333 packs with a year of 360 working days.

Solution:

(i) Economic Order Quantity

$$EOQ = \sqrt{\frac{2 \times A \times O}{Ci}} = \sqrt{\frac{2 \times 40{,}000\text{ packs} \times ₹8}{₹40 \times 10\%}} = 400\text{ packs.}$$

(ii) Number of orders per year

$$\frac{\text{Annual requirements}}{\text{E.O.Q}}$$

$$\frac{40{,}000 \text{ packs}}{400 \text{ packs}} = 100 \text{ orders a year}$$

(iii) Ordering and storage costs

	(₹)
Ordering costs :– 100 orders × ₹ 8.00	800
Storage cost :– ½ (400 packs × 10% of ₹40)	800
Total cost of ordering & storage	1,600

(iv) Timing of next order

(a) Day's requirement served by each order.

$$\text{Number of days requirements} = \frac{\text{No. of working days}}{\text{No. of order in a year}} = \frac{360}{100} = 3.6 \text{ days supply}$$

This implies that each order of 400 packs supplies for requirements of 3.6 days only.

(b) Days requirement covered by inventory

$$= \frac{\text{Units in inventory}}{\text{Economic order quantity}} \times \text{(Day's requirement served by an order)}$$

$$\therefore \frac{333 \text{ packs}}{400 \text{ packs}} \times 3.6 \text{ days} = 3 \text{ days requirement}$$

(c) Time interval for placing next order

Inventory left for day's requirement – Lead time of delivery

3 days – 3 days = 0 days

This means that next order for the replenishment of supplies has to be placed immediately.

Question-11

The annual carrying cost of material 'X' is ₹3.6 per unit and its total carrying cost is ₹9,000 per annum. What would be the Economic order quantity for material 'X', if there is no safety stock of material X?

Solution:

Calculation of Economic Order Quantity

$$\text{Average Inventory} = \frac{\text{Total Carrying Cost}}{\text{Carrying Cost per unit}} = \frac{₹\ 9{,}000}{₹\ 3.60} = 2{,}500 \text{ Units}$$

Economic Order Quantity = Average Inventory × 2 = 2,500 units × 2 = 5,000 units.

Question-12

The following information relating to a type of Raw material is available:

Annual demand	*2,000 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.

Solution:

$$\text{EOQ} = \sqrt{\frac{2 \times \text{Annual demand} \times \text{Cost per order}}{\text{Storage cost per unit per annum}}}$$

$$= \sqrt{\frac{2 \times 2{,}000 \text{ units} \times ₹20}{₹\ 20 \times (2+8)\%}} = \sqrt{\frac{80{,}000}{2}} = 200 \text{ Units}$$

Total Annual Inventory Cost

Purchasing cost of 2,000 units @ ₹20 per unit	=	₹ 40,000
Ordering Cost ($\frac{2{,}000 \text{ units}}{200 \text{ units}}$ × ₹ 20)	=	₹ 200
Carrying cost of Inventory ½ (200 units × ₹20 ×10%)	=	₹ 200
		₹ 40,400

Question 13

Re-order quantity of material 'X' is 5,000 kg.; Maximum level 8,000 kg.; Minimum usage 50 kg. per hour; minimum re-order period 4 days; daily working hours in the factory is 8 hours. You are required to calculate the re-order level of material 'X'.

Solution:

Maximum Level = Re-order level + Re-order Quantity- (Min. usage × Min. Re-order Period)

Re-order Level = Maximum Level – [Re-order Quantity – (Min. usage × Min. Re-order Period)

= 8,000 kg. – [5,000 kg. – (400 kg* × 4 days)] = 8,000 kg. – 3,400 kg. = 4,600 kg.

Hence, Re-order level is 4,600 kg.

*Minimum usage per day = 50 kg. × 8 hours = 400 kg.

Question-14

KL Limited produces product 'M' which has a quarterly demand of 8,000 units. The product requires 3 kg. quantity of material 'X' for every finished unit of product. The other information are follows:

Cost of material 'X'	*:*	*₹ 20 per kg.*
Cost of placing an order	*:*	*₹ 1,000 per order*
Carrying Cost	*:*	*15% per annum of average inventory*

You are required:

(i) Calculate the Economic Order Quantity for material 'X'.

(ii) Should the' company accept an offer of 2 percent discount by the supplier, if he wants to supply the annual requirement of material 'X' in 4 equal quarterly installments?

Solution:

Annual demand of material 'X'

= 8,000 units (per quarter) x 4 (No. of Quarter in a year) x 3 kg. (for every finished product)

= 96,000 kg.

(i) Calculation of Economic Order Quantity (EOQ) for material 'X'

$$\text{EOQ} = \sqrt{\frac{2 \text{ x Annual demand x ordering cost}}{\text{Carrying cost per unit per annum}}} = \sqrt{\frac{2 \times 96{,}000 \text{ kg} \times ₹\ 1000}{₹\ 20 \times 15\%}} = 8{,}000 \text{ kg.}$$

(ii) Evaluation of Cost under different options of 'order quantity'.

Particulars	When EOQ is ordered	When discount of 2% is accepted and supply is in 4 equal installments
Order size	8,000 kg.	24,000 kg. $\left(\frac{96{,}000\text{kg.}}{4}\right)$
No. of orders	12 $\left(\frac{96{,}000 \text{ kg.}}{8{,}000 \text{ kg.}}\right)$	4 $\left(\frac{96{,}000 \text{ kg.}}{24{,}000 \text{ kg.}}\right)$
Purchase Cost per kg.	₹ 20	₹ 19.60 {₹ 20 - (₹20 × 2%)}
Total Purchase Cost (A)	₹19,20,000 (96,000 kg. x ₹ 20)	₹18,81,600 (96,000 kg. x ₹19.6)
Ordering Cost (B)	₹12,000	₹ 4,000

	(12 orders x ₹ 1,000)	(4 orders x ₹ 1,000)
Carrying Cost (C)	₹ 12,000 $(\frac{8,000 \text{ kg.}}{2} \times 15\% \times ₹20)$	₹ 35,280 $(\frac{24,000 \text{ kg.}}{2} \times 15\% \text{ x } ₹19.6)$
Total Cost (A+B+C)	₹ 19,44,000	₹19,20,880

Advice – The total Cost is lower if Company accept an offer of 2 percent discount by the supplier, when supply of the annual requirement of material 'X' is made in 4 equal installments.

Question-15

Assume that the following quantity discount schedule for a particular bearing is available to a retail store:

Order size (unit)	*Discount*
0 - 49	*0%*
50 - 99	*5%*
100 - 199	*10%*
200 and above	*12%*

The cost of a single bearing with no discount is ₹ 30. The annual demand is 250 units. Ordering cost is ₹ 20 per order and annual inventory carrying cost is ₹ 4 per unit. Determine the optimal order quantity and the associated minimal total cost of inventory and purchasing costs, if shortages are not allowed.

Solution:

Working Notes

1. EOQ without discount

$$\text{EOQ} = \sqrt{\frac{2AO}{Ci}} = \sqrt{\frac{2 \times 250 \text{units} \times ₹20}{₹4}}$$

$$= \sqrt{2,500} = 50 \text{ units}$$

2. Prices with discount for different order size

   5% Discount = 30 – 5% = ₹ 28.50

   10% Discount = 30 – 10% = ₹ 27.00

   12% Discount = 30 – 12%= ₹ 26.40

Statement of Computing Total cost at various order sizes

Orders size (units)	No. of Orders in a year	Ordering Cost (₹)	Carrying cost of average inventory (₹)	Purchase cost (₹)	Total cost (₹)
(1)	(2)	(3)	(4)	(5)	(3+4+5)= (6)
50	5 $(\frac{250\,units}{50\,units})$	100 (5 orders×₹20)	100 $(\frac{50\,units}{2}\times ₹4)$	7,125 (250 ×₹28.50)	7,325
100	2.5* $(\frac{250\,units}{100\,units})$	50 (2.5 oders×₹20)	200 $(\frac{100\,units}{2}\times ₹4)$	6,750 (250 ×₹27)	7,000
125	2 $(\frac{250\,units}{125\,units})$	40 (2 oders×₹20)	250 $(\frac{125\,units}{2}\times ₹4)$	6,750 (250 ×₹27)	7,040
200	1.25* $(\frac{250\,units}{200\,units})$	25 (1.25 oders×₹20)	400 $(\frac{200\,units}{2}\times ₹4)$	6,600 (250 ×₹26.4)	7,025
250	1 $(\frac{250\,units}{250\,units})$	20 (1oder×₹20)	500 $(\frac{250\,units}{2}\times ₹4)$	6,600 (250 ×₹26.4)	7,120

Optimal order quantity = 100 units

Minimum total cost of inventory and purchasing cost = ₹ 7,000.

Note: Theoretically it may be 2.5 orders, (250÷100), however practically 3 orders are required. Therefore ordering cost would be ₹ 60 (3 × 20) and total cost ₹ 7,010 (60 + 200 + 6750).

(* Theoretically orders may be in fraction but in practicality orders shall be in a whole number.)

Question-16

Primex Limited produces product 'P'. It uses annually 60,000 units of a material 'Rex' costing ₹ 10 per unit. Other relevant information are:

Cost of placing an order	:	*₹ 800 per order*
Carrying cost	:	*15% per annum of average inventory*
Re-order period	:	*10 days*
Safety stock	:	*600 units*

The company operates 300 days in a year.

You are required to calculated:

(i) Economic Order Quantity for material 'Rex'.

(ii) Re-order Level

(ill) Maximum Stock Level

(iv) Average Stock Level

Solution:

(i) Economic Order Quantity (E.O.Q)

$$= \sqrt{\frac{2 \times \text{Annual requirement of 'Rex'} \times \text{Ordering cost per order}}{\text{Annual carrying cost per unit per annum}}}$$

$$= \sqrt{\frac{2 \times 60{,}000 \text{ units} \times ₹\,800}{₹\,10 \times 15\%}} \qquad = \sqrt{\frac{9{,}60{,}00{,}000}{₹\,1.5}}$$

= 8,000 units

(ii) Re-order Level = Safety Stock + (Normal daily Usage × Re-order period)

$= 600 + \left(\frac{60{,}000 \text{ units}}{300 \text{ days}} \times 10 \text{ days}\right)$

= 600 + 2,000

= 2,600 units

(iii) Maximum Stock Level = E.O.Q (Re-order Quantity) + Safety Stock

= 8,000 units + 600 units

= 8,600 units

(iv) Average Stock Level = Minimum Stock level + $\frac{1}{2}$ Re-order Quantity

$= 600^* + \frac{1}{2}$ 8,000 units

= 4,600 units

OR

Average Stock Level $= \frac{\text{Maximum Stock level + Minimum Stock level}}{2}$

$= \frac{8{,}600 \text{ units} + 600 \text{ units}}{2}$

= 4,600 units

* Minimum Stock Level	= Re-order level – (Normal daily usage × Re-order period)
	$= 2,600 - (\frac{60,000 \text{ units}}{300 \text{ days}} \times 10 \text{ days})$
	= 2,600 – 2,000
	= 600 units
	OR
Minimum Stock Level	= Safety Stock level = 600 units

Question-17

Aditya Ltd. produces a product 'Exe' using a raw material Dee. To produce one unit of Exe, 2 kg of Dee is required. As per the sales forecast conducted by the company, it will able to sale 10,000 units of Exe in the coming year. The following is the information regarding the raw material Dee:

(i) The Re-order quantity is 200 kg. less than the Economic Order Quantity (EOQ).

(ii) Maximum consumption per day is 20 kg. more than the average consumption per day.

(iii) There is an opening stock of 1,000 kg.

(iv) Time required to get the raw materials from the suppliers is 4 to 8 days.

(v) The purchase price is ₹125 per kg.

There is an opening stock of 900 units of the finished product Exe.

The rate of interest charged by bank on Cash Credit facility is 13.76%.

To place an order company has to incur ₹ 720 on paper and documentation work.

From the above information find out the followings in relation to raw material Dee:

(a) Re-order Quantity

(b) Maximum Stock level

(c) Minimum Stock level

(d) Calculate the impact on the profitability of the company by not ordering the EOQ.

[Take 364 days for a year]

Solution:

Working Notes:

(i) **Computation of Annual consumption & Annual Demand for raw material 'Dee':**

Sales forecast of the product 'Exe'	10,000 units
Less: Opening stock of 'Exe'	900 units

Fresh units of 'Exe' to be produced	9,100 units
Raw material required to produce 9,100 units of 'Exe' (9,100 units × 2 kg.)	18,200 kg.
Less: Opening Stock of 'Dee'	1,000 kg.
Annual demand for raw material 'Dee'	17,200 kg.

(ii) **Computation of Economic Order Quantity (EOQ):**

$$\text{EOQ} = \sqrt{\frac{2 \times \text{Annual demand of 'Dee'} \times \text{Ordering cost}}{\text{Carrying cost per unit per annum}}}$$

$$= \sqrt{\frac{2 \times 17{,}200 \text{ kg.} \times ₹720}{₹125 \times 13.76\%}} = \sqrt{\frac{2 \times 17{,}200 \text{ kg.} \times ₹720}{₹17.2}} = 1{,}200 \text{ kg.}$$

(iii) **Re- Order level:**

= (Maximum consumption per day × Maximum lead time)

$$= \left\{\left(\frac{\text{Annual Consumption of 'Dee'}}{364 \text{ days}} + 20 \text{ kg.}\right) \times 8 \text{ days}\right\}$$

$$= \left\{\left(\frac{18{,}200 \text{ kg.}}{364 \text{ days}} + 20 \text{ kg.}\right) \times 8 \text{ days}\right\} = 560 \text{ kg.}$$

(iv) **Minimum consumption per day of raw material 'Dee':**

Average Consumption per day = 50 Kg.

Hence, Maximum Consumption per day = 50 kg. + 20 kg. = 70 kg.

So Minimum consumption per day will be

Average Consumption $= \frac{\text{Min. consumption} + \text{Max. consumption}}{2}$

Or, 50 kg. $= \frac{\text{Min. consumption} + 70 \text{ kg.}}{2}$

Or, Min. consumption = 100 kg – 70 kg. = 30 kg.

(a) Re-order Quantity :

EOQ – 200 kg. = 1,200 kg. – 200 kg.= 1,000 kg.

(b) Maximum Stock level:

= Re-order level + Re-order Quantity – (Min. consumption per day × Min. lead time)

= 560 kg. + 1,000 kg. – (30 kg. × 4 days) = 1,560 kg. – 120 kg. = 1,440 kg.

(c) Minimum Stock level:

= Re-order level – (Average consumption per day × Average lead time)

= 560 kg. – (50 kg. × 6 days) = 260 kg.

(d) Impact on the profitability of the company by not ordering the EOQ.

		When purchasing the ROQ	When purchasing the EOQ
I	Order quantity	1,000 kg.	1,200 kg.
II	No. of orders a year	$\frac{17{,}200\,kg.}{1{,}000\,kg.} = 17.2$ or 18 orders	$\frac{17{,}200\,kg.}{1{,}200\,kg.} = 14.33$ or 15 orders
III	Ordering Cost	18 orders × ₹ 720 = ₹12,960	15 orders × ₹ 720 = ₹10,800
IV	Average Inventory	$\frac{1{,}000\,kg.}{2} = 500\,kg.$	$\frac{1{,}200\,kg.}{2} = 600\,kg.$
V	Carrying Cost	500 kg. × ₹ 17.2 = ₹ 8,600	600 kg. × ₹ 17.2 = ₹ 10,320
VI	Total Cost	₹ 21,560	₹ 21,120

Extra Cost incurred due to not ordering EOQ = ₹ 21,560 - ₹ 21,120 = ₹440

Question-18

A company manufactures a product from a raw material, which is purchased at ₹ 80 per kg. The company incurs a handling cost of ₹ 370 plus freight of ₹ 380 per order. The incremental carrying cost of inventory of raw material is ₹ 0.25 per kg per month. In addition, the cost of working capital finance on the investment in inventory of raw material is ₹ 12 per kg per annum. The annual production of the product is 1,00,000 units and 2.5 units are obtained from one kg. of raw material.

Required:

(i) Calculate the economic order quantity of raw materials.

(ii) Advise, how frequently company should order for procurement be placed.

(iii) If the company proposes to rationalize placement of orders on quarterly basis, what percentage of discount in the price of raw materials should be negotiated?

Assume 360 days in a year.

Solution:

(i) Calculation of Economic Order Quantity (E.O.Q)

Annual requirement (usage) of raw material in kg. (A) = $\frac{1,00,000 \text{ units}}{2.5 \text{ units per kg.}} = 40,000 \text{ kg.}$

Ordering Cost (Handling & freight cost) (O) = ₹ 370 + ₹ 380 = ₹ 750

Carrying cost per unit per annum (C) i.e. inventory carrying cost + working capital cost

= (₹0.25 × 12 months) + ₹ 12

= ₹15 per kg.

$$\text{E.O.Q.} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 40,000 \text{ kg.} \times ₹750}{₹15}} = 2,000 \text{ kg.}$$

(ii) Frequency of placing orders for procurement:

Annual consumption (A) = 40,000 kg.

Quantity per order (E.O.Q) = 2,000 kg.

No. of orders per annum ($\frac{A}{E.O.Q}$) = $\frac{40,000 \text{ kg.}}{2,000 \text{ kg.}}$ = 20 orders

Frequency of placing orders (in days) = $\frac{360 \text{ days}}{20 \text{ orders}}$ = 18 days

(iii) Percentage of discount in the price of raw materials to be negotiated:

Particulars	On Quarterly Basis	On E.O.Q Basis
1. Annual Usage (in Kg.)	40,000 kg.	40,000 kg.
2. Size of the order	10,000 kg.	2,000 kg.
3. No. of orders (1 ÷ 2)	4	20
4. Cost of placing orders or Ordering cost (No. of orders × Cost per order)	₹ 3,000 (4 order × ₹ 750)	₹ 15,000 (20 orders × ₹ 750)
5. Inventory carrying cost (Average inventory × Carrying cost per unit)	₹ 75,000 (10,000 kg. × ½ × ₹15)	₹ 15,000 (2,000 kg. × ½ × ₹ 15)
6. Total Cost (4 + 5)	₹ 78,000	₹ 30,000

When order is placed on quarterly basis the ordering cost and carrying cost increased by ₹ 48,000 (₹78,000 - ₹30,000).

So, discount required = ₹ 48,000

Total annual purchase = 40,000 kg. × ₹ 80 = ₹ 32,00,000

So, Percentage of discount to be negotiated = $\frac{₹48,000}{₹32,00,000} \times 100$ = 1.5%

Question-19

Following details are related to a manufacturing concern:

Re-order Level	*16,000 units*
Economic Order Quality	*90,000*
Minimum Stock Level	*100000 units*
Maximum Stock Level	*190000 units*
Average Lead Time	*6 days*
Difference between minimum lead time and Maximum lead time	*4 days*

Calculate:

(i) Maximum consumption per day

(ii) Minimum consumption per day

Solution:

Difference between Minimum lead time Maximum lead time = 4 days

Max. lead time – Min. lead time = 4 days

Or, Max. lead time = Min. lead time + 4 days..(i)

Average lead time is given as 6 days i.e.

$\frac{\text{Max.lead time} + \text{Min.lead time}}{2}$ = 6 days.. (ii)

Putting the value of (i) in (ii),

$\frac{\text{Min. lead time } + \text{ 4 days} + \text{Min.lead time}}{2}$ = 6 days

Or, Min. lead time + 4 days + Min. lead time = 12 days

Or, 2 Min. lead time = 8 days

Or, Minimum lead time = $\frac{8\,\text{days}}{2}$ = 4 days

Putting this Minimum lead time value in (i), we get

Maximum lead time = 4 days + 4 days = 8 days

(i) **Maximum consumption per day:**

Re-order level = Max. Re-order period × Maximum Consumption per day

1,60,000 units = 8 days × Maximum Consumption per day

Or, Maximum Consumption per day = $\frac{1,60,000 \text{ units}}{8 \text{ days}}$ = 20,000 units

(ii) Minimum Consumption per day:

Maximum Stock Level =

Re-order level + Re-order Quantity – (Min. lead time × Min. Consumption per day)

Or, 1,90,000 units = 1,60,000 units + 90,000 units – (4 days × Min. Consumption per day)

Or, 4 days × Min. Consumption per day = 2,50,000 units – 1,90,000 units

Or, Minimum Consumption per day = $\frac{60,000 \text{ units}}{4 \text{ days}}$ = 15,000 units

Store ledgers and Method of pricing of material issue

Question-20

The following are the details of receipts and issues of a material of stores in a manufacturing company for the period of three months ending 30th June, 2014:

Receipts:

Date	*Quantity (kg.)*	*Rate per kg. (₹)*
April 10	*1,600*	*5.00*
April 20	*2,400*	*4.90*
May 5	*1,000*	*5.10*
May 17	*1,100*	*5.20*
May 25	*800*	*5.25*
June 11	*900*	*5.40*
June 24	*1,400*	*5.50*

There was 1,500 kg. in stock at April 1, 2014 which was valued at ₹ 4.80 per kg.

Issues:

Date	*Quantity (kg.)*
April 4	*1,100*
April 24	*1,600*
May 10	*1,500*
May 26	*1,700*
June 15	*1,500*
June 21	*1,200*

Issues are to be priced on the basis of weighted average method.

The stock verifier of the company reported a shortage of 80 kgs. on 31st May, 2014 and 60 kgs. on 30th June, 2014. The shortage is treated as inflating the price of remaining material on account of shortage.

You are required to prepare a Stores Ledger Account.

Solution:

(a) **Stores Ledger Account for the three months ending 30th June, 2014 (Weighted Average Method)**

Date	Receipts				Issues				Balance		Rate for further Issue (₹)
	GRN No. PR No.	Qty. (Kg.)	Rates (₹)	Amounts	MR No.	Qty. (Kg.)	Rates (₹)	Amount (₹)	Qty. (Kg.)	Amount (₹)	
2014											
April 1									1,500	7,200	4.80
April 4						1,100	4.80	5,280	400	1,920	4.80
April 10		1,600	5.00	8,000					2,000	9,920	$\frac{9,920}{2,000} = 4.96$
April 20		2,400	4.90	11,760					4,400	21,680	$\frac{21,680}{4,400} = 4.93$
April 24						1,600	4.93	7,888	2,800	13,792	$\frac{13,792}{2,800} = 4.93$
May 5		1,000	5.10	5,100					3,800	18,892	$\frac{18,892}{3,800} = 4.97$
May 10						1,500	4.97	7,455	2,300	11,437	$\frac{11,437}{2,300} = 4.97$
May 17		1,100	5.20	5,720					3,400	17,157	$\frac{17,157}{3,400} = 5.05$
May 25		800	5.25	4,200					4,200	21,357	$\frac{21,357}{4,200} = 5.09$
May 26						1,700	5.09	8,653	2,500	12,704	$\frac{12,704}{2,500} = 5.09$
May 31					Shortage	80			2,420	12,704	$\frac{12,704}{2,420} = 5.25$
June 11		900	5.40	4,860					3,320	17,564	$\frac{17,564}{3,320} = 5.29$
June 15						1,500	5.29	7,935	1,820	9,629	$\frac{9,629}{1,820} = 5.29$
June 21						1,200	5.29	6,348	620	3,281	$\frac{3,281}{620} = 5.29$
June 24		1,400	5.50	7,700					2,020	10,981	$\frac{10,981}{2,020} = 5.44$
June 30					Shortage	60			1,960	10,981	$\frac{10,981}{1,960} = 5.60$

Question-21

Prepare a Store Ledger Account from the following transactions of XY Company Ltd.

April, 2014

1 Opening balance 200 units @ ₹ 10 per unit.

5 Receipt 250 units costing ₹ 2,000

8 Receipt 150 units costing ₹ 1,275

10 Issue 100 units

15 Receipt 50 units costing ₹ 500

20 Shortage 10 units

21 Receipt 60 units costing ₹ 540

22 Issue 400 units

The issues upto 10-4-14 will be priced at LIFO and from 11-4-14 issues will be priced at FIFO.

Shortage will be charged as overhead.

Solution:

(a) **Store Ledger Account**

Name - **Max. Stock Level -** **Bin No.-**
Code No. - **Min. Stock Level -** **Location Code-**
Description- **Re-order level –** **Re-order quantity-**

Date	Receipts			Issues			Balance		
	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)
April 1							200	10	2,000
" 5	250	8	2,000				200	10	4,000
							250	8	
" 8	150	8.50	1,275				200	10	5,275
							250	8	
							150	8.50	
" 10				100	8.50	850	200	10	4,425
							250	8	
							50	8.50	
" 15	50	10	500				200	10	4,925
							250	8	
							50	8.50	
							50	10	
" 20				10 (shortage)	10	100	190	10	4,825
							250	8	
							50	8.50	
							50	10	

" 21	60	9	540				190	10	5,365
							250	8	
							50	8.50	
							50	10	
							60	9	
" 22				190	10	3,580	40	8	1,785 (Closing Stock)
				210	8		50	8.50	
							50	10	
							60	9	

Question 22

The following transactions in respect of material Y occurred during the six months ended 30th June, 2014:

Month	***Purchase (units)***	***Price per unit (₹)***	***Issued units***
January	*200*	*25*	*Nil*
February	*300*	*24*	*250*
March	*425*	*26*	*300*
April	*475*	*23*	*550*
May	*500*	*25*	*800*
June	*600*	*20*	*400*

Required

The chief accountant argues that the value of closing stock remains the same no matter which method of pricing of material issues is used. Do you agree? Why or why not? Detailed stores ledgers are not required.

Solution:

Assumption: There was no opening stock as on 1st January 2014

Materials Cost and Control

Month	**Opening balance (units)**	**Purchases (units)**	**Issues (units)**	**Closing balance (units)**
January, 2014	Nil	200	-	200
February	200	300	250	250
March	250	425	300	375
April	375	475	550	300
May	300	500	800	Nil
June, 2014	Nil	600	400	200

At the end of May 2014, there was no closing stock, i.e. no opening stock on 1st June, 2014. But there was closing of 200 units at the end of June 2014.

Value of closing stock at the end of June 2014

FIFO 200 Units at ₹ 20	=	₹ 4,000
LIFO 200 Units at ₹ 20	=	₹ 4,000
Weighted average ₹ 20	=	₹ 4,000

Hence the argument of Chief Accountant is correct. He is correct only in the above case. If there was closing stock at the end of May 2014, the argument of the Chief Accountant would not be correct.

Question-23

After the annual stock taking you come to know of some significant discrepancies between book stock and physical stock. You gather the following information:-

Item	*Stock card Units*	*Stores Ledger Units*	*Physical Check Units*	*Cost/unit (₹)*
A	*600*	*600*	*560*	*60*
B	*380*	*380*	*385*	*40*
C	*750*	*780*	*720*	*10*

(a) What action should be taken to record the information shown.

(b) Suggest reasons for the shortage and discrepancies disclosed above and recommended a possible course of action by management to prevent future losses.

Solution:

(a) **Item A:** The shortage of 40 units may be entered in the Stock Card and Stores Ledger. That means, stock card should reflect the physical quantity only. The value is ₹ 2,400 (i.e. 40 units at ₹ 60 per unit).

Accounting treatment

1. *If the shortage is normal:-*

Production Overhead control A/c	Dr.	2,400	
To Stores Ledger control A/c			2,400

2. *If the shortage is abnormal:-*

Costing P&L A/c	Dr.	2,400	
To Stores Ledger control A/c			2,400

3. *If the shortage is due to non-recording or short-recording of direct material issued to production:*

WIP Control A/c	Dr. 2,400	
To Stores Ledger control A/c		2,400

4. *If the shortage is due to non-recording or short-recording of indirect material issued:-*

Production Overhead control A/c	Dr. 2,400	
To Stores Ledger control A/c		2,400

5. *Clerical errors, if any, should be rectified.*

Item B: Excess physical units is 5 units valuing 5 unit × ₹40 = ₹ 200.

Accounting treatment

1. *If the excess is due to normal causes:*

Stores Ledger control A/c	Dr. 200	
To Production Overhead control A/c		200

2. *If the excess is due to abnormal causes:*

Stores Ledger control A/c	Dr. 200	
To Costing P&L A/c		200

3. *If the excess is due to wrong recording of direct material:*

Stores Ledger control A/c	Dr. 200	
To WIP Control A/c		200

4. *If the excess is due to wrong recording of indirect material:*

Stores Ledger control A/c	Dr. 200	
To Production Overhead control A/c		200

Item C:

	Units
Physical stock	720
Stock Card	750
Shortage	30

Value 30 units at ₹ 10 = ₹ 300.

Accounting treatment is the same as given in case of Item A.

Stock Card	750
Stores Ledger	780
Difference	30

Reasons for difference of 30 units between stock card and stores Ledger:

1. One issue voucher of 30 units might not have been posted in Stores Ledger

2. There may be clerical errors in balancing, posting etc. After ascertaining, these may be rectified.
3. One receipt of 30 units might not have been posted in Stock Card. After posting of this stock card balance will be 780 units. Then the shortage will be 60 units as compared to physical quantity of 720 units.

(b) Reasons for shortage and discrepancies:

1. Wastage of material due to spoilage, breakages, evaporation etc. it may be normal or abnormal.
2. Theft or pilferage.
3. Issued but not entered in stock card.
4. Over issues.
5. Entering the issue in the wrong stock card.
6. Clerical errors in balancing or posting etc.
7. Incorrect entries in stock card.
8. Goods received and deposited in the wrong bins.
9. Small defective units – nails, screws etc.
10. Purchase in kg. but issues to production in numbers i.e. bolts, nuts etc.

Recommended course of action to prevent future losses

1. The entries should be correctly entered in stock cards.
2. Internal check system should be introduced by double checking on the entries.
3. Entry in the stores should be restricted to authorized persons only.
4. To avoid pilferage, the store room should be well guarded and protected. (Just like cash room).
5. Proper accounting should be done for all stock movements.
6. FIFO system should be followed while issuing materials (pricing of issue of materials may be a different method). This will avoid losses due to deterioration or obsolescence.
7. All issues of stock should be made on the basis of stores requisition duly signed by authorised person.
8. To minimise losses due to breakage in case of heavy and bulky materials, materials handling equipment like forklift trucks and cranes should be provided.
9. Wrong issues should be avoided by accurate measuring and weighing equipment should be inspected / checked periodically.
10. Proper storage conditions should be provided, particularly in the case of perishable items and items of lesser shelf life.

11. No movement of materials from one place to another place without proper authorisation and documentation.

Question-24

Aditya Ltd. is engaged in heavy engineering works on the basis of job order received from industrial customers. The company has received a job order of making turbine from a power generating company. Below are some details of stores receipts and issues of copper wire, used in the manufacturing of turbine:

Feb. 1	*Opening stock of 1,200 Kgs. @ ₹ 475 per kg.*
Feb. 5	*Issued 975 kgs. to mechanical division vide material requisition no. Mec 09/13*
Feb. 6	*Received 3,500 kgs. @ ₹ 460 per kg vide purchase order no. 159/2013*
Feb. 7	*Issued 2,400 kgs. to electrical division vide material requisition no. Ele 012/13*
Feb. 9	*Returned to stores 475 kgs. by electrical division against material requisition no. Ele 012/13.*
Feb. 15	*Received 1,800 kgs. @ ₹ 480 per kg. vide purchase order no. 161/ 2013*
Feb. 17	*Returned to supplier 140 kgs. out of quantity received vide purchase order no. 161/2013.*
Feb. 20	*Issued 1,900 kgs. to electrical division vide material requisition no. Ele 165/ 2013*

On 28th February, 2014 it was found that 180 kgs. of wire was fraudulently misappropriated by the stores assistant and never recovered by the company.

From the above information you are required to prepare the Stock Ledger account using 'Weighted Average' method of valuing the issues.

Solution:

Store Ledger of Aditya Ltd. (Weighted Average Method)

Date	Receipts			Issues			Balance of Stock		
Feb.	Qty (kg.)	Rate (₹)	Amount (₹)	Qty (kg.)	Rate (₹)	Amount (₹)	Qty (kg.)	Rate (₹)	Amount (₹)
1	-	-	-	-	-	-	1,200	475.00	5,70,000
5	-	-	-	975	475.00	4,63,125	225	475.00	1,06,875
6	3,500	460.00	16,10,000	-	-	-	3,725	460.91	17,16,875
7	-	-	-	2,400	460.91	11,06,175	1,325	460.91	6,10,700
9	475	460.91	2,18,932	-	-	-	1,800	460.91	8,29,632
15	1,800	480.00	8,64,000	-	-	-	3,600	470.45	16,93,632
17	-	-	-	140	480.00	67,200	3,460	470.07	16,26,432

20	-	-	-	1,900	470.07	8,93,133	1,560	470.06	7,33,299
28	-	-	-	180*	470.06	84,611	1,380	470.06	6,48,688

* 180 kgs. is abnormal loss, hence it will be transferred to Costing Profit & Loss A/c.

Miscellaneous

Question-25

The following data are available in respect of material X for the year ended 31st March, 2014:

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.

Solution:

Working Notes

		(₹)
(a)	Opening stock	90,000
	Add: Purchases	2,70,000
		3,60,000
	Less: Closing stock	1,10,000
	Material consumed during the year	2,50,000

(b) Average stock $= \frac{\text{Opening Stock} + \text{Closing Stock}}{2}$

$= \frac{₹90,000 + ₹1,10,000}{2} = ₹1,00,000$

(i) Inventory turnover Ratio $= \frac{\text{Material Consumed}}{\text{Average Stock}} = \frac{₹2,50,000}{₹1,00,000} = 2.5 \text{ times}$

(ii) No. of days for which the average inventory is held

$$\frac{\text{No. days in a year}}{\text{Inventory Turnover Ratio}} = \frac{365 \text{ days}}{2.5 \text{ times}} = 146 \text{ days}$$

Question-26

Raw materials 'AXE' costing ₹ 150 per kg. and 'BXE' costing ₹ 90 per kg. are mixed in equal proportions for making product 'A'. The loss of material in processing works out to 25% of the product. The production expenses are allocated at 40% of direct material cost. The end product is priced with a margin of 20% over the total cost.

Material 'BXE' is not easily available and substitute raw material 'CXE' has been found for 'BXE' costing ₹ 75 per kg. It is required to keep the proportion of this substitute material in the mixture as low as possible and at the same time maintain the selling price of the end product at existing level and ensure the same quantum of profit as at present.

You are required to compute the ratio of the mix of the raw materials 'AXE' and 'CXE'.

Solution:

Working Notes:

(i) Computation of material mix ratio:

Let 1 kg. of product A requires 1.25 kg. of input of materials A X E and B X E

Raw materials are mixed in equal proportions.

Then raw material A X E = ½ ×1.25 kg. = 0.625 kg.

Then raw material B X E = ½ ×1.25 kg. = 0.625 kg.

(ii) Computation of selling price per kg. of product A

		(₹)
Raw material A X E 0.625 kg. × ₹150 =	₹ 93.75	
Raw material B X E 0.625 kg. × ₹90 =	₹ 56.25	150.00
Production expenses (40% of material cost)		60.00
Total cost		210.00
Add: profit 20% of total cost		42.00
Selling price		252.00

Computation of proportions of materials A X E and C X E in 'A'

Let material C X E required in product A be 'm' kg.

Then for producing 1 kg of product 'A', material A X E requirement = (1.25 – m) kg.

To maintain same level of profit and selling price as per Working note (ii), it is required that the total cost of material in 1 kg. of product A should not exceed ₹ 150.

i.e., m kg. × ₹ 75 + (1.25 –m) kg. × ₹150 = ₹150

or 75 m + 187.5 – 150 m = 150

or 75 m = 37.5

or m = 0.5 kg.

Raw material A X E requirement in product A = 1.25 – 0.5 = 0.75 kg.

So, proportion of material A X E and C X E = 0.75 : 0.50 i.e. 3 : 2

Question-27

Aditya Agro Ltd. produces edible oils of different varieties. The monthly demand pattern for the finished products are as follows:

Mustard oil	*45,000 Litre*
Soybean oil	*15,000 Litre*
Olive oil	*3,000 Litre*

To produce one litre of Mustard oil, Soybean oil and Olive oil, 5 kg. of mustards, 6 kg. of soybeans and 4.5 kg. of olives are required respectively. There is no opening and closing stock of materials.

Aditya Agro Ltd. can purchase the materials either from the farmers directly or from the wholesale market. The company can purchase any quantity of materials from the wholesale market but in case of purchase from the farmers, it has to purchase the minimum specified quantity of materials at a time. Following is the material-wise summary related with the purchase of materials:

	Wholesale Market	*Farmers*
Mustard:		
Minimum Quantity to be purchased	*Any quantity*	*13,50,000 kg.*
Purchase price per kg. (₹)	*15.00*	*12.50*
*Central Sales Tax (CST)**	*2%*	*---*
Transportation cost per purchase	*6,000*	*15,000*
Sorting and piling cost per purchase	*----*	*1,200*
Loading cost per 50 kg.	*10.00*	*5.00*
Unloading cost per 50 kg.	*2.00*	*2.00*
Soybean:		
Minimum Quantity to be purchased	*Any Quantity*	*2,70,000 kg.*
Purchase price per kg. (₹)	*11.00*	*9.00*
*Value Added Tax (VAT)***	*4%*	*---*
Transportation cost per purchase	*9,000*	*12,000*
Sorting and piling cost per purchase	*---*	*800*
Loading cost per 50 kg.	*10.00*	*3.00*
Unloading cost per 50 kg.	*2.00*	*2.00*
Olive:		
Minimum Quantity to be purchased	*Any Quantity*	*1,62,000 kg.*

Purchase price per kg. (₹)	*36.00*	*28.00*
*Import duty****	*---*	*10%*
Transportation Cost per purchase (₹)	*3,000*	*11,000*
Sorting and piling cost per purchase	*1,800*	*---*
Loading cost per 50 kg.	*10.00*	*25.00*
Unloading cost per 50 kg.	*2.00*	*2.00*

The company is paying 12.5% p.a. as interest to its bank for cash credit facility and ₹100 per 100 kg. as rent to the warehouse.

*[*CST will be added with the purchase price of mustards; **VAT will not be added with the purchase price of soybeans; ***Import duty will be added with the purchase price of olives.]*

You are required to

(i) Calculate the purchase cost of each material

(a) from Wholesale market

(b) from the Farmers

(ii) Calculate Economic Order Quantity of each material under the both options.

(iii) Recommend the best purchase option for the material 'olive'.

Solution:

(i) Calculation of Purchase Cost per Kg. of Materials

	Wholesale Market (₹)	Farmers (₹)
Mustard:		
Purchase price	15.00	12.50
Add: Central Sales Tax @ 2%	0.30	---
Add: Loading Cost	0.20 (₹ 10 ÷ 50 Kg.)	0.10 (₹ 5 ÷ 50 Kg.)
Add: Unloading Cost	0.04 (₹ 2 ÷ 50 Kg.)	0.04 (₹ 2 ÷ 50 Kg.)
	15.54	12.64
Soybean:		
Purchase price	11.00	9.00
Add: Loading Cost	0.20 (₹ 10 ÷ 50 Kg.)	0.06 (₹ 3 ÷ 50 Kg.)
Add: Unloading Cost	0.04 (₹ 2 ÷ 50 Kg.)	0.04 (₹ 2 ÷ 50 Kg.)
	11.24	9.10

Olive:		
Purchase price	36.00	28.00
Add: Import duty @ 10%	---	2.80
Add: Loading Cost	0.20 (₹ 10 ÷ 50 Kg.)	0.50 (₹ 25 ÷ 50 Kg.)
Add: Unloading Cost	0.04 (₹ 2 ÷ 50 Kg.)	0.04 (₹ 2 ÷ 50 Kg.)
	36.24	31.34

(ii) Economic Order Quantity (E.O.Q) = $\sqrt{\frac{2 \times \text{Annual requirement} \times \text{Ordering cost}}{\text{Carrying cost per kg. per annum}}}$

Annual Requirement (A) :

Commodity		Quantity (Kg.)
Mustard	(45,000 Ltr. × 5 Kg. × 12 months)	27,00,000
Soybean	(15,000 Ltr. × 6 Kg. × 12 months)	10,80,000
Olive	(3,000 Ltr. × 4.5 Kg. × 12 months)	1,62,000

Cost per Order (O):

	Wholesale Market (₹)	Farmers (₹)
Mustard:		
- Transportation cost	6,000	15,000
- Sorting and piling cost	---	1,200
	6,000	16,200
Soybean:		
- Transportation cost	9,000	12,000
- Sorting and piling cost	---	800
	9,000	12,800
Olive:		
- Transportation cost	3,000	11,000
- Sorting and piling cost	1,800	---
	4,800	11,000

Carrying Cost per Kg. per annum (C × i):

	Wholesale Market (₹)	Farmers (₹)
Mustard:		
- Interest on cash credit	1.9425 (₹ 15.54 × 12.5%)	1.5800 (₹ 12.64 × 12.5%)

- Warehouse rent*	1.0000	1.0000
	2.9425	2.5800
Soybean:		
- Interest on cash credit	1.4050 (₹ 11.24 × 12.5%)	1.1375 (₹ 9.10 × 12.5%)
- Warehouse rent	1.0000	1.0000
	2.4050	2.1375
Olive:		
- Interest on cash credit	4.5300 (₹ 36.24 × 12.5%)	3.9175 (₹ 31.34 × 12.5%)
- Warehouse rent	1.0000	1.0000
	5.5300	4.9175

* Warehouse rent per Kg. = $\frac{₹100}{100\text{Kg.}}$ = ₹ 1

Calculation of E.O.Q for each material under the both options

	Wholesale Market (Kg.)	Farmers (Kg.)
Mustard	$\sqrt{\frac{2\times27,00,000\text{Kg.}\times₹6,000}{₹2.9425}}$ = 1,04,933.53	$\sqrt{\frac{2\times27,00,000\text{Kg.}\times₹16,200}{₹2.5800}}$ = 1,84,138.47
Soybean	$\sqrt{\frac{2\times10,80,000\text{Kg.}\times₹9,000}{₹2.4050}}$ = 89,906.40	$\sqrt{\frac{2\times10,80,000\text{Kg.}\times₹12,800}{₹2.1375}}$ = 1,13,730.98
Olive	$\sqrt{\frac{2\times1,62,000\text{Kg.}\times₹4,800}{₹5.5300}}$ = 16,769.90	$\sqrt{\frac{2\times1,62,000\text{Kg.}\times₹11,000}{₹4.9175}}$ = 26,921.34

(iii) Selection of best purchase option for the purchase of Olives

	Wholesale Market	Farmers
Annual Requirement (A) (Kg.)	1,62,000	1,62,000
Order Quantity (Q)	16,769.90	1,62,000
No. of orders $\left(\frac{A}{Q}\right)$	9.66 or 10	1

Average Inventory $\left(\frac{Q}{2}\right)$ (Kg.)	8,384.95	81,000
Ordering Cost (₹) (I)	48,000 (10 Orders × ₹ 4,800)	11,000 (1 Order × ₹ 11,000)
Carrying Cost (₹) (II) (Average Inventory × Carrying cost per kg.)	46,368.77 (8,384.95 Kg. × ₹ 5.5300)	3,98,317.5 (81,000 Kg. × ₹ 4.9175)
Purchase Cost (₹) (III)	58,70,880 (1,62,000 Kg. × ₹ 36.24)	50,77,080 (1,62,000 Kg. × ₹ 31.34)
Total Cost (I) + (II) + (III)	59,65,248.77	54,86,397.50

Purchasing olives direct from the farmers is the best purchase option for the Aditya Agro Ltd.

3 Labour

Basic Concepts

Labour Cost	The cost of wages and other benefits paid by employer to workers on the basis of time or on the basis of quantum of output as a result of physical or mental exertion.
Direct Labour	Labour cost that is specifically incurred for or can be readily charged to or identified with a specific job, contract, work order or any other unit of cost.
Indirect Labour	Labour cost which cannot be readily identified with products or services but are generally incurred in carrying out production activity.
Idle Time	Idle time refers to the labour time paid for but not utilized on production. Idle time thus represents the time for which wages are paid but no output is obtained.
Normal Idle Time	Idle time which *arises due to unavoidable reasons* under the given working environment. The cost of normal idle time should be charged to the cost of production.
Abnormal Idle Time	Idle time which arises *due to avoidable reasons* and can be checked if proper controls are in place. Cost incurred in abnormal idle time is charged to Costing Profit and Loss account.
Time Keeping	It refers to maintenance and recording of attendance of an employee.
Time Booking	It refers to the detailed recording of the actual time spent by an employee on a single job, process or in any other production related activities.
Overtime	Overtime is the amount of wages paid for working beyond normal working hours.
Overtime Premium	The rate for overtime work is higher than the normal time rate The *extra amount so paid over the normal rate* is called overtime premium.
Labour Turnover	Labour turnover in an organization is the *rate of change in the composition of labour force* during a specified period measured against a suitable

	index.
Incentives	Incentive can be defined as the stimulation for effort and effectiveness by offering monetary and other benefits.
Time Rate System	Under this system workers are paid for their effort on the *basis of time* spent on the work i.e., hour, day, week or month etc.
Differential Time Rate	Under this method different hourly rates are fixed for different levels of efficiency. Upto a certain level a fixed rate is paid and *based on the efficiency level the hourly rate increases gradually*.
Straight Piece Work	Payment is made on the basis of a fixed amount per unit of output irrespective of time taken. It is the number of units produced by the worker multiplied by rate per unit.
Differential Piece Rate	Under differential piece rate system different piece rate slabs are used for different efficiency or activity level. Efficiency is measured against the standard output level.
Wage Abstract	A summary giving details of wages to be charged to individual jobs, work orders or processes for a specific period.
Job Evaluation	It is a process of analyzing and assessment of jobs to ascertain their relative worthiness from the management's points of view.
Merit Rating	It is a systematic evaluation of the personality and performance of each employee by his supervisor or some other qualified persons.
Time and Motion Study	It is the study of time taken and motions (movements) performed by workers while performing their jobs at the place of their work.

Basic Formulae

Time Rate System	Earnings = Hours worked × Rate per hour	
Straight Piece Rate System	Earnings = Number of units × Piece rate per unit	
	Differential Piece Rate System	
Merrick Differential Piece Rate System	*Efficiency*	*Payment*
	Up to 83 %	Ordinary piece rate
	83% to 100%	110% of ordinary piece rate (10% above the ordinary piece rate)

	Above 100% (20% — 120% or 130% of ordinary piece rate to 30% of ordinary piece rate)
	Combination of Time and Piece Rate
Gantt Task and Bonus System	*Output* — *Payment* Output below standard — Guaranteed time rate Output at standard — 120% of time rate Output above standard — 120% of piece rate
Emerson Efficiency System	Earning is calculated as follows : *Efficiency* — *Payment* Below 66-2/3% — No bonus, only guaranteed time rate is paid. 66-2/3% to 100% — Worker is paid by hourly rate for the time he actually worked plus in increase in bonus according to degree of efficiency on the basis of step bonus rates. Bonus rate can be up to 20%. Above 100% — 120% of time wage rate plus additional bonus of 1% for each 1% — increase in efficiency.
Bedeaux Point System	Earnings = Hours worked × Rate per hour + $\left(\frac{75}{100} \times \frac{\text{Bedeaux points saved}}{60} \times \text{Rate per hour}\right)$
Haynes Manit System	This system is similar to Bedeaux Point system. Instead of Bedeaux points saved, 'MANIT'(Man-minutes) saved are measured for payment of bonus. Bonus is distributed as follows : 50% bonus to the workers 10% bonus to the supervisors 40% bonus to the employer
Accelerated Premium System	In this system individual employer makes his own formula. The following formula may be used for a general idea of the scheme: $y = 0.8 \times x^2$ Where y = wages x = efficiency

	Premium Bonus Plan
Halsey Premium Plan	Earnings = Hours worked × Rate per hour + $\left(\frac{50}{100} \times \text{Time saved} \times \text{Rate per hour}\right)$
Halsey-Weir Premium Plan	Earnings = Hours worked × Rate per hour + $\left(\frac{30}{100} \times \text{Time saved} \times \text{Rate per hour}\right)$
Rowan System	Earnings = Hours worked × Rate per hour + $\left(\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Hours worked} \times \text{Rate per hour}\right)$
	Labour Turnover Rate
Separation Method	$\text{Separation Method} = \frac{\text{Number of separations during the period}}{\text{Average number of workers on roll}} \times 100$
Replacement Method	$\text{Replacement Method} = \frac{\text{Number of workers replaced in a period}}{\text{Average number of workers on roll}} \times 100$
Flux Method	$\text{Flux Method} = \frac{\text{No. of separations} + \text{No. of replacements}}{\text{Average number of workers on roll}} \times 100$ OR $= \frac{\text{No. of separations} + \text{No. of replacements} + \text{No. of new recruitments}}{\text{Average number of workers on roll}} \times 100$

SECTION-A

Question-1

Discuss the Gantt task and bonus system as a system of wage payment and incentives.

Solution:

Gantt Task and Bonus System: This system is a combination of time and piecework system. According to this system a high standard or task is set and payment is made at time rate to a worker for production below the set standard.

Wages payable to workers under the plan are calculated as under:

Output	Payment
(i) Output below standard	Guaranteed time rate
(ii) Output at standard	Time rate plus bonus of 20% (usually) of time rate
(iii) Output over standard	High piece rate on worker's output. (It is so fixed so as to include a bonus of 20% of time rate)

Question-2

Discuss the accounting treatment of Idle time and overtime wages.

Solution:

Accounting treatment of idle time wages & overtime wages in cost accounts: Normal idle time is treated as a part of the cost of production. Thus, in the case of direct workers, an allowance for normal idle time is built into the labour cost rates. In the case of indirect workers, normal idle time is spread over all the products or jobs through the process of absorption of factory overheads.

Under Cost Accounting, the overtime premium is treated as follows:

- If overtime is resorted to at the desire of the customer, then the overtime premium may be charged to the job directly.
- If overtime is required to cope with general production program or for meeting urgent orders, the overtime premium should be treated as overhead cost of particular department or cost center which works overtime.
- Overtime worked on account of abnormal conditions should be charged to costing Profit & Loss Account.
- If overtime is worked in a department due to the fault of another department the overtime premium should be charged to the latter department.

Question-3

Discuss the effect of overtime payment on productivity.

Solution:

Effect of overtime payment on productivity: Overtime work should be resorted to only when it is extremely essential because it involves extra cost. The overtime payment increases the cost of production in the following ways:

1. The overtime premium paid is an extra payment in addition to the normal rate.
2. The efficiency of operators during overtime work may fall and thus output may be less than normal output.

3. In order to earn more the workers may not concentrate on work during normal time and thus the output during normal hours may also fall.
4. Reduced output and increased premium of overtime will bring about an increase in cost of production.

Question-4

State the circumstances in which time rate system of wage payment can be preferred in a factory.

Solution:

Circumstances in which time rate system of wage payment can be preferred:

In the following circumstances the time rate system of wage payment is preferred in a factory.

1. Persons whose services cannot be directly or tangibly measured, e.g., general helpers, supervisory and clerical staff etc.
2. Workers engaged on highly skilled jobs or rendering skilled services, e.g., tool making, inspection and testing.
3. Where the pace of output is independent of the operator, e.g., automatic chemical plants.

Question-5

Discuss briefly, how you will deal with casual workers and workers employed on outdoor work in Cost Accounts.

Solution:

Causal and outdoor workers: Casual workers (badli workers) are employed temporarily, for a short duration to cope with sporadic increase in volume of work. If the permanent labour force is not sufficient to cope effectively with a rush of work, additional labour (casual workers) are employed to work for a short duration.

Outdoor workers are those workers who do not carry out their work in the factory premises. Such workers either carry out the assigned work in their homes (e.g., knitwear, lamp shades) or at a site outside the factory.

Casual workers are engaged on daily basis. Wages are paid to them either at the end of the day's work or after a periodic interval. Wages paid are charged as direct or indirect labour cost depending on their identifiability with specific jobs, work orders, or department.

Rigid control should be exercised over the out-workers specially with regard to following:

1. Reconciliation of materials drawn/ issued from the store with the output.
2. Ensuring the completion of output during the stipulated time so as to meet the orders and contracts comfortably.

Question-6

It should be management's endeavor to increase inventory turnover but to reduce labour turnover. Expand and illustrate the idea contained in this statement.

Solution:

Inventory turnover: It is a ratio of the value of materials consumed during a period to the average value of inventory held during the period. A high inventory turnover indicates fast movement of stock.

Labour turnover: It is defined as an index denoting change in the labour force for an organization during a specified period. Labour turnover in excess of normal rate is termed as high and below it as low turnover.

Effects of high inventory turnover and low labour turnover: High inventory turnover reduces the investment of funds in inventory and thus accounts for the effective use of the concern's financial resources. It also accounts for the increase of profitability of a business concern. As against high labour turnover the low labour turnover is preferred because high labour turnover causes-decrease in production targets; increase in the chances of break-down of machines at the shop floor level; increase in the number of accidents; loss of customers and their brand loyalty due to either non-supply of the finished goods or due to sub-standard production of finished goods; increase in the cost of selection, recruitment and training; increase in the material wastage and tools breakage.

All the above listed effects of high labour turnover account for the increase in the cost of production/ process/ service. This increase in the cost finally accounts for the reduction of concern's profitability. Thus, it is necessary to keep the labour turnover at a low level.

As such, it is correct that management should endeavour to increase inventory turnover and reduce labour turnover for optimum and best utilization of available resources and reduce the cost of production and thus increase the profitability of the organization.

Question-7

Explain the meaning of and the reasons for Idle time and discuss its treatment in cost accounting.

Solution:

Idle time refers to the labour time paid for but not utilized on production. It, in fact, represents the time for which wages are paid, but during which no output is given out by the workers. This is the period during which workers remain idle.

Reasons for idle time: According to reasons, idle time can be classified into normal idle time and abnormal idle time. Normal idle time is the time which cannot be avoided or reduced in the normal course of business.

The main reasons for the occurrence of normal idle time are as follows:

1. Time taken by workers to travel the distance between the main gate of factory and the place of their work.
2. Time lost between the finish of one job and starting of next job.
3. Time spent to overcome fatigue.
4. Time spent to meet their personal needs like taking lunch, tea etc.

The main reasons for the occurrence of abnormal idle time are:

1. Due to machine break downs, power failure, non-availability of raw materials, tools or waiting for jobs due to defective planning.
2. Due to conscious management policy decision to stop work for some time.
3. In the case of seasonal goods producing units, it may not be possible for them to produce evenly throughout the year. Such a factor too results in the generation of abnormal idle time.

Treatment in Cost Accounting: Idle time may be normal or abnormal.

Normal idle time: It is inherent in any job situation and thus it cannot be eliminated or reduced. For example: time gap between the finishing of one job and the starting of another; time lost due to fatigue etc.

The cost of normal idle time should be charged to the cost of production. This may be done by inflating the labour rate. It may be transferred to factory overheads for absorption, by adopting a factory overhead absorption rate.

Abnormal idle time: It is defined as the idle time which arises on account of abnormal causes; e.g. strikes; lockouts; floods; major breakdown of machinery; fire etc. Such an idle time is uncontrollable.

The cost of abnormal idle time due to any reason should be charged to Costing Profit & Loss Account.

Question 8

Discuss the objectives of time keeping & time booking.

Solution:

Objectives of time keeping and time booking: Time keeping has the following two objectives:

(i) *Preparation of Payroll:* Wage bills are prepared by the payroll department on the basis of information provided by the time keeping department.

(ii) *Computation of Cost:* Labour cost of different jobs, departments or cost centers are computed by costing department on the basis of information provided by the time keeping department.

The objectives of time booking are as follows:

(i) To ascertain the labour time spent on a job and the idle labour hours.

(ii) To ascertain labour cost of various jobs and products.

(iii) To calculate the amount of wages and bonus payable under the wage incentive scheme.

(iv) To compute and determine overhead rates and absorption of overheads under the labour and machine hour method.

(v) To evaluate the performance of labour by comparing actual time booked with standard or budgeted time.

Question-9

Distinguish between Job Evaluation and Merit Rating.

Solution:

Job Evaluation: It can be defined as the process of analysis and assessment of jobs to ascertain reliably their relative worth and to provide management with a reasonably sound basis for determining the basic internal wage and salary structure for the various job positions. In other words, job evaluation provides a rationale for differential wages and salaries for different groups of employees and ensures that these differentials are consistent and equitable.

Merit Rating: It is a systematic evaluation of the personality and performance of each employee by his supervisor or some other qualified persons.

Thus the main points of distinction between job evaluation and merit rating are as follows:

1. Job evaluation is the assessment of the relative worth of jobs within a company and merit rating is the assessment of the relative worth of the man behind a job. In other words job evaluation rate the jobs while merit rating rate employees on their jobs.
2. Job evaluation and its accomplishment are means to set up a rational wage and salary structure whereas merit rating provides scientific basis for determining fair wages for each worker based on his ability and performance.
3. Job evaluation simplifies wage administration by bringing uniformity in wage rates. On the other hand merit rating is used to determine fair rate of pay for different workers on the basis of their performance.

Question 10

A factory having the latest sophisticated machines wants to introduce an incentive scheme for its workers, keeping in view the following:

(i) The entire gains of improved production should not go to the workers.

(ii) In the name of speed, quality should not suffer.

(iii) The rate setting department being newly established is liable to commit mistakes.

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

Solution:

Rowan scheme of premium bonus (variable sharing plan) is a suitable incentive scheme for the workers of the factory. If this scheme is adopted, the entire gains due to time saved by a worker will not pass to him.

Another feature of this scheme is that a worker cannot increase his earnings or bonus by merely increasing its work speed. The reason for this is that the bonus under Rowan Scheme is maximum when the time taken by a worker on a job is half of the time allowed. As this fact is known to the workers, therefore they work at such a speed which helps them to maintain the quality of output too.

Lastly, Rowan System provides a safeguard in case of any loose fixation of the standards by the rate setting department. It may be observed from the following illustration that in the Rowan Scheme the bonus paid will be low due to any loose fixation of standards. Workers cannot take undue advantage of such a situation. The above three features of Rowan Plan can be discussed with the help of the following illustration:

Illustration

(i) *Time allowed = 4 hours*

Time taken = 3 hours

Time Saved = 1 hour

Rate = ₹ 5 per hour.

Bonus $= \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate}$

$= \frac{3 \text{ hours}}{4 \text{ hours}} \times 1 \text{ hour} \times ₹ 5 = ₹ 3.75$

In the above illustration time saved is 1 hour and therefore total gain is ₹ 5. Out of ₹ 5/- according to Rowan Plain only ₹ 3.75 is given to the worker in the form of bonus. In other words a worker is entitled for 75 percent of the time saved in the form of bonus.

(ii) *The figures of bonus in the above illustration when the time taken is 2 hours and 1 hours respectively are as below:*

Bonus $= \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate} = \frac{2 \text{ hours}}{4 \text{ hours}} \times 2 \text{ hours} \times ₹ 5 = ₹ 5$

Bonus $= \frac{1 \text{ hours}}{4 \text{ hours}} \times 3 \text{ hours} \times ₹ 5 = ₹ 3.75$

The above figures of bonus clearly show that when time taken is half of the time allowed, the bonus is maximum. When the time taken is reduced from 2 to 1 hour, the bonus figures fell by ₹ 1.25. Hence, it is quite apparent to workers that it is of no use to increase speed of work. These features of Rowan Plan thus protect the quality of output.

(iii) If the rate setting department erroneously sets the time allowed as 10 hours instead of 4 hours, in the above illustration, then the bonus paid will be as follows:

$$\text{Bonus} = \frac{3\ \text{hours}}{10\ \text{hours}} \times 7\ \text{hours} \times ₹\,5 = ₹\,10.5$$

The bonus paid for saving 7 hours thus is ₹ 10.50 which is approximately equal to the wages of 2 hours. In other words the bonus paid to the workers is low. Hence workers cannot take undue advantage of any mistake committed by the rate setting department of the concern.

Question-11

What do you mean by time and motions study? Why is it so important to management?

Solution:

Time and motions study: It is the study of time taken and motions (movements) performed by workers while performing their jobs at the place of their work. Time and motion study has played a significant role in controlling and reducing labour cost.

Time Study is concerned with the determination of standard time required by a person of average ability to perform a job. Motion study, on the other hand, is concerned with determining the proper method of performing a job so that there are no wasteful movements, hiring the worker unnecessarily. However, both the studies are conducted simultaneously. Since materials, tools, equipment and general arrangement of work, all have vital bearing on the method and time required for its completion. Therefore, their study would be incomplete and would not yield its full benefit without a proper consideration of these factors.

Time and motion study is important to management because of the following features:

1. Improved methods, layout, and design of work ensure effective use of men, material and resources.
2. Unnecessary and wasteful methods are pin-pointed with a view to either improving them or eliminating them altogether. This leads to reduction in the work content of an operation, economy in human efforts and reduction of fatigue.
3. Highest possible level of efficiency is achieved in all respect.
4. Provides information for setting labour standards - a step towards labour cost control and cost reduction.
5. Useful for fixing wage rates and introducing effective incentive scheme.

Question-12

What do you understand by labour turnover? How is it measured?

Solution:

Labour turnover in an organization is the rate of change in the composition of labour force during a specified period measured against a suitable index. The standard of usual labour turnover in the industry or labour turnover rate for a past period may be taken as the index or norm against which actual turnover rate should be compared.

The methods for measuring labour turnover are:

Replacement method $= \dfrac{\text{Number of employees replaced during the year}}{\text{Average number of employees on roll during the year}} \times 100$

Separation method $= \dfrac{\text{Number of employees separated during the year}}{\text{Average number of employees on roll during the year}} \times 100$

Flux method $= \left[\dfrac{\begin{array}{c}\text{No. of employees replaced} \\ \text{during the year}\end{array} + \begin{array}{c}\text{No. of employees separated} \\ \text{during the year}\end{array}}{\text{Average number of employees on roll during the year}}\right] \times 100$

Or

$$= \left[\dfrac{\begin{array}{c}\text{No. of employees replaced} \\ \text{during the year}\end{array} + \begin{array}{c}\text{No. of employees separated} \\ \text{during the year}\end{array} + \begin{array}{c}\text{No. of employees recruited} \\ \text{during the year}\end{array}}{\text{Average number of employees on roll during the year}}\right] \times 100$$

Question-13

Discuss the two types of cost associated with labour turnover.

Solution:

Types of cost associated with labour turnover

Two types of costs which are associated with labour turnover are:

(i) *Preventive costs:* This includes costs incurred to keep the labour turnover at a low level i.e., cost of medical schemes. If a company incurs high preventive costs, the rate of labour turnover is usually low.

(ii) *Replacement costs:* These are the costs which arise due to high labour turnover. If men leave soon after they acquire the necessary training and experience of work, additional costs will have to be incurred on new workers, i.e., cost of advertising, recruitment, selection, training and induction, extra cost also incurred due to abnormal breakage of tools and machines, defectives, low output, accidents etc., caused due to the inefficiency and inexperienced new workers.

It is obvious that a company will incur very high replacement costs if the rate of labour turnover is high. Similarly, only adequate preventive costs can keep labour turnover at a low level. Each company must, therefore, workout the optimum level of labour turnover keeping in view its personnel policies and the behaviour of replacement costs and preventive costs at various levels of labour turnover rates.

Question-14

Distinguish between Direct and Indirect labour.

Solution:

Direct labour cost is the labour costs that is specifically incurred for or can be readily charged to or identified with a specific job, contract, work-order or any other unit of cost.

Indirect labour costs are labour costs which cannot be readily identified with products or services but are generally incurred in carrying out production activity.

The importance of the distinction lies in the fact that whereas direct labour cost can be identified with and charged to the job, indirect labour costs cannot be so charged and are, therefore, to be treated as part of the factory overheads to be included in the cost of production.

Question-15

What do you understand by overtime premium? What is the effect of overtime payment on productivity and cost? Discuss the treatment of overtime premium in cost accounts and suggest a procedure for control of overtime work.

Solution:

Work done beyond normal working hours is known as overtime work. Overtime payment is the amount of wages paid for working beyond normal working hours. The rate for overtime work is higher than the normal time rate; usually it is at double the normal rates. The extra amount so paid over the normal rate is called overtime premium. Overtime work should be resorted to only when it is extremely essential because it involves extra cost. The overtime payment affects to increase the cost of production in the following ways:

(1) The premium paid is an extra payment in addition to the normal rate.

(2) The efficiency of operators during overtime work may fall and thus the output may be lesser than normal output.

(3) In order to earn more the workers may not concentrate on work during normal time and thus the output during normal hours may also fall.

(4) Reduced output and increased premium will bring about an increase in costs of production.

Under cost accounting the overtime premium is treated as follows:

(i) If overtime is resorted to, at the desire of the customer, then overtime premium may be charged to the job directly.

(ii) If overtime is due to a general pressure of work to increase the output, the premium may be charged to general overheads.

(iii) If overtime is due to the negligence or delay, it may be charged to the department concerned.

(iv) If it is due to circumstances beyond control, e.g. fire, strike etc. it may be charged to Costing Profit and Loss Account.

It is necessary that proper Control over the overtime work should be exercised in order to keep it to the minimum. The procedure based on following steps may be adopted for such control.

(1) Watch on the output during normal hours should be maintained to ensure that overtime is not granted when normal output is not obtained during the normal hours, without any special reasons.

(2) Statement concerning overtime work to be prepared along with justifications, at appropriate places for putting up before competent authority.

(3) Prior sanction about overtime should be obtained from competent authority.

(4) Actual rate of output produced during the overtime period should be compared with normal rate of output.

(5) Periodical reports on overtime wages should be sent to top management for taking corrective action.

(6) If possible an upper limit may be fixed for each category of worker in respect of overtime.

Question-16

Enumerate the various methods of Time booking

Solution:

The various methods of time booking are:

(a) Job ticket.

(b) Combined time and job ticket.

(c) Daily time sheet.

(d) Piece work card.

(e) Clock card.

Question-17

Enumerate the remedial steps to be taken to minimize the labour turnover.

Solution:

The following steps are useful for minimizing labour turnover:

(a) *Exit interview*: An interview to be arranged with each outgoing employee to ascertain the reasons of his leaving the organization.

(b) *Job analysis and evaluation*: to ascertain the requirement of each job.

(c) Organization should make use of a scientific system of recruitment, placement and promotion for employees.

(d) Organization should create healthy atmosphere, providing education, medical and housing facilities for workers.

(e) Committee for settling workers grievances.

Question-18

Describe briefly, how wages may be calculated under the following systems:

(i) Gantt task and bonus system

(ii) Emerson's efficiency system

(iii) Rowan system

(iv) Halsey system

(v) Barth system.

Solution:

(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 made at a higher piece rate. The piece rate fixed also includes an element of bonus to the extent of 20%. Bonus is calculated over the time rate.

(ii) **Emerson's Efficiency System:** Under this system wages may be calculated as below:

Performance		*Wages*
Below 66⅔% efficiency	–	Time rate without any bonus
66⅔% - 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 is fixed for the performance of a job and bonus is paid if time is saved.

$$\text{Total Wages} = (\text{Time taken} \times \text{Time Rate}) + \left(\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Time Rate}\right)$$

(iv) **Halsey System:** Under this system a 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.

Total Wages = (Time taken $\times$ Time rate) + (50% of time saved $\times$ time rate)

(v) **Barth System:**

$$\text{Earnings} = \text{Hourly rate} \times \sqrt{\text{Standard hours} \times \text{Hours worked}}$$

This is particularly suitable for trainees and beginners and also for unskilled workers.

Question-19

Discuss accounting treatment of idle capacity costs in cost accounting.

Solution:

Treatment of Idle Capacity Cost

(a) If idle capacity is due to unavoidable reasons such as repairs & maintenance, changeover of job etc., a supplementary overhead rate may be used to recover the idle capacity cost. In this case, the costs are charged to production capacity utilized.

(b) If idle capacity cost is due to avoidable reasons such as faulty planning, power failure etc, the cost should be charged to Costing P&L A/c.

(c) If idle capacity is due to seasonal factors, then the cost should be charged to cost of production by inflating overhead rates.

Question-20

Enumerate the causes of labour turnover.

Solution:

Causes of Labour Turnover: The main causes of labour turnover in an organisation/ industry can be broadly classified under the following three heads:

(a) Personal Causes;

(b) Unavoidable Causes; and

(c) Avoidable Causes.

Personal causes are those which induce or compel workers to leave their jobs; such causes include the following:

(i) Change of jobs for betterment.

(ii) Premature retirement due to ill health or old age.

(iii) Domestic problems and family responsibilities.

(iv) Discontent over the jobs and working environment.

Unavoidable causes are those under which it becomes obligatory on the part of management to ask one or more of their employees to leave the organisation; such causes are summed up as listed below:

(i) Seasonal nature of the business;

(ii) Shortage of raw material, power, slack market for the product etc.;

(iii) Change in the plant location;

(iv) Disability, making a worker unfit for work;

(v) Disciplinary measures.

Avoidable causes are those which require the attention of management on a continuous basis so as to keep the labour turnover ratio as low as possible. The main causes under this case are indicated below:

(i) Dissatisfaction with job, remuneration, hours of work, working conditions, etc.,

(ii) Strained relationship with management, supervisors or fellow workers;

(iii) Lack of training facilities and promotional avenues;

(iv) Lack of recreational and medical facilities;

(v) Low wages and allowances.

SECTION-B

Calculation of Labour Turnover

Question 1

From the following information, calculate Labour turnover rate and Labour flux rate:

No. of workers as on 01.01.2013 = 7,600

No. of workers as on 31.12.2013 = 8,400

During the year, 80 workers left while 320 workers were discharged 1,500 workers were recruited during the year of these, 300 workers were recruited because of exits and the rest were recruited in accordance with expansion plans.

Solution:

Labour turnover rate:

It comprises of computation of labour turnover by using following methods:

(i) Separation Method:

$$= \frac{\text{No. of workers left + No. of workers discharged}}{\text{Average number of workers}} \times 100$$

$$= \frac{(80+320)}{(7{,}600+8{,}400)\div 2} \text{x } 100 \qquad = \frac{400}{8{,}000} \times 100 = 5\%$$

(ii) Replacement Method:

$$= \frac{\text{No. of workers replaced}}{\text{Average number of workers}} \text{x}100 = \frac{300}{8{,}000} \times 100 = 3.75\%$$

(iii) New Recruitment:

$$= \frac{\text{No. of workers newly recruited}}{\text{Average number of workers}} \times 100$$

$$= \frac{\text{No. Recruitments - No. of Replacements}}{\text{Average number of workers}} \times 100$$

$$= \frac{1{,}500-300}{8{,}000} \times 100 \qquad = \frac{1{,}200}{8{,}000} \times 100 = 15\%$$

Flux Method:

$$= \frac{\text{No. of separations + No. of accessions}}{\text{Average number of workers}} \times 100$$

$$= \frac{(400+1500)}{(7{,}600+8{,}400) \div 2} \times 100 \qquad = \frac{1{,}900}{8{,}000} \times 100 = 23.75\%$$

Question-2

Accountant of your company had computed labour turnover rates for the quarter ended 30th September, 2013 as 14%, 8% and 6% under Flux method, Replacement method and Separation method respectively. If the number of workers replaced during 2nd quarter of the financial year 2013-14 is 36, find the following:

(i) The number of workers recruited and joined; and

(ii) The number of workers left and discharged.

Solution:

Labour Turnover Rate (Replacement method) $= \frac{\text{No. of workers replaced}}{\text{Average No. of workers}}$

Or, $\frac{8}{100} = \frac{36}{\text{Average No. of workers}}$

Or, Average No. of workers = 450

Labour Turnover Rate (Separation method) = $\frac{\text{No. of workers separated}}{\text{Average No. of workers}}$

Or, $\frac{6}{100} = \frac{\text{No. of workers separated}}{450}$

Or, No. of workers separated = 27

Labour Turnover Rate (Flux Method) = $\frac{\text{No. of Separations} + \text{No. of accession (Joinings)}}{\text{Average No. of workers}}$

or, $\frac{14}{100} = \frac{27 + \text{No. of accessions (Joinings)}}{450}$

or, 100 (27 + No. of Accessions) = 6,300

or, No. of Accessions = 36

(i) The No. of workers recruited and Joined = 36

(ii) The No. of workers left and discharged = 27

Question-3

Corrs Consultancy Ltd. is engaged in BPO industry. One of its trainee executives in the Personnel department has calculated labour turnover rate 24.92% for the last year using Flux method.

Following is the some data provided by the Personnel department for the last year:

Employees	***At the beginning***	***Joined***	***Left***	***At the end***
Data Processors	*540*	*1,080*	*60*	*1,560*
Payroll Processors	*?*	*20*	*60*	*40*
Supervisors	*?*	*60*	*---*	*?*
Voice Agents	*?*	*20*	*20*	*?*
Assistant Managers	*?*	*20*	*---*	*30*
Senior Voice Agents	*4*	*---*	*---*	*12*
Senior Data Processors	*8*	*---*	*---*	*34*
Team Leaders	*?*	*---*	*---*	*?*
Employees transferred from the Subsidiary Company				
Senior Voice Agents	*---*	*8*	*---*	*---*

Senior Data Processors	---	*26*	---	---
Employees transferred to the Subsidiary Company				
Team Leaders	---	---	*60*	---
Assistant Managers	---	---	*10*	---

At the beginning of the year there were total 772 employees on the payroll of the company. The opening strength of the Supervisors, Voice Agents and Assistant Managers were in the ratio of 3 : 3 : 2.

The company has decided to abandon the post of Team Leaders and consequently all the Team Leaders were transferred to the subsidiary company.

The company and its subsidiary are maintaining separate set of books of account and separate Personnel Department.

You are required to calculate:

(a) Labour Turnover rate using Replacement method and Separation method.

(b) Verify the Labour turnover rate calculated under Flux method by the trainee executive of the Corrs Consultancy Ltd.

Solution:

Working Notes:

(i) Calculation of no. of employees at the beginning and end of the year

	At the Beginning of the year	**At the end of the year**
Data Processors	540	1,560
Payroll Processors [Left- 60 + Closing- 40 – Joined- 20]	80	40
Supervisors*	30	90
Voice Agents*	30	30
Assistant Managers*	20	30
Senior Voice Agents	4	12
Senior Data Processors	8	34
Team Leaders	60	0
Total	**772**	**1,796**

(*) **At the beginning of the year:**

Strength of Supervisors, Voice Agents and Asst. Managers =

[772 – {540 + 80 + 4 + 8 + 60} employees] or [772 – 692 = 80 employees]

[{Supervisors- $80\times\frac{3}{8}$ = 30, Voice Agents- $80\times\frac{3}{8}$ = 30 & Asst. Managers- $80\times\frac{2}{8}$ = 20} employees]

At the end of the year:

[Supervisor-(Opening- 30 + 60 Joining) = 90; Voice Agents- (Opening- 30 + 20 Joined – 20 Left) = 30]

(ii) No. of Employees Separated, Replaced and newly recruited during the year

Particulars	Separations	New Recruitment	Replacement	Total Joining
Data Processors	60	1,020	60	1,080
Payroll Processors	60	--	20	20
Supervisors	--	60	--	60
Voice Agents	20	--	20	20
Assistant Managers	10	10	10	20
Sr. Voice Agents	--	8	--	8
Sr. Data Processors	--	26	--	26
Team Leaders	60	--	--	--
Total	**210**	**1,124**	**110**	**1,234**

(Since, Corrs Consultancy Ltd. and its subsidiary are maintaining separate Personnel Department, so transfer-in and transfer-out are treated as recruitment and separation respectively.)

(a) Calculation of Labour Turnover:

Replacement Method $= \frac{\text{No. of employees replaced during the year}}{\text{Average no. of employees on roll}}\times 100$

$= \frac{110}{(772+1,796)/2}\times 100 = \frac{110}{1,284}\times 100 = 8.57\%$

Separation Method $= \frac{\text{No. of employees separated during the year}}{\text{Average no. of employees on roll}}\times 100$

$= \frac{210}{1,284}\times 100 = 16.36\%$

(b) Labour Turnover under Flux Method:

$$= \frac{\text{No. of employees (Joined + Separated) during the year}}{\text{Average no. of employees on roll}} \times 10$$

$$= \frac{\text{No. of employees (Replaced + New recruited + Separated) during the year}}{\text{Average no. of employees on roll}} \times 100$$

$$= \frac{1,234 + 210}{1,284} \times 10 = 112.46\%$$

Labour Turnover calculated by the executive trainee of the Personnel department is incorrect as it has not taken the No. of new recruitment while calculating the labour turnover under Flux method.

Question-4

Human Resources Department of A Ltd. computed labour turnover by replacement method at 3% for the quarter ended June 2015. During the quarter, fresh recruitment of 40 workers was made. The number of workers at the beginning and end of the quarter was 990 and 1,010 respectively.

You are required to calculate the labour turnover rate by Separation Method and Flux Method.

Solution:

Labour Turnover by Replacement Method $= \frac{\text{No. of workers replaced during the quarter}}{\text{Average no. of workers on roll during the quarter}}$

Or, 0.03 $= \frac{\text{No. of workers replaced during the quarter}}{(990 + 1,010) \div 2}$

Or, No. of workers replaced during the quarter = 0.03 × 1,000 = 30 workers

(i) Labour Turnover by Separation Method

$$= \frac{\text{No. of workers separated during the quarter}}{\text{Average no. of workers on roll during the quarter}} \times 100$$

$$= \frac{\text{Worker at begining + Fresh recruitment + Replacements – Workers at closing}}{\text{Average no. of workers on roll during the quarter}} \times 100$$

$$= \frac{990 + 40 + 30 - 1,010}{(990 + 1,010) \div 2} \times 100 = \frac{50 \text{ workers}}{1,000 \text{ workers}} \times 100 = 5\%$$

(ii) Labour Turnover by Flux Method

$$= \frac{\text{No. of workers (Separated + Replaced + Fresh Recruitment) during the quarter}}{\text{Average no. of workers on roll during the quarter}} \times 100$$

$$= \frac{50+30+40}{(990+1{,}010)\div 2} \times 100 \qquad = \frac{120 \text{ workers}}{1{,}000 \text{ workers}} \times 100 \qquad = 12\%$$

Question-5

X Y Z Ltd. wants to ascertain the profit lost during the year 2013-14 due to increased labour turnover. For this purpose, they have given you the following information:

(1) Training period of the new recruits is 50,000 hours. During this period their productivity is 60% of the experienced workers. Time required by an experienced worker is 10 hours per unit.

(2) 20% of the output during training period was defective. Cost of rectification of a defective unit was ₹ 25.

(3) Potential productive hours lost due to delay in recruitment were 1,00,000 hours.

(4) Selling price per unit is ₹ 180 and P/V ratio is 20%.

(5) Settlement cost of the workers leaving the organization was ₹ 1,83,480.

(6) Recruitment cost was ₹1,56,340

(7) Training cost was ₹1,13,180.

You are required to calculate the profit lost by the company due to increased labour turnover during the year 2013-14.

Solution:

Output by experienced workers in 50,000 hours = $\frac{50{,}000}{60}$ = 5,000 units

∴ Output by new recruits = 60% of 5,000 = 3,000 units

Less of output = 5,000 – 3,000 = 2,000 units

Total loss of output = 10,000 + 2,000 = 12,000 units

Contribution per unit = 20% of 180 = ₹ 36

Total contribution cost = 36 × 12,000 = ₹ 4,30,000

Cost of repairing defective units = 3,000 × 0.2 × 25 = ₹ 15,000

Profit forgone due to labour turnover

	(₹)
Loss of Contribution	4,32,000
Cost of repairing defective units	15,000
Recruitment cost	1,56,340

Training cost	1,13,180
Settlement cost of workers leaving	1,83,480
Profit forgone in 2013-14	9,00,000

Calculation of Effective hourly wages rate, Incentives and Total earnings

Question-6

ZED Limited is working by employing 50 skilled workers, it is considering the introduction of 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 earnings of the workers; it could act as sufficient incentive for them to produce more.

Because of assurance, the increase in productivity has been observed as revealed by the figures for the month of April, 2014.

Hourly rate of wages (guaranteed)	*₹ 30*
Average time for producing one unit by one worker at the previous performance (This may be taken as time allowed)	*1.975 hours*
Number of working days in the month	*24*
Number of working hours per day of each worker	*8*
Actual production during the month	*6,120 units*

Required:

(i) Calculate the effective rate of earnings under the Halsey scheme and the Rowan scheme.

(ii) Calculate the savings to the ZED Limited in terms of direct labour cost per piece.

(iii) Advise ZED Limited about the selection of the scheme to fulfill their assurance.

Solution:

Working notes:

1. Computation of time saved (in hours) per month:

(Standard production time for 6,120 units) – (Actual time taken by the workers)

= (6,120 units × 1.975 hours) – (24 days × 8 hours per day × 50 skilled workers)

= (12,087 hours – 9,600 hours)

= 2,487 hours

2. Computation of bonus for time saved under Halsey and Rowan schemes:

Time saved = 2,487 hours
(Refer to working note 1)

Wage rate per hour = ₹ 30

Bonus under Halsey Scheme = ½ × 2,487 hours × ₹ 30
(With 50% bonus) = ₹ 37,305

Bonus under Rowan Scheme = $\frac{\text{Time saved}}{\text{Time allowed}}$ × Time taken × Rate per hour

= $\frac{2{,}487 \text{ hours}}{12{,}087 \text{ hours}} \times 9{,}600 \text{ hours} \times ₹\ 30$

= ₹ 59,258.38

(i) Computation of effective rate of earnings under the Halsey and Rowan scheme:

Total earnings (under Halsey scheme) (Refer to working note 2)

= Time wages + Bonus

= (24 days × 8 hours + 50 skilled workers × ₹ 30) + ₹ 37,305

= ₹ 2,88,000 + ₹ 37,305 = ₹ 3,25,305

Total earnings (under Rowan scheme) (Refer to working note 2)

= Time wages + Bonus

= ₹ 2,88,000 + ₹ 59,258.38

= ₹ 3,47,258.38

Effective rate of earnings per hour (under Halsey Plan) = $\frac{₹3{,}25{,}305}{9{,}600 \text{ hours}}$ = ₹ 33.89

Effective rate of earnings per hour (under Rowan Plan) = $\frac{₹3{,}47{,}258.38}{9{,}600 \text{ hours}}$ = ₹ 36.17

(ii) Savings to the ZED Ltd., in terms of direct labour cost per piece:

	(₹)
Direct labour cost (per unit) under time wages system (1.975 hours per unit × ₹ 30)	59.25
Direct labour cost (per unit) under Halsey Plan $\left(\frac{₹3{,}25{,}305}{6{,}120 \text{ units}}\right)$	53.15

Direct labour cost (per unit) under Rowan Plan $\left(\frac{₹3,47,258.38}{6,120\text{units}}\right)$ 56.74

Saving of direct labour cost under:

Halsey Plan (₹ 59.25 – ₹ 53.15) ₹ 6.10

Rowan Plan (₹ 59.25 – ₹ 56.74) ₹ 2.51

(iii) Advise to ZED Ltd.: ***(about the selection of the scheme to fulfill assurance)***

Halsey scheme brings more savings to the management of ZED Ltd., over the present earnings of ₹ 2,88,000 but the other scheme i.e. Rowan scheme fulfils the promise of 20% increase over the present earnings of ₹ 2,88,000 by paying 20.58% in the form of bonus. Hence Rowan Plan may be adopted.

Question-7

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		
	A	*B*	*C*
Actual hours worked in a week	*38*	*40*	*34*
Hourly rate of wages	*₹ 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 ₹ 0.10

You are required to calculate the wages of each worker under:

(i) Guaranteed hourly rates basis

(ii) Piece work earnings basis, but guaranteed at 75% of basic pay (guaranteed hourly rate) if his earnings are less than 50% of basic pay.

(iii) Premium bonus basis where the worker receives bonus based on Rowan scheme.

Solution:

(i) Computation of wages of each worker under guaranteed hourly rate basis

Workers	Actual hours worked in a week	Hourly rate of wages (₹)	Wages (₹)
(a)	(b)	(c)	(d) = (b) × (c)
A	38	6.00	228.00
B	40	5.00	200.00
C	34	7.20	244.80

(ii) Computation of wages of each worker under piece work earnings basis

		Worker A		Worker B		Worker C	
Product	Rate per unit	Units	Wages (₹)	Units	Wages (₹)	Units	Wages (₹)
(a)	(b)	(c)	(d= b*c)	(e)	(f = b*e)	(g)	(h=b*g)
P	1.20	21	25.20	-	-	60	72
Q	1.80	36	64.80	-	-	135	243
R	3.00	46	138.00	25	75	-	-
			228.00		75.00		315.00

Since each worker has been guaranteed at 75% of basic pay, if his earnings are less than 50% of basic pay (guaranteed hourly rate), therefore, earning of the workers will be as follows Workers A and C will be paid the wages as computed viz., ₹ 228 and ₹ 315 respectively. The computed earnings under piece rate basis for worker B is ₹ 75 which is less than 50% of basic pay i.e., ₹ 100 (₹ 200 × 50) therefore he would be paid ₹ 150 i.e. 75% × ₹ 200 .

Working Notes:

1. Piece rate / per unit

Product	Standard time per unit in minutes	Piece rate each minute (₹)	Piece rate per unit (₹)
(a)	(b)	(c)	(d) = (b) × (c)
P	12	0.10	1.20
Q	18	0.10	1.80
R	30	0.10	3.00

2. Time allowed to each worker

Worker A = (21 units × 12 minutes) + (36 units × 18 minutes) + (46 units × 30 minutes)

= 2,280 minutes or 38 hours

Worker B = 25 units × 30 minutes

= 750 minutes or 12.5 hours

Worker C = (60 units × 12 minutes) + (135 units × 18 minutes)

= 3,150 minutes or 52.5 hours

(iii) Computation of wages of each worker under Premium bonus basis (where each worker receives bonus based on Rowan Scheme)

Workers	Time allowed hours	Time taken hours	Time saved hours	Wage rate/hour (₹)	Earnings (₹)	Bonus (₹)	Total of earning & bonus (₹)
A	38.00	38.00	-	6.00	228.00	-	228.00
B	12.50	40.00	-	5.00	200.00	-	200.00
C	52.50	34.00	18.50	7.20	244.80	86.26*	331.06

* Bonus under Rowan scheme $= \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour}$

$= \frac{18.5 \text{ hours}}{52.5 \text{ hours}} \times 34 \text{ hours} \times ₹\ 7.20$

= ₹ 86.26

Question-8

The finishing shop of a company employs 60 direct workers. Each worker is paid ₹ 400 as wages per week of 40 hours. When necessary, overtime is worked up to 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 up to the specified limit although no premium on incentives will be paid.

The company is considering introduction of either Halsey Scheme or Rowan Scheme of wages incentive system. The budgeted weekly output is 19,200 units. The selling price is ₹ 11 per unit and the direct material cost is ₹ 8 per unit. The variable overheads amount to ₹ 0.50 per direct labour hour and the fixed overhead is ₹ 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.

Solution:

Working notes:

1.	Total available hours per week (60 workers × 40 hours)	2,400
2.	Total standard hours required to produce 19,200 units (19,200 units ÷ 6 units per hour)	3,200
3.	Total labour hours required after the introduction of bonus scheme to produce 19,200 units (19,200 units ÷ 8 units per man hour)	2,400
4.	Time saved in hours (3,200 hours – 2,400 hours)	800
5.	Wage rate per hour (₹) (₹ 400 ÷ 40 hours)	10

6. Bonus:

(i) Halsey Scheme $= \frac{1}{2} \times$ Time saved × Wage rate per hour

$$= \frac{1}{2} \times 800 \text{ hours} \times ₹\ 10 = ₹\ 4{,}000$$

(ii) Rowan Scheme $= \frac{\text{Time saved}}{\text{Time allowed}} \times$ Time taken × Wage rate per hour

$$= \frac{800 \text{ hours}}{3{,}200 \text{ hours}} \times 2{,}400 \text{ hours} \times ₹\ 10 = ₹\ 6{,}000$$

Statement showing the effect on the company's weekly present profit by the introduction of Halsey & Rowan schemes

	Present (₹)	Halsey (₹)	Rowan (₹)
Sales revenue: (A) (19,200 units × ₹11)	2,11,200	2,11,200	2,11,200
Direct material cost (19,200 units × ₹ 8)	1,53,600	1,53,600	1,53,600
Direct wages (Refer to working notes 2 & 3)	32,000 (3,200 hrs. × ₹10)	24,000 (2,400 hrs. × ₹10)	24,000 (2,400 hrs. × ₹10)
Overtime premium	4,000 (800 hrs.× ₹ 5)	-	-
Bonus (Refer to working notes 6 (i) & (ii))	-	4,000	6,000

Variable overheads	1,600 (3,200 hr.×₹0.50)	1,200 (2,400 hr.×₹0.50)	1,200 (2,400 hr.×₹0.50)
Fixed overheads	9,000	9,000	9,000
Total cost : (B)	2,00,200	1,91,800	1,93,800
Profit: {(A)- (B)}	11,000	19,400	17,400

Question-9

The standard hours of job X is 100 hours. The job has been completed by Amar in 60 hours, Akbar in 70 hours and Anthony in 95 hours.

The bonus system applicable to the job is as follows:-

Percentage of time saved to time allowed (Slab rate)	*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 41% to 100%	*25% of time saved*

The rate of pay is ₹ 1 per hour, Calculate the total earnings of each worker and also the rate of earnings per hour.

Solution:

Statement of total earnings and rate of earning per hour

	Workers		
	Amar	**Akbar**	**Anthony**
Standard hours of Job	100 hours	100 hours	100 hours
Time taken on the Jobs (i)	60 hours	70 hours	95 hours
Time saved	40 hours	30 hours	5 hours
Percentage of time saved to time allowed	40%	30%	5%
Bonus hours (ii) (See Working Note 1)	6.5 hours	4.5 hours	0.5 hours
Total hours to be paid [(i) + (ii)]	66.5 hours	74.5 hours	95.5 hours
Total earning @ ₹ 1 per hour	₹ 66.5	₹ 74.5	₹ 95.5
Rate of earning per hour (See Working Note 2)	₹ 1.1083	₹ 1.0642	₹ 1.005

Note:

1. Bonus hours as percentage of time saved:

   Amar : (10 hours × 10%) + (10 hours × 15%) + (20 hours × 20%) = 6.5 hours

Akbar	:	(10 hours × 10%) + (10 hours × 15%) + (10 hours × 20%)	= 4.5 hours
Anthony	:	5 hours × 10%	= 0.5 hours

2. Rate of Earning per hour:

$$= \frac{\text{Total earning}}{\text{Total time taken on the job}}$$

Amar : $\frac{₹\ 66.5}{60\ \text{hours}} = ₹\ 1.1083$

Akbar : $\frac{₹\ 74.5}{70\ \text{hours}} = ₹\ 1.0642$

Anthony : $\frac{₹\ 95.50}{95\ \text{hours}} = ₹\ 1.005$

Question-10

The existing Incentive system of Alpha Limited 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 hours*
Piece-work rate	:	*Add 20% to basic piece-rate*
Premium Bonus	:	*Add 50% to time.*

Required:

(i) *Prepare a Statement showing hours worked, weekly earnings, number of articles produced and labour cost per article for one operator under the following systems:*

(a) *Existing time-rate*

(b) *Straight piece-work*

(c) *Rowan system*

(d) *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.

Solution:

Table showing Labour Cost per Article

Method of Payment	Hours worked	Weekly earnings (₹)	Number of articles produced	Labour cost per article (₹)
Existing time rate (WN-1)	49	8,425.00	120	70.21
Straight piece rate system (WN-2)	40	8,640.00	135	64.00
Rowan Premium System (WN-3)	40	9,007.41	135	66.72
Halsey Premium System (WN-4)	40	8,600.00	135	63.70

Working Notes:

1. Existing time rate

Weekly wages:

Normal shift	(40 hours × ₹ 160)	₹ 6,400
Late shift	(9 hours × ₹ 225)	₹ 2,025
		₹ 8,425

2. Piece Rate System

15 articles are produced in 5 hours

Therefore, to produce 135 articles, hours required is $\frac{5\,\text{hours}}{15\,\text{articles}} \times 135\,\text{articles}$ = 45 hours.

Cost of producing 135 articles:

At basic time rate (45 hours × ₹160) = ₹ 7,200

Add: Bonus @ 20% on basic Piece rate

$\left(\frac{₹7,200}{135\,\text{articles}} \times 20\% \times 135\,\text{articles}\right)$ = ₹ 1,440

Earning for the week ₹ 8,640

3. Rowan Premium System

(i) Time allowed for producing 135 articles $\left(\frac{5\,\text{hours}}{15\,\text{articles}} \times 135\,\text{articles} \times 150\%\right)$ = 67.5 hours

(ii) Time taken to produce 135 articles = 40.0 hours

(iii) Time Saved = 27.5 hours

Earnings under Rowan Premium system:

$$= (\text{Time taken} \times \text{Rate per hour}) + \left(\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour}\right)$$

$$= (40\,\text{hours} \times ₹160) + \left(\frac{27.5\,\text{hours}}{67.5\,\text{hours}} \times 40\,\text{hours} \times ₹160\right) = ₹\ 9{,}007.41$$

4. Halsey Premium System

$$= (\text{Time taken} \times \text{Rate per hour}) + (\frac{1}{2} \times \text{Time saved} \times \text{Rate per hour})$$

$$= (40\,\text{hours} \times ₹160) + \left(\frac{1}{2} \times 27.5\,\text{hours} \times ₹160\right) = ₹6{,}400 + ₹2{,}200 \quad = ₹8{,}600$$

Question-11

'Under the Rowan Premium Bonus system, a less efficient worker can obtain same bonus as a highly efficient worker.' Discuss with suitable examples

Solution:

Bonus under Rowan system = $\frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate per hour}$

The statement that under Rowan Premium bonus system, a less efficient worker and a highly efficient worker can obtain same amount of bonus, can be proved with the help of an example. Let time allowed for a job is 4 hours and Labour rate per hour is ₹ 5.

Case I : Less efficient worker, If time taken = 3 hours.

Bonus = $\frac{3\,\text{hours}}{4\,\text{hours}} \times 1\,\text{hour} \times ₹\ 5 = ₹\ 3.75$

Case II : Highly efficient worker, If time taken = 1 hour

Bonus = $\frac{1\,\text{hour}}{4\,\text{hours}} \times 3\,\text{hours} \times ₹\ 5 = ₹\ 3.75$

So, it can be concluded that under Rowan System, the less efficient worker and highly efficient worker can get the same bonus.

Question-12

Using Taylor's differential piece rate system, find the earning of Anderson from the following particulars:

Standard time per piece	*12 minutes*
Normal rate per hour	*₹ 20*
In a 8 hours day, Anderson produced	*37 Units*

Solution:

Standard output per day $\left(\frac{8\,\text{hours} \times 60\,\text{minutes}}{12\,\text{minutes}}\right)$ = 40 units

Actual output = 37 units

Efficiency (%) = $\frac{37\,\text{units}}{40\,\text{units}} \times 100$ = 92.5%

Under the Taylor's differential piece rate system lower rate is 83% of the normal piece rate and is applicable if efficiency of worker is below 100%.

Earning rate per unit = $83\% \times \frac{₹20}{5\,\text{units}^*}$ = ₹ 3.32 per unit

Earning of Anderson = 37 units × ₹ 3.32 = ₹122.84

* In one hour, production will be = $\frac{60\,\text{minutes}}{12\,\text{minutes}} = 5\,\text{units}$

Question 13

Standard output in 10 hours is 240 units; actual output in 10 hours is 264 units. Wages rate is ₹ 10 per hour. Calculate the amount of bonus and total wages under Emerson efficiency Plan.

Solution:

Efficiency (%) = $\frac{264}{240} \times 100 = 110\%$

As per Emerson efficiency plan, in case of above 100% efficiency, bonus of 20% of basic wages plus 1% for each 1% increase in efficiency is admissible.

So, new bonus percentage = 20 + (110 – 100) = 30

Amount of Bonus = $\frac{30}{100}$ (Hours worked × Rate per hour)

= $\frac{30}{100} \times 10\,\text{hours} \times ₹10 = ₹\ 30$

Total wages = (10 hours × ₹10) + ₹30 = ₹ 130.

Question 14

Two workmen, Andrew and Baker, produce the same product using the same material. Andrew is paid bonus according to Halsey plan, while Baker is paid bonus according to Rowan plan. The time allowed to manufacture the product is 100 hours. Andrew has taken 60 hours and Baker has taken 80 hours to complete the product. The normal hourly rate of wages of workman Andrew is ₹ 24 per hour. The total earnings of both the workers are same. Calculate normal hourly rate of wages of workman Baker.

Solution:

	Andrew	**Baker**
Time allowed (Hours)	100	100
Time taken (Hours)	60	80
Time saved (Hours)	40	20
Let the rate of wages of the worker Baker is 'L' per hour		
Normal Wages	₹ 1,440 (60 hours× ₹24)	₹ 80 L (80 hours× L)
Bonus	₹ 480*	₹ 16 L**
Total earnings	₹ 1,920	₹ 96 L

* Bonus under Halsey system $= \frac{1}{2} \times \text{Time saved} \times \text{Rate per hour}$

$= \frac{1}{2} \times 40 \text{ hours} \times ₹24 = ₹480$

** Bonus under Rowan system $= \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time worked} \times \text{Rate per hour}$

$= \frac{20 \text{ hours}}{100 \text{ hours}} \times 80 \text{ hours} \times L = 16\ L$

According to the problem,

Total earnings of Andrew = Total earnings of Baker

₹ 1,920 = ₹ 96 L

L = ₹ 20

Therefore, Hourly rate of wages of Baker is ₹ 20 per hour.

Question 15

Standard Time for a job is 90 hours. The hourly rate of guaranteed wages is ₹ 50. Because of the saving in time a worker A gets an effective hourly rate of wages of ₹ 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 under Rowan Plan is ₹ 10 i.e.(₹ 60 – ₹ 50)

This is Equal to $\frac{\text{Time Saved}}{\text{Time Allowed}} \times \text{Rate per hour}$ (Please refer Working Note)

Or, $\frac{\text{Time Saved}}{\text{Time Allowed}} \times ₹50 = ₹10$

Or, $\frac{\text{Time Saved}}{90\text{ hours}} \times ₹50 = ₹10$

Therefore, Time Saved = 18 hours and Time Taken is 72 hours i.e. (90 hours – 18 hours)

Effective Hourly Rate under Halsey System:

Time saved = 18 hours

Bonus @ 40% = 18 hours × 40% × ₹ 50 = ₹ 360

Total Wages = (₹50 × 72 hours + ₹360) = ₹ 3,960

Effective Hourly Rate = ₹ 3,960 ÷ 72 hours = ₹ 55

Working Note:

Effective hourly rate = $\frac{(\text{Time Taken} \times \text{Rate per hour}) + \frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Rate per hour}}{\text{Time Taken}}$

Or, $₹ 60 = \frac{\text{Time Taken} \times \text{Rate per hour}}{\text{Time Taken}} + \frac{\frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Rate per hour}}{\text{Time Taken}}$

Or, $₹ 60 - \frac{\text{Time Taken} \times \text{Rate per hour}}{\text{Time Taken}} = \frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Rate per hour} \times \frac{1}{\text{Time Taken}}$

Or, $₹ 60 - ₹ 50 = \frac{\text{Time Saved}}{\text{Time Allowed}} \times ₹50$

Question 16

You are given the following information of a worker:

(i) Name of worker : Mr. Roger

(ii) Ticket No. : 002

(iii)	*Work started*	:	*1-4-14 at 8 a.m.*
(iv)	*Work finished*	:	*5-4-14 at 12 noon*
(v)	*Work allotted*	:	*Production of 2,160 units*
(vi)	*Work done and approved*	:	*2,000 units*
(vii)	*Time and units allowed*	:	*40 units per hour*
(viii)	*Wage rate*	:	*₹ 25 per hour*

(ix) Mr. Roger worked 9 hours a day.

You are required to calculate the remuneration of Mr. Roger on the following basis:

(i) Halsey plan and

(ii) Rowan plan

Solution:

No. of units produced and approved = 2,000 units

Standard time = 40 units per hour

Hourly Wage Rate = ₹ 25

Time allowed $= \frac{2{,}000\,\text{units}}{40\,\text{units}}$ = 50 hours

Time Taken = (4 days × 9 hours) + 4 hours = 40 hours

(i) Calculation of Remuneration under Halsey Plan:

Standard time allowed for 2,000 units :	50 hours
Actual time taken for 2,000 units :	40 hours
Time saved	10 hours
Basic wages for time taken 40 hours @ ₹ 25	₹ 1,000
Bonus: 50% of time saved $(\frac{50}{100} \times 10\,\text{hours} \times ₹25)$	₹ 125
Total remuneration	₹ 1,125

(ii) Calculation of Remuneration under Rowan Plan:

Wages for time taken 40 hours @ ₹ 25 ₹ 1,000

Bonus $= \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Hourly rate}$

$= \frac{10\,\text{hours}}{50\,\text{hours}} \times 40\,\text{hours} \times ₹25$ = ₹ 200

Total remuneration ₹ 1,200

Question 17

Mr. Michael executes a piece of work in 120 hours as against 150 hours allowed to him. His hourly rate is ₹ 10 and he gets a dearness allowance @ ₹ 30 per day of 8 hours worked in addition to his wages. You are required to calculate total wages received by Mr. Michael under the following incentive schemes:

(i) Rowan Premium Plan, and

(ii) Emerson's Efficiency Plan

Solution:

Time Allowed = 150 hours

Time Taken = 120 hours

Time Saved = 30 hours

(i)	Rowan Premium Plan	(₹)
	Normal wages (₹ 10 x 120 hours)	1,200
	D.A. for 15 days i.e. $\frac{120\,\text{hours}}{8\,\text{hours}}$ (₹30 x 15 days)	450
	Bonus : $= \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Hourly rate}$	
	$= \frac{30\,\text{hours}}{150\,\text{hours}} \times 120\,\text{hours} \times ₹10$	240
	Total Wages	1,890
(ii)	Emersion`s Efficiency Plan	
	Normal wages (120 hours × ₹ 10)	1,200
	D.A. (15 days x ₹ 30)	450
	Bonus * = 45% × ₹1,200	540
	Total Wages	2,190

* Efficiency $= \frac{\text{Time Allowed}}{\text{Time Taken}} \times 100 = \frac{150}{120} \times 100 = 125\ \%$

Rate of Bonus up to 100%	=	20%
From 101% to 125%	=	25%
		45%

Question 18

The management of a company wants to formulate an incentive plan for the workers with a view to increase productivity. The following particulars have been extracted from the books of company:

Piece Wage rate ₹ 10

Weekly working hours 40

Hourly wages rate ₹ 40 (guaranteed)

Standard/normal time per unit 15 minutes.

Actual output for a week:

Worker A:	*176 pieces*
Worker B:	*140 pieces*

Differential piece rate: 80% of piece rate when output below normal and 120% of piece rate when output above normal.

Under Halsey scheme, worker gets a bonus equal to 50% of Wages of time saved.

Calculate:

(i) Earning of workers under Halsey's and Rowan's premium scheme.

(ii) Earning of workers under Taylor's differential piece rate system and Emerson's efficiency plan.

Solution:

Calculation of earnings for workers under different incentive plans:

(i) Halsey's Premium Plan:

	Worker – A	**Worker – B**
Actual time taken	40 hours	40 hours
Standard time for actual Production	44 hours $(\frac{176 \text{ Pcs} \times 15 \text{ Min.}}{60 \text{ Min.}})$	35 hours $(\frac{140 \text{ Pcs} \times 15 \text{ Min.}}{60 \text{ Min.}})$
Minimum Wages	₹ 1,600 (40 hours x ₹ 40)	₹ 1,600 (40 hours x ₹ 40)
Bonus	₹ 80 {50% (44-40) x ₹40}	No bonus
Earning	<u>₹ 1,680</u>	<u>₹ 1,600</u>
Rowan's Premium Plan:		
Minimum Wages (as above)	₹ 1,600	₹ 1,600
Bonus	= ₹ 145.45 $(\frac{4\text{ hours}}{44\text{ hours}} \times 40\text{ hours} \times ₹40)$	No bonus

	Earning	₹ 1,745.45	₹ 1,600
(ii)	**Taylor's differential Piece rate**		
	Efficiency	110%	87.5%
		$(\frac{176\,pcs.}{160\,pcs.}\times100)$	$(\frac{140\,pcs.}{160\,pcs.}\times100)$
	Earning	₹ 2,112	₹ 1,120
		(₹10 x 120% x 176 pcs.)	(₹10 x 80% x 140 pcs.)
	Emerson's efficiency Plan		
	Time Wages	1,600	1,600
		(₹ 40 x 40 hours)	(₹ 40 x 40 hours)
	Bonus	480	320
		(20+10)% of (₹40x40 hrs)	(20% of 1,600)
	Earning	₹ 2,080	₹ 1,920

Question 19

What are the main features of Halsey and Rowan method of payment of remuneration? State how Rowan Scheme is better than Halsey Scheme. Given time allowed of 30 hours for a job and the wage rate of ₹ 1.00 per hour, illustrate your answer by assuming your own figure for time taken to do the job.

Solution:

F.A. Halsey, an American engineer, brought out his plan in 1891. The main features of his plan were as follows:

(i) Time rate is guaranteed.

(ii) Standard time is fixed for the job or operation.

(iii) In case a worker completes the job or operation in less time than allowed time (or standard time) he is paid a fixed percentage of saving in time, which is usually 50%.

(iv) Under this plan, the employer is benefited to the extent of remaining 50% of time saved.

Employer is not protected against over speeding jobs by workers resulting in waste, damages etc.

Rowan Scheme was introduced by James Rowan in Glasgow in the year 1898. It is similar to Halsey Scheme but the premium concept here is different. The main features of Rowan Scheme are:

(i) Time rate is guaranteed.

(ii) Bonus is based on time saved.

(iii) Instead of fixed percentage of time saved, bonus is in proportion of time saved to time allowed.

(iv) Protects employer against loose rate setting.

(v) Employer shares the benefit of increased output.

The Rowan Scheme is better than Halsey Scheme because of the following reasons:

(i) In Halsey Scheme, bonus is set at 50% of time saved. It does not serve as a strong incentive. If workers over speed, the quality of the products deteriorates.

(ii) In Rowan Scheme, there is an automatic check on the earnings and thus over speeding is arrested. In Halsey Scheme if two third of the time is saved, the worker can double his earning per hour and in Rowan Scheme, this is not possible.

(iii) The earning per hour in Rowan Scheme is higher upto 50% of time saved and falls thereafter whereas in Halsey Scheme the earnings per hour increases at a slow speed and can be doubled.

Consider the following example in which the time allowed for performing the job is 30 hours and the wage rate is ₹ 1.00 per hour. We will depict with the help of imaginary figures in the following example, how the earnings per hour under Halsey and Rowan plan will vary.

Example:

Time Allowed	*Time taken*	*Wages (₹)*	*Bonus (₹)*		*Total Wages (₹)*		*Earning per hour(₹)*	
			*Halsey**	*Rowan***	*Halsey*	*Rowan*	*Halsey*	*Rowan*
(1)	*(2)*	*(3)=(2)× ₹1*	*(4)*	*(5)*	*(6)=(3)+(4)*	*(7)=(3)+(5)*	*(8)= (6)/(2)*	*(9)= (7)/(2)*
30	30	30	-	-	30.00	30.00	1.00	1.00
30	20	20	5.00	6.67	25.00	26.67	1.25	1.33
30	15	15	7.50	7.50	22.50	22.50	1.50	1.50
30	10	10	10.00	6.67	20.00	16.67	2.00	1.67
30	5	5	12.50	4.17	17.50	9.17	3.50	1.83

* Bonus under Halsey Plan = 50% of (Time Allowed – Time Taken) × Rate per hour

** Bonus under Rowan Plan = $\frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate per hour}$

Question 20

A skilled worker is paid a guaranteed wage rate of ₹ 120 per hour. The standard time allowed for a job is 6 hour. He took 5 hours to complete the job. He is paid wages under Rowan Incentive Plan.

(i) Calculate his effective hourly rate of earnings under Rowan Incentive Plan.

(ii) If the worker is placed under Halsey Incentive Scheme (50%) and he wants to maintain the same effective hourly rate of earnings, calculate the time in which he should complete the job.

Solution:

(i) Effective hourly rate of earnings under Rowan Incentive Plan

Earnings under Rowan Incentive plan =

$$(\text{Actual time taken} \times \text{wage rate}) + \frac{\text{Time Saved}}{\text{Time Allowed}} \times \text{Time taken} \times \text{Wage rate}$$

$$= (5 \text{ hours} \times ₹120) + \left(\frac{1 \text{ hour}}{6 \text{ hours}} \times 5 \text{ hours} \times ₹\ 120\right)$$

$$= ₹\ 600 + ₹100 = ₹700$$

Effective hourly rate = ₹700/5 hours = ₹ 140 /hour

(ii) Let time taken = X

$$\therefore \text{ Effective hourly rate} = \frac{\text{Earnings under Halsay Scheme}}{\text{Time Taken}}$$

Or, Effective hourly rate under Rowan Incentive plan =

$$\frac{(\text{Time taken} \times \text{Rate}) + 50\%\ \ \text{Rate} \times (\text{Time allowed} - \text{Time taken})}{\text{TimeTaken}}$$

Or, $₹140 = \dfrac{(X \times ₹120) + 50\%\ \ ₹120 \times (6 - X)}{X}$

Or, $140X = 120X + 360 - 60X$

Or, $80X = 360$

Or, $X = \dfrac{360}{80} = 4.5$ hours

Therefore, to earn effective hourly rate of ₹140 under Halsey Incentive Scheme worker has to complete the work in 4.5 hours.

Question 21

A, B and C are three industrial workers working in Sports industry and are experts in making cricket pads. A, B and C are working in Mahi Sports, Virat Sports and Sikhar Sports companies respectively. Workers are paid under different incentive schemes. Company wise incentive schemes are as follows:

Company	*Incentive scheme*
Mahi Sports	*Emerson's efficiency system*
Virat Sports	*Merrick differential piece rate system*
Sikhar Sports	*Taylor's differential piece work system*

The relevant information for the industry is as under:

Standard working hours	*8 hours a day*
Standard output per hour (in units)	*2*
Daily wages rate	*₹ 360*
No. of working days in a week	*6 days*

Actual outputs for the week are as follows:

A	*B*	*C*
132 units	*108 units*	*96 units*

You are required to calculate effective wages rate and weekly earnings of all the three workers.

Solution:

Calculation of effective wages rate and weekly earnings of the workers A, B and C

Workers	A	B	C
Standard Output	96 units (8 hrs. × 2 units × 6 days)	96 units (8 hrs. × 2 units × 6 days)	96 units (8 hrs. × 2 units × 6 days)
Actual Output	132 units	108 units	96 units
Efficiency (%)	$\frac{132\text{units}}{96\text{units}}\times100 = 137.5$	$\frac{108\text{units}}{96\text{units}}\times100 = 112.5$	$\frac{96\text{units}}{96\text{units}}\times100 = 100$
Daily wages Rate	₹ 360	₹ 360	₹ 360
Incentive system	Emerson's Efficiency System	Merrick differential piece rate system	Taylor's differential piece work system
Rate of Bonus	57.5% of time rate (20% + 37.5%)	20% of ordinary piece rate	25% of ordinary piece rate

Effective Wage Rate	₹ 70.875 per hour $\left(\frac{₹\ 360}{8\text{hours}} \times 157.5\%\right)$	₹ 27 per piece $\left(\frac{₹\ 360}{16\text{units}} \times 120\%\right)$	₹ 28.125 per piece $\left(\frac{₹\ 360}{16\text{units}} \times 125\%\right)$
Total weekly earnings	₹ 3,402 (8 hours × 6 days × ₹ 70.875)	₹ 2,916 (108 units × ₹ 27)	₹ 2,700 (96 units × ₹ 28.125)

Question 22

Jigyasa Boutiques LLP. (JBL) takes contract on job works basis. It works for various fashion houses and retail stores. It has employed 26 workers and pays them on time rate basis. On an average an employee is allowed 2 hours for boutique work on a piece of garment. In the month of March 2014, two workers Margaret and Jennifer were given 30 pieces and 42 pieces of garments respectively for boutique work. The following are the details of their work:

	Margaret	*Jennifer*
Work assigned	*30 pcs.*	*42 pcs.*
Time taken	*28 hours*	*40 hours*

Workers are paid bonus as per Halsey System. The existing rate of wages is ₹ 50 per hour. As per the new wages agreement the workers will be paid ₹ 55 per hour w.e.f. 1st April 2014. At the end of the month March 2014, the accountant of the company has calculated wages to these two workers taking ₹ 55 per hour.

(i) From the above information calculate the amount of loss that the company has incurred due to incorrect rate selection.

(ii) What would be the loss incurred by the JBL due to incorrect rate selection if it had followed Rowan scheme of bonus payment.

(iii) Amount that could have been saved if Rowan scheme of bonus payment was followed.

(iv) Do you think Rowan scheme of bonus payment is suitable for JBL?

Solution:

	Margaret	Jennifer
No. of garments assigned (Pieces.)	30	42
Hour allowed per piece (Hours)	2	2
Total hours allowed (Hours)	60	84
Hours Taken (Hours)	28	40
Hours Saved (Hours)	32	44

(i) Calculation of loss incurred due to incorrect rate selection.

(While calculating loss only excess rate per hour has been taken)

	Margaret (₹)	Jennifer (₹)	Total (₹)
Basic Wages	140 (28 Hrs. × ₹ 5)	200 (40 Hrs. × ₹ 5)	340
Bonus (as per Halsey Scheme) (50% of Time Saved × Excess Rate)	80 (50% of 32 Hrs. × ₹ 5)	110 (50% of 44 Hrs. × ₹ 5)	190
Excess Wages Paid	220	310	530

(ii) Amount of loss if Rowan scheme of bonus payment were followed

	Margaret (₹)	Jennifer (₹)	Total (₹)
Basic Wages	140.00 (28 Hrs. × ₹ 5)	200.00 (40 Hrs. × ₹ 5)	340.00
Bonus (as per Rowan Scheme) $\left(\frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Excess Rate}\right)$	74.67 $\left(\frac{28}{60} \times 32 \times ₹ 5\right)$	104.76 $\left(\frac{40}{84} \times 44 \times ₹ 5\right)$	179.43
Excess Wages Paid	214.67	304.76	519.43

(iii) Calculation of amount that could have been saved if Rowan Scheme were followed

	Margaret (₹)	Jennifer (₹)	Total (₹)
Wages paid under Halsey Scheme	220.00	310.00	530.00
Wages paid under Rowan Scheme	214.67	304.76	519.43
Difference (Savings)	5.33	5.24	10.57

(iv) Rowan Scheme of incentive payment has the following benefits, which is suitable with the nature of business in which Jigyasa Boutique LLP operates:

(a) Under Rowan Scheme of bonus payment, workers cannot increase their earnings or bonus by merely increasing its work speed. Bonus under Rowan Scheme is maximum when the time taken by a worker on a job is half of the time allowed. As this fact is known to the workers, therefore, they work at such a speed which helps them to maintain the quality of output too.

(b) If the rate setting department commits any mistake in setting standards for time to be taken to complete the works, the loss incurred will be relatively low.

Computation of Labour Cost

Question 23

Two workers 'A' and 'B' produce the same product using the same material. Their normal wage rate is also the same. 'A' is paid bonus according to Rowan scheme while 'B' is paid bonus according to Halsey scheme. The time allowed to make the product is 50 hours. 'A' takes 30 hours while 'B' takes 40 hours to complete the product. The factory overhead rate is ₹ 5 per person-hour actually worked. The factory cost of product manufactured by 'A' is ₹ 3,490 and for product manufactured by 'B' is ₹ 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.

Solution:

Workings:

1. Let 'M' be the cost of material and 'L' be the normal rate of wages per hour

	Worker A (₹)	Worker B (₹)
Material cost	M	M
Labour wages	30 L	40 L
Bonus	12 L*	5 L**
Overheads (30 hours × ₹5); (40 hours × ₹5)	150	200
Factory cost {M + (30 L + 12 L) + 150 = 3,490} {M + (40 L + 5 L) + 200 = 3,600}	M + 42 L = 3,340 ....(i)	M + 45 L = 3,400.... (ii)

* Bonus under Rowan system $= \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time worked} \times \text{Rate per hour}$

$= \frac{20\,\text{hours}}{50\,\text{hours}} \times 30\,\text{hours} \times L = 12\ L$

** Bonus under Halsey system $= \frac{1}{2} \times \text{Time saved} \times \text{Rate per hour}$

$= \frac{1}{2} \times 10\,\text{hours} \times L = 5\ L$

2. Solving (i) and (ii) to get the value of 'M' and 'L'

$$\begin{aligned} M + 42\,L &= 3{,}340 \ldots\ldots\ldots\ldots (i) \\ \underline{M + 45\,L} &\underline{= 3{,}400 \ldots\ldots\ldots\ldots (ii)} \\ -\ 3\,L &= -\,60 \\ L &= 20 \end{aligned}$$

By substituting the value of 'L' in (i), we will get the value of M

$M + 42 \times 20 = 3{,}340$ or, $M = 2{,}500$

(i) Normal rate of wages is ₹ 20 per hour. (Working Note – 2)

(ii) Cost of materials = ₹ 2,500. (Working Note – 2)

(iii) **Comparative Statement of factory cost**

	Worker A (₹)	Worker B (₹)
Material cost	2,500	2,500
Wages (30 hours × ₹ 20); (40 hours × ₹ 20)	600	800
Bonus (12 × 20); (5 × 20)	240	100
Overheads (30 hours × ₹ 5); (40 hours × ₹ 5)	150	200
Factory cost	3,490	3,600

Question 24

Calculate the earnings 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*	*₹ 100*	*₹ 160*
(ii)	*Dearness Allowance*	*50%*	*50%*
(iii)	*Contribution to provident Fund (on basic wages)*	*8%*	*8%*
(iv)	*Contribution to Employees' State Insurance (on basic wages)*	*2%*	*2%*
(v)	*Overtime*	*10 hours*	

The normal working hours for the month are 200. Overtime is paid at double the total of normal wages and dearness allowance. Employer's contribution to state Insurance and Provident Fund are at equal rate with employees' contributions. The two workers were employed on jobs X, Y and Z in the following proportions:

	Jobs		
	X	*Y*	*Z*
Worker A	*40%*	*30%*	*30%*
Worker B	*50%*	*20%*	*30%*

Overtime was done on job Y.

Solution:

Statement showing Earnings of Workers A and B

Workers	**A (₹)**	**B (₹)**
Basic Wages	100.00	160.00
Dearness Allowance (50% of Basic Wages)	50.00	80.00
Overtime Wages (Refer to Working Note 1)	15.00	----
Gross Wages earned	165.00	240.00
Less: Provident Fund (8% × ₹100); (8% × ₹160)	(8.00)	(12.80)
– ESI (2% × ₹100); (2% × ₹160)	(2.00)	(3.20)
Net Wages paid	155.00	224.00

Statement of Labour Cost

	A (₹)	**B (₹)**
Gross Wages (excluding overtime)	150.00	240.00
Employer's contribution to P.F. and E.S.I.	10.00	16.00
	160.00	256.00
Ordinary wages Labour Rate per hour (₹160 ÷ 200 hours); (₹256 ÷ 200 hours)	0.80	1.28

Statement Showing Allocation of Wages to Jobs

	Total Wages	**Jobs**		
		X	**Y**	**Z**
Worker A				
Ordinary Wages (4:3:3)	160.00	64.00	48.00	48.00
Overtime	15.00	--	15.00	--
Worker B				
Ordinary Wages(5:2:3)	256.00	128.00	51.20	76.80
	431.00	192.00	114.20	124.80

Working Notes

1. Normal Wages are considered as basic wages

Over time $= \dfrac{2 \text{ x } (\text{Basic wage} + \text{D.A.}) \text{ x } 10 \text{ hours}}{200 \text{ hours}}$

$= 2 \text{ x } \dfrac{₹150}{200} \text{ x } 10 \text{ hours}$

$= 1.50 \times 10$ hours $=$ ₹15

Question-25

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*	*0.65*
2	*25 minutes*	*B*	*0.50*
3	*10 minutes*	*C*	*0.40*
4	*30 minutes*	*D*	*0.35*
5	*20 minutes*	*E*	*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 operations required, the labour cost per dozen and the total labour cost per week to produce the total targeted output.

Solution:

Statement of number of operators required and labour cost per dozen and per week. Production target is 600 dozen or 7,200 article per week.

Particulars	**Operation No.**					**Total**
	1	**2**	**3**	**4**	**5**	
Time per article (minutes)	15	25	10	30	20	
Total time in hours for production. of 600 dozen $\left(\frac{600 \text{ doz.} \times 12}{60 \text{ min.}} = 120\right)$	1,800 (120 × 15min.)	3,000 (120 × 25 min.)	1,200 (120 × 10 min.)	3,600 (120 × 30 min.)	2,400 (120 × 20 min.)	
No. of operators	45	75	30	90	60	300

$\left(\frac{\text{Total time}}{40 \text{ hours}}\right)$						
Labour cost per dozen (₹) $\frac{\text{Total time} \times \text{Rate per hour}}{600 \text{ dozen}}$	1.95	2.50	0.80	2.10	1.20	8.55
Labour cost per week (₹) (Cost per doz. × 600 doz.)	1,170	1,500	480	1,260	720	5,130

Question 26

Arnav Limited manufactures and sales plastic chairs. It pays wages under the differential piece rate system by following F.W. Taylor's System with a standard piece rate of ₹ 12.50 per unit of chair produced by the workers. Standard production per hour is 4 chairs. Each worker is supposed to work 8 hours a day from Monday to Friday and 5 hours on Saturday. Presently, there are 118 workers who are entitled for this plan.

The plant and machinery used to manufacture the chairs was purchased long back and does not match with the efficiency of the workers. Workers appraised their concerns to the management and demanded wages on the time rate basis i.e. ₹ 50 per hour and the incentive under the Halsey Premium plan.

The following production estimates has been made for the month of November, 2015 under the three scenarios:

Scenario	***Worst case***	***Optimal case***	***Best case***
Production (in units)	*42,400*	*84,960*	*1,27,400*

Required:

(a) Calculate total wages and average wages per worker per month, under the each scenario, when

(i) Current system of wages and incentive payment system is followed

(ii) Workers' demand for time rate wages and Halsey premium plan is accepted.

(b) Mr. K, during the month of October 2015, has produced 1,050 units. What will be impact on his earning if he will be able to produce the same number of units in next month also. Should he support the workers' demand?

(Take 4 working weeks in a month)

Solution:

(a) Calculation of Total wages and average wages per worker per month.

(i) When Current system of wages and incentive payment system is followed:

		Worst case	Optimal case	Best case
I	Standard Production (in units) (45 hours × 4 units × 4 weeks × 118 workers)	84,960	84,960	84,960
II	No. of units to be produced	42,400	84,960	1,27,400
III	Efficiency {(II ÷ I) × 100}	49.91%	100%	149.95%
IV	Differential piece rate*	₹10 (₹12.5× 0.8)	₹15 (₹12.5 × 1.2)	₹15 (₹12.5 × 1.2)
V	Total Wages (II × IV)	₹4,24,000	₹12,74,400	₹19,11,000
VI	Average wages per worker (V ÷ 118)	₹3,593.22	₹10,800	₹16,194.92

*For efficiency less than 100%, 83% of piece rate and for efficiency more than or equals to 100%, 125% of piece rate may also be taken.

(ii) When workers' demand for time rate wages and Halsey premium plan is accepted:

		Worst case	Optimal case	Best case
I	No. of units expected to be produced (units)	42,400	84,960	1,27,400
II	Standard no. units in an hour (units)	4	4	4
III	Standard Hours (I ÷ II)	10,600	21,240	31,850
IV	Expected working hours (45 hours × 4 weeks × 118 workers)	21,240	21,240	21,240
V	Hours to be saved (III – IV)	--	--	10,610
VI	Time wages (IV × ₹50)	₹10,62,000	₹10,62,000	₹10,62,000
VII	Incentive under Halsey Premium Plan $\left(\frac{1}{2} \times \text{Time saved} \times ₹\ 50\right)$	--	--	₹2,65,250
VIII	Total Wages (VI +VII)	₹10,62,000	₹10,62,000	₹13,27,250
IX	Average wages per worker (VIII ÷ 118)	₹9,000	₹9,000	₹11,247.88

(b) Calculation of gain or loss in the current monthly income of Mr. K:

	Wages earned in October 2015:	
	Standard production unit (45 hours × 4 weeks × 4 units)	720 units
	No. of units produced	1,050 units
	Efficiency	145.83%
	Differential piece rate (refer the above part)	₹15
I	Total wages (1,050 units × ₹15)	₹15,750
	Expected wages under the new scheme	
	Standard hours (1,050 units ÷ 4 units)	262.50 hours
	Expected hours to be taken (45 hours × 4 weeks)	180 hours
	Time saved	82.50 hours
	Time wages (180 hours × ₹50)	₹9,000
	Incentive $\left(\frac{1}{2} \times \text{Time saved} \times ₹50\right)$	₹2,062.50
II	Total expected wages	₹11,062.50
	Loss from the proposed scheme (II – I)	₹4,687.50

Supporting the demand of colleague workers will cost ₹4,687.50 in the next month to Mr. K.

Miscellaneous

Question 27

If the 'activity ratio' and 'capacity ratio' of a company is 104% and 96% respectively, find out its 'efficiency ratio'.

Solution:

Efficiency Ratio can be obtained by dividing the activity ratio by capacity ratio as follows:-

$$\text{Efficiency Ratio} = \frac{\text{Activity ratio}}{\text{Capacity ratio}} \text{x} 100$$

$$= \frac{104\%}{96\%} \text{x} 100 = 108.33\%$$

The inter – relationship is shown below:

$$\text{Activity Ratio} = \frac{\text{Std. hours for actual production}}{\text{Budgeted Hours}} \text{x} 100$$

Capacity ratio $= \dfrac{\text{Actual working hours}}{\text{Budgeted hours}} \times 100$

Efficiency ratio $= \dfrac{\text{Std. hours for actual production}}{\text{Actual hours worked}} \times 100$

i.e. Efficiency Ratio $= \dfrac{\text{Activity Ratio}}{\text{Capacity Ratio}}$

$$= \frac{\text{Std. hours for actual production}}{\text{Budgeted hours}} \times \frac{\text{Budgeted hours}}{\text{Actual hours worked}}$$

$$= \frac{\text{Std. hours for actual production}}{\text{Actual hours worked}} \times 100$$

Activity Ratio = Capacity Ratio × Efficiency Ratio

4 Overheads

Basic Concepts

Overheads	Overheads represent expenditure on labour, materials or services that cannot be economically identified with specific saleable cost unit.
Types of Overheads on the Basis of Function	• Factory or Manufacturing Overheads • Office and Administration Overheads • Selling and Distribution Overheads • Research and Development Overheads
Types of Overheads on the Basis of Nature	• Fixed Overhead- Expenses that are not affected by any variation in the volume of activity. • Variable- Expenses that change in proportion to the change in the volume of activity. • Semi variable- The expenses that do not change when there is a small change in the level of activity but change whenever there is a slightly big change or change in the same direction as change in the level of activity but not in the same proportion.
Cost Allocation	The term 'allocation' refers to assignment or allotment of an entire item of cost to a particular cost center or cost unit.
Cost Apportionment	Apportionment implies the allotment of proportions of items of cost to cost centres or departments.
Re-apportionment	The process of assigning service department overheads to production departments is called reassignment or re-apportionment.
Absorption	The process of recovering overheads of a department or any other cost center from its output is called recovery or absorption.
	Methods used for Re-appointment
Direct Re-distribution Method	Under this method service department costs are apportioned over the production departments only, ignoring the services rendered by one service department to the other service department.
Step Method or Non-	This method gives cognizance to the service rendered by service department to another service department. The sequence here begins

reciprocal Method	with the department that renders service to the maximum number of other service departments.
Reciprocal Service Method	This method is used when different service departments render services to each other, in addition to rendering services to production departments. In such cases various service departments have to share overheads of each other. The methods available for dealing with reciprocal services are (a) Simultaneous equation method; (b) Repeated distribution method; (c) Trial and error method.
Simultaneous Equation Method	Under this method at first the costs of service department is ascertained with the help of equations and then the cost so ascertained is re-distributed to the production departments on the basis of given percentage.
Repeated Distribution Method	Under this method service departments' costs are distributed to other service and production departments on agreed percentages and this process continues to be repeated till the figures of service departments are either exhausted or reduced to a very small amount.
Trial and Error Method	Under this method the cost of one service department is apportioned to another service department/s. The cost of another service department plus the share received from the first cost centre is again apportioned to the first cost centre. This process is repeated till the amount to be apportioned becomes negligible.
	Methods for the Computation of the Overheads Rate
Percentage of Direct Material Method	Under this method, the cost of direct material consumed is taken as the base for calculating the amount of overhead absorbed.
Percentage of Prime Cost Method	This method is based on the fact that both materials as well as labour contribute in raising factory overheads. Hence, the total of the two (and other direct expenses) i.e. Prime cost are taken as base for absorbing the factory overhead.
Percentage of Direct Labour Cost Method	Under this method, the cost of direct labour is taken as the base for calculating the amount of overhead absorbed.
Labour Hour Rate Method	This method is an improvement on the percentage of direct labour cost method, as it fully recognises the significance of the time element in the incurring and absorbing the manufacturing overheads. Under this method, direct labour hours are taken as the base for calculating the amount of overhead absorbed.

Machine Hour Rate Method	Under this method, machine hours are taken as the base for calculating the amount of overhead absorbed.
	Types of Overhead Rates
Pre-determined Overhead Rate	This rate is determined in advance by estimating the amount of the overhead for the period in which it is to be used.
Blanket Overhead Rate	Blanket overhead rate refers to the computation of one single overhead rate for the whole factory. It is to be distinguished from the departmental overhead rate which refers to a separator
Departmental Overhead Rate	Where the product lines are varied or machinery is used to a varying degree in the different departments, i.e. where conditions throughout the factory are not uniform, the use of departmental rates is to be preferred for each individual cost centre or department.

Basic Formulae

Overhead Recovery Rate or Overhead Absorption Rate	$\text{Overhead Absorption Rate} = \dfrac{\text{Amount of overhead incurred}}{\text{Basis for absorption}}$
Predetermined Overhead Rate	Predetermined Overhead Rate = $\dfrac{\text{Budgeted overhead for the period}}{\text{Budgeted basis for the period}}$
Blanket Overhead Rate	Blanket Overhead Rate = $\dfrac{\text{Overhead cost for the entire factory for the period}}{\text{Base for the period (Total labour hours, total machine hours, etc.)}}$
Multiple Overhead Rate	Multiple Overhead Rate = $\dfrac{\text{Overheads allocated / apportioned to each Deptt.}}{\text{Corresponding base}}$
Variable Overhead in Semi-Variable Overhead	Variable Overhead Rate = $\dfrac{\text{Change in amount of expense}}{\text{Change in activity level or quantity}}$

SECTION-A

Question-1

What is blanket overhead rate? In which situations, blanket rate is to be used and why?

Solution:

Blanket overhead rate is one single overhead absorption rate for the whole factory. It may be computed by using the following formula:

$$\text{Blanket overhead rate} = \frac{\text{Overhead costs for the whole factory}}{\text{* Total units of the selected base}}$$

* The selected base can be the total output; total labour hours; machine hours etc.

Situation for using blanket rate:

The use of blanket rate may be considered appropriate for factories which produce only one major product on a continuous basis. It may also be used in those units in which all products utilise same amount of time in each department. If such conditions do not exist, the use of blanket rate will give misleading results in the determination of the production cost, specially when such a cost ascertainment is carried out for giving quotations for tenders.

Question-2

Discuss the step method and reciprocal service method of secondary distribution of overheads.

Solution:

Step method and Reciprocal Service method of secondary distribution of overheads

Step method: This method gives cognizance to the service rendered by service department to another service department, thus sequence of apportionments has to be selected. The sequence here begins with the department that renders service to the maximum number of other service department. After this, the cost of service department serving the next largest number of department is apportioned.

Reciprocal service method: This method recognises the fact that where there are two or more service department, they may render services to each other and, therefore, these inter departmental services are to be given due weight while re-distributing the expense of service department. The methods available for dealing with reciprocal servicing are:

- Simultaneous equation method
- Repeated distribution method
- Trial and error method

Question-3

Discuss the problems of controlling the selling and distribution overheads.

Solution:

Problems of controlling the selling & distribution overheads are

(i) The incidence of selling & distribution overheads depends on external factors such as distance of market, nature of competition etc. which are beyond the control of management.

(ii) They are dependent upon customers' behaviour, liking etc.

(iii) These expenses are of the nature of policy costs and hence not amenable to control.

The above problems of controlling selling & distribution overheads can be tackled by adopting the following steps:

(a) Comparing the figures of selling & distribution overhead with the figures of previous period.

(b) Selling & distribution overhead budgets may be used to control such overhead expenses by making a comparison of budgetary figures with actual figures of overhead expenses, ascertaining variances and finally taking suitable actions,

(c) Standards of selling & distribution expenses may be set up for salesmen, territories, products etc. The laid down standards on comparison with actual overhead expenses will reveal variances, which can be controlled by suitable action.

Question-4

Distinguish between cost allocation and cost absorption.

Solution:

Cost allocation and Cost absorption:

Cost allocation is the allotment of whole item of cost to a cost centre or a cost unit. In other words, it is the process of identifying, assigning or allowing cost to a cost centre or a cost, unit.

Cost absorption is the process of absorbing all indirect costs or overhead costs allocated or apportioned over particular cost center or production department by the units produced.

Question-5

Discuss in brief three main methods of allocating support departments costs to operating departments. Out of these three, which method is conceptually preferable?

Solution:

The three main methods of allocating support departments costs to operating departments are:

(i) *Direct re-distribution method:* Under this method, support department costs are directly apportioned to various production departments only. This method does not consider the service provided by one support department to another support department.

(ii) *Step method:* Under this method the cost of the support departments that serves the maximum numbers of departments is first apportioned to other support departments and production departments. After this the cost of support department serving the next largest number of departments is apportioned. In this manner we finally arrive on the cost of production departments only.

(iii) *Reciprocal service method:* This method recognises the fact that where there are two or more support departments they may render services to each other and, therefore, these inter-departmental services are to be given due weight while re-distributing the expenses of the support departments. The methods available for dealing with reciprocal services are:

   (a) Simultaneous equation method
   (b) Repeated distribution method
   (c) Trial and error method.

   The reciprocal service method is conceptually preferable. This method is widely used even if the number of service departments is more than two because due to the availability of computer software it is not difficult to solve sets of simultaneous equations.

Question-6

Explain Single and Multiple Overhead Rates.

Solution:

Single and Multiple Overhead Rates:

Single overhead rate: It is one single overhead absorption rate for the whole factory.

It may be computed as follows:

$$\text{Single overhead rate} = \frac{\text{Overhead costs for the entire factory}}{\text{Total quantity of the base selected}}$$

The base can be total output, total labour hours, total machine hours, etc.

The single overhead rate may be applied in factories which produces only one major product on a continuous basis. It may also be used in factories where the work performed in each department is fairly uniform and standardized.

Multiple overhead rate: It involves computation of separate rates for each production department, service department, cost center and each product for both fixed and variable overheads. It may be computed as follows:

Multiple overhead rate

$$= \frac{\text{Overhead allocated / appportioned to each department/ cost centre or product}}{\text{Corresponding base}}$$

Under multiple overheads rate, jobs or products are charged with varying amount of factory overheads depending on the type and number of departments through which they pass. However, the number of overheads rate which a firm may compute would depend upon two opposing factors viz. the degree of accuracy desired and the clerical cost involved.

Question-7

How do you deal with the following in cost accounts?

(i) Fringe benefits

(ii) Bad debts.

Solution:

Treatment of Cost Accounts

(i) *Fringe benefits:* the benefits paid to workers in every organisation in addition to their normal wages or salaries are known as fringe benefits. They include – Housing facility, children education allowance, holiday pay, leave pay, leave travel concession to home town or any place in India, etc.

Expenditure incurred on fringe benefits in respect of factory workers should be apportioned among all the production and service departments on the basis of the number of workers in each department.

(ii) *Bad debts:* There is no unanimity among various authors about the treatment of bad debts. Some authors believe that bad debts are financial losses and therefore should not be included in the cost of a particular product or job. Another view is that, bad debts are a part of selling and distribution overhead, especially where they arise in the normal course of trading. Therefore they should be treated in cost accounts in the same way as any other selling and distribution expense.

Question-8

Distinguish between fixed and variable overheads.

Solution:

Fixed and Variable Overheads: Fixed overheads do not vary with the volume of production within certain limits. In other words, the amount of fixed overhead tends to remain constant for volumes of production within the installed capacity of plant. For example, rent of office, salary of works manger, etc.

Variable overhead varies in direct proportion to the volume of production. It increases or decreases in direct relation to any increase or decrease in output.

Question-9

How would you treat the idle capacity costs in Cost Accounts?

Solution:

Treatment of idle capacity cost in Cost Accounts:

It is that part of the capacity of a plant, machine or equipment which cannot be effectively utilised in production. The idle capacity may arise due to lack of product demand, non availability of raw-material, shortage of skilled labour, shortage of power, etc. Costs associated with idle capacity are mostly fixed in nature. These costs remain unabsorbed or unrecovered due to under-utilisation of plant and service capacity. Idle capacity costs are treated in the following ways in Cost Accounts.

(i) If the idle capacity cost is due to unavoidable reasons - a supplementary overhead rate may be used to recover the idle capacity cost. In this case, the costs are charged to the production capacity utilised.

(ii) If the idle capacity cost is due to avoidable reasons - such as faulty planning, etc. the cost should be charged to Costing Profit and Loss Account.

(iii) If the idle capacity cost is due to trade depression, etc., - being abnormal in nature the cost should also be charged to the Costing Profit and Loss Account.

Question-10

Discuss the treatment in cost accounts of the cost of small tools of short effective life.

Solution:

Small tools are mechanical appliances used for various operations on a work place, specially in engineering industries. Such tools include drill bits, chisels, screw cutter, files etc.

Treatment of cost of small tools of short effective life:

(i) Small tools purchased may be capitalized and depreciated over life if their life is ascertainable. Revaluation method of depreciation may be used in respect of very small tools of short effective life. Depreciation of small tools may be charged to:

- Factory overheads
- Overheads of the department using the small tool.

(ii) Cost of small tools should be charged fully to the departments to which they have been issued, if their life is not ascertainable.

Question-11

Explain what do you mean by Chargeable Expenses and state its treatment in Cost Accounts.

Solution:

Chargeable expenses: All expenses, other than direct materials and direct labour cost which are specifically and solely incurred on production, process or job are treated as chargeable or direct expenses. These expenses in cost accounting are treated as part of prime cost,

Examples of chargeable expenses include - Rental of a machine or plant hired for specific job, royalty, and cost of making a specific pattern, design, drawing or making tools for a job.

Question-12

Define Selling and Distribution Expenses. Discuss the accounting for selling and distribution expenses.

Solution:

Selling expenses: Expenses incurred for the purpose of promoting, marketing and sales of different products.

Distribution expenses: Expenses relating to delivery and despatch of goods/products to customers.

Accounting treatment for selling and distribution expenses:

These expenses may be recovered by using any one of following method of recovery.

1. Percentage on cost of production / cost of goods sold.
2. Percentage on selling price.
3. Rate per unit sold.

Question-13

Indicate the base or bases that you would recommend to apportion overhead costs to production department:

(i) Supplies	*(ii) Repairs*
(iii) Maintenance of building	*(iv) Executive salaries*
(v) Rent	*(vi) Power and light*
(vii) Fire insurance	*(viii) Indirect labour.*

Solution:

Item	Bases of apportionment
(i) Supplies	Actual supplies made to different departments
(ii) Repair	Direct labour hours; Machine hours; Direct labour wages; Plant value.
(iii) Maintenance of building	Floor area occupied by each department
(iv) Executive salaries	Actual basis; Number of workers.
(v) Rent	Floor area
(vi) Power and light	K W hours or H P (power) Number of light points; Floor space; Meter readings (light)
(vii) Fire insurance	Capital cost of plant and building; Value of stock
(viii) Indirect labour	Direct labour cost.

Question-14

Explain briefly the conditions when supplementary rates are used.

Solution:

When the amount of under absorbed and over absorbed overhead is significant or large, because of differences due to wrong estimation, then the cost of product needs to be adjusted by using supplementary rates (under and over absorption/ actual overhead) to avoid misleading impression.

Question-15

Explain the cost accounting treatment of unsuccessful Research and Development cost.

Solution:

Cost of unsuccessful research is treated as factory overhead, provided the expenditure is normal and is provided in the budget. If it is not budgeted, it is written off to the profit and loss account. If the research is extended for long time, some failure cost is spread over to successful research.

Question-16

Discuss the difference between allocation and apportionment of overhead.

Solution:

The following are the differences between allocation and apportionment.

1. Allocation costs are directly allocated to cost centre. Overheads which cannot be directly allocated are apportioned on some suitable basis.

2. Allocation allots whole amount of cost to cost centre or cost unit where as apportionment allots part of cost to cost centre or cost unit.
3. No basis required for allocation. Apportionment is made on the basis of area, assets value, number of workers etc.

Question-17

Explain the treatment of over and under absorption of Overheads in Cost accounting.

Solution:

Treatment of over and under absorption of overheads are:-

(i) **Writing off to costing P&L A/c:–** Small difference between the actual and absorbed amount should simply be transferred to costing P&L A/c, if difference is large then investigate the causes and after that abnormal loss shall be transferred to costing P&L A/c.

(ii) **Use of supplementary Rate**: Under this method the balance of under and over absorbed overheads may be charged to cost of W.I.P., finished stock and cost of sales proportionately with the help of supplementary rate of overhead.

(iii) **Carry Forward to Subsequent Year:** Difference should be carried forward in the expectation that next year the position will be automatically corrected. This would really mean that costing data of two years would be wrong.

Question-18

What are the methods of re-apportionment of service department expenses over the production departments? Discuss.

Solution:

Methods of re-apportionment of service department expenses over the production departments

(i) Direct re-distribution method.

(ii) Step method or non-reciprocal method.

(iii) Reciprocal Service method

Direct re-distribution Method: Service department costs under this method are apportioned over the production departments only, ignoring services rendered by one service department to another. The basis of apportionment could be no. of workers. H.P of machines.

Step Method or Non-Reciprocal Method

This method gives cognizance to the service rendered by service department to another service department. Therefore, as compared to previous method, this method is more complicated because a sequence of apportionments has to be selected here. The sequence here begins with the department that renders service to the maximum number of other service departments.

Production Department			Service Department		
P_1	P	P_3	S_1	S_2	S_3
↑	↑	↑	↑	↑	↓
↑	↑	↑	↑	↓	
↑	↑	↑	↓		

Reciprocal Service Method

This method recognises the fact that where there are two or more service departments they may render service to each other and, there these inter-departmental services are to be given due weight while re-distributing the expenses of service department.

The methods available for dealing with reciprocal services are:

- Simultaneous equation method
- Repeated distribution method
- Trial & Error method.

SECTION-B

Calculation of Machine Hour Rate

Question-1

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 expense data relating to the machine are as under:

- *Cost of the machine is ₹ 5,00,000. Life 10 years. Estimated scrap value at the end of life is ₹ 20,000.*

		(₹)
–	*Repairs and maintenance per annum*	*60,480*
–	*Consumable stores per annum*	*47,520*
–	*Rent of building per annum (The machine under reference occupies 1/6 of the area)*	*72,000*
–	*Supervisor's salary per month (Common to three machines)*	*6,000*
–	*Wages of operator per month per machine*	*2,500*
–	*General lighting charges per month allocated to the machine*	*1,000*
–	*Power 25 units per hour at ₹ 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.

Required

Calculate a two-tier machine hour rate for (a) set up time, and (b) running time

Solution:

Working Notes:

1. (i) Effective hours for standing charges (208 hours – 8 hours) = 200 hours

   (ii) Effective hours for variable costs (208 hours – 28 hours) = 180 hours

2. Standing Charges per hour

	Cost per month (₹)	**Cost per hour (₹) (Cost per month ÷ 200 hours)**
Supervisor's salary $\left(\frac{₹\,6,000}{3\,\text{machines}}\right)$	2,000	10.00
Rent of building $\left(\frac{1}{6}\times\frac{₹\,72,000}{12\,\text{months}}\right)$	1,000	5.00
General lighting	1,000	5.00
Total Standing Charges	4,000	20.00

3. Machine running expenses per hour

	Cost per month (₹)	***Cost per hour (₹)***
Depreciation $\left(\frac{₹\,(5,00,000-20,000)}{10\,\text{years}}\times\frac{1}{12\,\text{months}}\right)$	4,000	20.00 $\left(\frac{₹4,000}{200\,\text{hours}}\right)$
Wages	2,500	12.50 $\left(\frac{₹2,500}{200\,\text{hours}}\right)$
Repairs & Maintenance $\left(\frac{₹\,60,480}{12\,\text{months}}\right)$	5,040	28.00 $\left(\frac{₹5,040}{180\,\text{hours}}\right)$
Consumable stores	3,960	22.00

$\left(\frac{₹\,47,520}{12\,\text{months}}\right)$		$\left(\frac{₹3,960}{180\,\text{hours}}\right)$
Power (25 units × ₹2 × 180 hours)	9,000	50.00
Total Machine Expenses	24,500	132.50

Computation of Two – tier machine hour rate

	Set up time rate per machine hour (₹)	***Running time rate per machine hour (₹)***
Standing Charges	20.00	20.00
Machine expenses **:**		
Depreciation	20.00	20.00
Repair and maintenance	–	28.00
Consumable stores	–	22.00
Power	–	50.00
Machine hour rate of overheads	40.00	140.00
Wages	12.50	12.50
Comprehensive machine hour rate	52.50	152.50

Question-2

A manufacturing unit has purchased and installed a new machine of ₹ 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 ₹ 70,000 as scrap at the end of its working life. Other relevant data are as follows:

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

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

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

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

(v) Electricity used by the machine during the production is 16 units per hour at a cost of ₹ 3 per unit. No electricity is consumed during unproductive maintenance and setting up time.

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

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

Solution:

Working Note:

1. Effective machine hour when set-up time is unproductive:

   = Budgeted working hours – (Maintenance time + Setting-up time)

   = [2,592 – (300 + 92)] hours. = 2,200 hours.

2. Effective machine hour when set-up time is productive:

   = Budgeted working hours – maintenance time

   = (2,592 - 300) hours. = 2,292 hours.

3. Operators' wages per annum

   Basic wages (4 operators × ₹420 × 54 weeks) = ₹ 90,720

   Add: Fringe benefits (15% of ₹90,720) = ₹ 13,608

   ₹1,04,328

4. Depreciation per annum

   $$\frac{₹12,70,000 - ₹70,000}{12\text{ years}} = ₹\ 1,00,000$$

5. Cost of special chemical solution

   324 days ÷ 6 days × ₹ 400 = ₹ 21,600

Computation of Machine hour Rate

	Amount p.a. (₹)	Amount per hour (₹) (when set-up time is unproductive)	Amount per hour (₹) (when set-up time is productive)
Standing charges			
Operators wages	1,04,328		
$\left(\frac{₹1,04,328}{8\text{ machines}} \times \frac{1}{2,200\text{ hours}}\right)$;		5.93	
$\left(\frac{₹1,04,328}{8\text{ machines}} \times \frac{1}{2,292\text{ hours}}\right)$			5.69

Departmental and general overhead (50,000 × 110%) $\left(\frac{₹55,000}{8\text{ machines}} \times \frac{1}{2,200\text{ hours}}\right)$; $\left(\frac{₹55,000}{8\text{ machines}} \times \frac{1}{2,292\text{ hours}}\right)$	55,000	3.13	3.00
(A)	1,59,328	9.06	8.69
Machine Expenses Depreciation $\left(\frac{₹1,00,000}{2,200\text{ hours}}\right)$; $\left(\frac{₹1,00,000}{2,292\text{ hours}}\right)$	1,00,000	45.45	43.63
Electricity (16 units × ₹3)		48.00	48.00
Special chemical solution $\left(\frac{₹21,600}{2,200\text{ hours}}\right)$; $\left(\frac{₹21,600}{2,292\text{ hours}}\right)$	21,600	9.82	9.42
Maintenance $\left(\frac{₹25,000}{2,200\text{ hours}}\right)$; $\left(\frac{₹25,000}{2,292\text{ hours}}\right)$	25,000	11.36	10.91
(B)		114.63	111.96
Machine Hour Rate (A + B)		123.69	120.65

Question-3

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

Original purchase price of the machine (subject to depreciation at 10% per annum on original cost)	*₹3,24,000*
Normal working hours for the month (The machine works for only 75% of normal capacity)	*200 hours*
Wages to Machine-man	*₹125 per day (of 8 hours)*
Wages to Helper (machine attendant)	*₹75 per day (of 8 hours)*
Power cost for the month for the time worked	*₹15,000*
Supervision charges apportioned for the machine centre	

for the month	*₹3,000*
Electricity & Lighting for the month	*₹7,500*
Repairs & maintenance (machine) including Consumable stores per month	*₹17,500*
Insurance of Plant & Building (apportioned) for the year	*₹16,250*
Other general expense per annum	*₹27,500*

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

Solution:

Effective machine hours = 200 hours × 75% = 150 hours

Computation of Comprehensive Machine Hour Rate

	Per month(₹)	Per hour (₹)
Fixed cost		
Supervision charges	3,000.00	
Electricity and lighting	7,500.00	
Insurance of Plant and building (₹16,250 ÷12)	1,354.17	
Other General Expenses (₹27,500÷12)	2,291.67	
Depreciation (₹32,400÷12)	2,700.00	
	16,845.84	112.31
Direct Cost		
Repairs and maintenance	17,500.00	116.67
Power	15,000.00	100.00
Wages of machine man		44.91
Wages of Helper		32.97
Machine Hour rate (Comprehensive)		406.86

Wages per machine hour

	Machine man	Helper
Wages for 200 hours		
Machine-man (₹125× 25)	₹3,125.00	---
Helper (₹75× 25)	---	₹1,875.00
Dearness Allowance (DA)	₹1,575.00	₹1,575.00
	₹4,700.00	₹3,450.00

Production bonus (1/3 of Basic and DA)	1,567.00	1,150.00
Leave wages (10% of Basic and DA)	470.00	345.00
	6,737.00	4,945.00
Effective wage rate per machine hour	₹44.91	₹32.97

Question-4

A machine shop cost centre contains three machines of equal capacities. To operate these three machines nine operators are required i.e. three operators on each machine. Operators are paid ₹20 per hour. The factory works for fourtyeight 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 forty eight 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 company for the purpose of computing machine hour rate includes the direct wages of the operator and also recoups the factory overheads allocated to the machines. The following details of factory overheads applicable to the cost centre are available:

- *Depreciation 10% per annum on original cost of the machine. Original cost of the each machine is ₹52,000.*
- *Maintenance and repairs per week per machine is ₹60.*
- *Consumable stores per week per machine are ₹75.*
- *Power : 20 units per hour per machine at the rate of 80 paise per unit.*
- *Apportionment to the cost centre : Rent per annum ₹5,400, Heat and Light per annum ₹9,720, foreman's salary per annum ₹12,960 and other miscellaneous expenditure per annum ₹18,000.*

Required:

(i) Calculate the cost of running one machine for a four week period.

(ii) Calculate machine hour rate.

Solution:

Effective Machine hour for four-week period

= Total working hours – unproductive set-up time

= {(48 hours × 4 weeks) – {(4 hours × 4 weeks)}

= (192 – 16) hours)   =176 hours.

(i) Computation of cost of running one machine for a four week period

		(₹)	(₹)
(A)	Standing charges (per annum)		
	Rent	5,400.00	
	Heat and light	9,720.00	
	Forman's salary	12,960.00	
	Other miscellaneous expenditure	18,000.00	
	Standing charges (per annum)	46,080.00	
	Total expenses for one machine for four week period $\left(\frac{₹46{,}080}{3\,\text{machines} \times 13\,\text{four}-\text{week period}}\right)$		1,181.54
	Wages (48 hours × 4 weeks × ₹ 20 × 3 operators)		11,520.00
	Bonus {(176 hours × ₹ 20 × 3 operators) × 10%}		1,056.00
	Total standing charges		13,757.54
(B)	Machine Expenses		
	Depreciation = $\left(₹52{,}000 \times 10\% \times \frac{1}{13\,\text{four - week period}}\right)$		400.00
	Repairs and maintenance (₹60 × 4 weeks)		240.00
	Consumable stores (₹ 75 × 4 weeks)		300.00
	Power (176 hours × 20 units × ₹ 0 .80)		2,816.00
	Total machine expenses		3,756.00
(C)	Total expenses (A) + (B)		17,513.54

(ii) Machine hour rate = $\frac{₹\ 17{,}513.54}{176\,\text{hours}} = ₹99.51$

Question-5

A machine costing ₹ 10 lakhs, was purchased on 1-4-2014. The expected life of the machine is 10 years. At the end of this period its scrap value is likely to be ₹ 10,000. The total cost of all the machines including new one was ₹ 90 lakhs.

The other information is given as follows:

(i) Working hours of the machine for the year was 4,200 including 200 non-productive hours.

(ii) Repairs and maintenance for the new machine during the year was ₹ 5,000.

(iii) Insurance Premium was paid for all the machine ₹ 9,000.

(iv) New machine consumes 8 units of electricity per hour, the rate per unit being ₹ 3.75

(v) The new machine occupies 1/10th area of the department. Rent of the department is ₹ 2,400 per month.

(vi) Depreciation is charged on straight line basis.

Compute machine hour rate for the new machine.

Solution:

Computation of machine hour rate of new Machine

	Total (₹)	Per hour (₹)
A. Standing Charges I. Insurance Premium ₹ 9,000 × $\frac{1}{9}$	1,000	
II. Rent $\frac{1}{10}$ × ₹2,400 ×12 months	2,880	
	3,880	0.97*
B. Machine expenses I. Repairs and Maintenance (₹5,000 ÷ 4,000 hours)		1.25
II. Depreciation $\left[\frac{₹10,00,000 - ₹10,000}{10\,\text{years} \times 4,000\,\text{hours}}\right]$		24.75
III. Electricity (8 units x ₹ 3.75)		30.00
Machine hour rate		56.97

Working Note

1 Calculation of productive Machine hour rate

Total hours	4,200
Less: Non-Productive hours	200
Effective machine hours	4,000

* ₹ 3,880 ÷ 4,000 hours = ₹ 0.97

Question-6

You are given the following information of the three machines of a manufacturing department of X Ltd.:

	Preliminary estimates of expenses (per annum)			
	Total (₹)	Machines		
		A (₹)	B (₹)	C (₹)
Depreciation	*20,000*	*7,500*	*7,500*	*5,000*
Spare parts	*10,000*	*4,000*	*4,000*	*2,000*
Power	*40,000*			
Consumable stores	*8,000*	*3,000*	*2,500*	*2,500*
Insurance of machinery	*8,000*			
Indirect labour	*20,000*			
Building maintenance expenses	*20,000*			
Annual interest on capital outlay	*50,000*	*20,000*	*20,000*	*10,000*
Monthly charge for rent and rates	*10,000*			
Salary of foreman (per month)	*20,000*			
Salary of Attendant (per month)	*5,000*			

(The foreman and the attendant control all the three machines and spend equal time on them.)

The following additional information is also available:

	Machines		
	A	B	C
Estimated Direct Labour Hours	*1,00,000*	*1,50,000*	*1,50,000*
Ratio of K.W. Rating	*3*	*2*	*3*
Floor space (sq. ft.)	*40,000*	*40,000*	*20,000*

There are 12 holidays besides Sundays in the year, of which two were on Saturdays. The manufacturing department works 8 hours in a day but Saturdays are half days. All machines work at 90% capacity throughout the year and 2% is reasonable for breakdown.

You are required to :

Calculate predetermined machine hour rates for the above machines after taking into consideration the following factors:

- *An increase of 15% in the price of spare parts.*
- *An increase of 25% in the consumption of spare parts for machine 'B' & 'C' only.*
- *20% general increase in wages rates.*

Solution:

(a) Computation of Machine Hour Rate

	Basis of apportionment	Total (₹)	Machines		
			A (₹)	B (₹)	C (₹)
(A) Standing Charges					
Insurance	Depreciation Basis (3:3:2)	8,000	3,000	3,000	2,000
Indirect Labour	Direct Labour (2:3:3)	24,000	6,000	9,000	9,000
Building maintenance expenses	Floor Space (2:2:1)	20,000	8,000	8,000	4,000
Rent and Rates	Floor Space (2:2:1)	1,20,000	48,000	48,000	24,000
Salary of foreman	Equal	2,40,000	80,000	80,000	80,000
Salary of attendant	Equal	60,000	20,000	20,000	20,000
Total standing charges		4,72,000	1,65,000	1,68,000	1,39,000
Hourly rate for standing charges			84.70	86.24	71.36
(B) Machine Expenses:					
Depreciation	Direct	20,000	7,500	7,500	5,000
Spare parts	Final estimates	13,225	4,600	5,750	2,875
Power	K.W. rating (3:2:3)	40,000	15,000	10,000	15,000
Consumable Stores	Direct	8,000	3,000	2,500	2,500
Total Machine expenses		81,225	30,100	25,750	25,375
Hourly Rate for Machine expenses			15.45	13.22	13.03
Total (A + B)		553,225	1,95,100	1,93,750	1,64,375
Machine Hour rate			100.15	99.46	84.38

Working Notes:

(i) Calculation of effective working hours:

No. of full off-days = No. of Sunday + No. of holidays

= 52 + 12 = 64 days

No. of half working days = 52 days – 2 holidays = 50 days

No. of full working days	= 365 days – 64 days – 50 days = 251 days
Total working Hours	= {(251 days × 8 hours) + (50 days × 4 hours)}
	= 2,008 hours + 200 = 2,208 hours.
Total effective hours	= Total working hours × 90% - 2% for break-down
	= 2,208 hours × 90% - 2% (2,208 hours × 90%)
	= 1,987.2 hours – 39.74 hours
	= 1947.46 or Rounded up to 1948 hours.

(ii) Amount of spare parts is calculated as under:

	A (₹)	B (₹)	C (₹)
Preliminary estimates	4,000	4,000	2,000
Add: Increase in price @ 15%	600	600	300
	4,600	4,600	2,300
Add: Increase in consumption @ 25%	–	1,150	575
Estimated cost	4,600	5,750	2,875

(iii) Amount of Indirect Labour is calculated as under:

	(₹)
Preliminary estimates	20,000
Add: Increase in wages @ 20%	4,000
	24,000

(iv) Interest on capital outlay is a finance cost, therefore it has been excluded from the cost accounts.

Question-7

M.L. Auto Ltd. is a manufacturer of auto components and the details of its expenses for the year 2014 are given below:

		(₹)
(i)	*Opening Stock of Material*	*1,50,000*
(ii)	*Closing Stock of Material*	*2,00,000*
(iii)	*Purchase of Material*	*18,50,000*
(iv)	*Direct Labour*	*9,50,000*
(v)	*Factory Overhead*	*3,80,000*
(vi)	*Administrative Overhead*	*2,50,400*

During 2015, the company has received an order from a car manufacturer where it estimates that the cost of material and labour will be ₹ 8,00,000 and ₹ 4,50,000 respectively. M.L. Auto Ltd. charges factory overhead as a percentage of direct labour and administrative overhead as a percentage of factory cost based on previous year's cost.

Cost of delivery of the components at customer's premises is estimated at ₹ 45,000.

You are required to:

(i) Calculate the overhead recovery rates based on actual costs for 2014.

(ii) Prepare a detailed cost statement for the order received in 2015 and the price to be quoted if the company wants to earn a profit of 10% on sales.

Solution:

(i) Calculation of Overhead Recovery Rate:

Factory Overhead Recovery Rate $= \frac{\text{Factory Overhead in 2014}}{\text{Direct Labour Costs in 2014}} \times 100$

$= \frac{₹\ 3,80,000}{₹\ 9,50,000} \times 100$ = 40% of Direct labour

Administrative Overhead Recovery Rate

$= \frac{\text{Administrative Overhead in 2014}}{\text{Factory Costs in 2014 (W.N.)}} \times 100$

$= \frac{₹\ 2,50,400}{₹\ 31,30,000} \times 100$ = 8% of Factory Cost

Working Note: Calculation of Factory Cost in 2014

Particulars	Amount (₹)
Opening Stock of Material	1,50,000
Add: Purchase of Material	18,50,000
Less: Closing Stock of Material	(2,00,000)
Material Consumed	18,00,000
Direct Labour	9,50,000
Prime Cost	27,50,000
Factory Overhead	3,80,000
Factory Cost	31,30,000

(ii) Detailed Cost Statement for the Order received from M.L. Auto Ltd. during 2015

Particulars	Amount (₹)
Material	8,00,000
Labour	4,50,000
Factory Overhead (40% of ₹ 4,50,000)	1,80,000
Factory Cost	14,30,000
Administrative Overhead (8% of ₹ 14,30,000)	1,14,400
Cost of delivery	45,000
Total Cost	15,89,400
Add: Profit @ 10% of Sales or 11.11% of cost or 1/9 of 15,89,400	1,76,600
Sales value (Price to be quoted for the order) (₹ 15,89,400 /0.9)	17,66,000

Hence the price to be quoted is ₹17,66,000 if the company wants to earn a profit of 10% on sales.

Under-absorption/ Over absorption of Overheads and use of Supplementary Rate

Question-8

ABC Ltd. manufactures a single product and absorbs the production overheads at a pre-determined rate of ₹10 per machine hour.

At the end of financial year 2013-14, it has been found that actual production overheads incurred were ₹ 6,00,000. It included ₹ 45,000 on account of 'written off' obsolete stores and ₹ 30,000 being the wages paid for the strike period under an award.

The production and sales data for the year 2013-14 is as under:

Production:	
Finished goods	*20,000 units*
Work-in-progress (50% complete in all respects)	*8,000 units*
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 2013-14; and

(ii) Show the accounting treatment of under – absorption of production overheads.

Solution:

(i) Amount of under-absorption of production overheads during the year 2013-14

		(₹)
Total production overheads actually incurred during the year 2013-14		6,00,000
Less: 'Written off' obsolete stores	₹ 45,000	
Wages paid for strike period	₹ 30,000	75,000
Net production overheads actually incurred: (A)		5,25,000
Production overheads absorbed by 48,000 machines hours @ ₹10 per hour: (B)		4,80,000
Amount of under-absorption of production overheads: [(A)–(B)]		45,000

(ii) Accounting treatment of under absorption of production overheads: It is given in the statement of the question that 20,000 units were completely finished and 8,000 units were 50% complete, one third of the under-absorbed overheads were due to lack of production planning and the rest were attributable to normal increase in costs.

		(₹)
1.	(33-1/3% of ₹45,000) i.e. ₹15,000 of under – absorbed overheads were due to lack of production planning. This being abnormal, should be debited to the Profit and Loss A/c	15,000
2	Balance (66-2/3% of ₹45,000) i.e. ₹30,000 of under – absorbed overheads should be distributed over work-in-progress, finished goods and cost of sales by using supplementary rate	30,000
	Total under-absorbed overheads	45,000

Apportionment of unabsorbed overheads of ₹30,000 over, work-in-progress, finished goods and cost of sales.

	Equivalent Completed units	(₹)
Work-in-progress (4,000 units × ₹1.25) (Refer to Working Note)	4,000	5,000
Finished goods (2,000 units × ₹1.25)	2,000	2,500
Cost of sales (18,000 units × ₹1.25)	18,000	22,500
	24,000	30,000

Accounting treatment:

Work-in-progress control A/c	Dr.	₹ 5,000	
Finished goods control A/c	Dr.	₹ 2,500	
Cost of Sales A/c	Dr.	₹22,500	
Profit & Loss A/c	Dr.	₹15,000	
To Overhead control A/c			₹ 45,000

Working Note:

$$\text{Supplementary overhead absorption rate} = \frac{₹30,000}{24,000 \text{ units}} = ₹1.25 \text{ per unit}$$

Question-9

Your company uses a historical cost system and applies overheads on the basis of "pre-determined" rates. The following are the figure from the Trial Balance as at 30th September, 2013:-

Manufacturing overheads	*₹ 4,26,544 Dr.*
Manufacturing overheads applied	*₹ 3,65,904 Cr.*
Work-in-progress	*₹ 1,41,480 Dr.*
Finished goods stocks	*₹ 2,30,732 Dr.*
Cost of goods sold	*₹ 8,40,588 Dr.*

Give two methods for the disposal of the unabsorbed overheads and show the profit implications of each method.

Solution:

Calculation of manufacturing overhead under absorbed	(₹)
Actual overheads	4,26,544
Overhead recovered (applied)	3,65,904
Under absorption (recovery) of overhead	60,640

The two methods for the disposal of the under-absorbed overheads in this problem may be:-

(1) Write off the under – absorbed overhead to Costing Profit & Loss Account.

(2) Use supplementary rate, to recover the under-absorbed overhead.

According to first method, the total unabsorbed overhead amount of ₹60,640 will be written off to Costing Profit & Loss Account. The use of this method will reduce the profits of the concern by ₹ 60,640 for the period.

According to second method, a supplementary rate may be used to adjust the overhead cost of each cost unit. The under-absorbed amount in total may, at the end of the accounting period, be apportioned on ratio basis to the three control accounts, viz, Work-in-progress, Finished goods stock and Cost of goods sold account. Apportioning of under-absorbed overhead can be carried out by using direct labour hours/ machine hours/ the value of the balances in each of these accounts, as the basis. Prorated figures of under-absorbed overhead over Work-in-progress, Finished goods stock and Cost of goods sold in this question on the basis of values, of the balances in each of these accounts are as follows:-

	Additional Overhead (Under-absorbed) Total		
	(₹)	(₹)	(₹)
Work-in-progress	1,41,480	7,074*	1,48,554
Finished Goods Stock	2,30,732	11,537@	2,42,269
Cost of Goods Sold	8,40,588	42,029#	8,82,617
	12,12,800	60,640	12,73,440

By using this method, the profit for the period will be reduced by ₹42,029 and the value of stock will increase by ₹18,611. The latter will affect the profit of the subsequent period.

Working Notes

The apportionment of under-absorbed overhead over Work-in-progress, Finished goods stock and Cost of goods sold on the basis of their value in the respective account is as follows:-

*Overhead to be absorbed by work-in-progress $= \frac{₹60,640}{12,12,800} \times 1,41,480 = ₹7,074$

@Overhead to be absorbed by finished goods $= \frac{₹60,640}{12,12,800} \times 2,30,732 = ₹11,537$

#Overhead to be absorbed by cost of goods sold $= \frac{₹60,640}{12,12,800} \times 8,40,588 = ₹42,029$

Question-10

PQR 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 blanket rate based on machine hours. The budgeted production overheads of the factory are ₹ 10,08,000 and budgeted machine hours are 96,000.

For a period of first six months of the financial year 2013–2014, following information were extracted from the books:

Actual production overheads	*₹ 6,79,000*
Amount included in the production overheads:	
Paid as per court's order	*₹ 45,000*
Expenses of previous year booked in current year	*₹ 10,000*

Paid to workers for strike period under an award	*₹ 42,000*
Obsolete stores written off	*₹ 18,000*

Production and sales data of the concern for the first six months are as under:

Production:

Finished goods	*22,000 units*
Works-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 ¼ of the under-absorption was due 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.

Solution:

(i) Amount of under absorption of production overheads during the period of first six months of the year 2013-2014:

	Amount (₹)	Amount (₹)
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 stores written off	18,000	1,15,000
		5,64,000
Less: Production overheads absorbed as per machine hour rate (48,000 hours × ₹10.50*)		5,04,000
Amount of under absorbed production overheads		60,000

Budgeted Machine hour rate (Blanket rate) = $\frac{₹\ 10,08,000}{96,000 \text{ hours}}$ = ₹ 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 Costing Profit and Loss Account.

Amount to be debited to Costing Profit and Loss Account = (60,000 * ¼) ₹15,000.

Balance of under absorbed production overheads should be distributed over Works in progress, Finished goods and Cost of sales by applying supplementary rate*.

Amount to be distributed = (60,000 * ¾) ₹45,000.

$$\text{Supplementary rate} = \frac{₹\ 45{,}000}{30{,}000\ \text{units}} = ₹\ 1.50\ \text{per unit}$$

(iii) Apportionment of under absorbed production overheads over WIP, Finished goods and Cost of sales:

	Equivalent completed units	**Amount (₹)**
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

Question-11

X Ltd. recovers overheads at a. pre-determined rate of ₹ 50 per man-day. The total factory overheads incurred and the man-days actually worked were ₹ 79 lakhs and 1.5 lakhs days respectively. During the period 30,000 units were sold. At the end of the period 5,000 completed units were held in stock but there was no opening stock of finished goods. Similarly, there was no stock of uncompleted units at the beginning of the period but at the end of the period there were 10,000 uncompleted units which may be treated as 50% complete.

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

How would unabsorbed overheads be treated in cost accounts?

Solution:

Absorbed overheads = Actual Man- days x Rate per day

= 1,50,000 days x ₹50

= ₹ 75,00,000

Under absorption of overheads = Actual overheads – Absorbed overheads

= ₹ 79,00,000 – ₹ 75,00,000

= ₹ 4,00,000

Reasons for under – absorption:

1. Defective Planning ₹ 4,00,000 x 60% = ₹2,40,000
2. Increase in overhead cost ₹ 4,00,000 x 40% = ₹1,60,000

Treatment in Cost Accounts:

(i). The unabsorbed overheads of ₹ 2,40,000 on account of defective planning to be treated as abnormal and thus be charged to Costing profit & loss account.

(ii) The balance of unabsorbed overheads i.e. ₹ 1,60,000 be charged as below on the basis of supplementary overhead absorption rate

Supplementary Rate = ₹1,60,000 ÷ {30,000 units + 5,000 units +(50% of 10,000 units)= ₹ 4

(a)	To Cost of sales Account	= 30,000 units x ₹ 4	= ₹ 1,20,000
(b)	To Finished stock account	= 5,000 units x ₹ 4	= ₹ 20,000
(c)	To WIP Account	= 50% of 10,000 units x ₹4	= ₹ 20,000
			₹ 1,60,000

Distribution of Overheads

Question-12

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

The following data are available for October, 2013:

Departments	*Revenues*	*Number of Employees*	*Processing time used (in minutes)*
Corporate Sales	*₹ 16,67,750*	*42*	*2,400*
Consumer Sales	*₹ 8,33,875*	*28*	*2,000*
Administrative	*--*	*14*	*400*
Information system	*--*	*21*	*1,400*

Cost incurred in each of four departments for October, 2013 are as follow:

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 differently?

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

Solution:

(i) Statement showing the allocation of support department costs to the sales departments (using the Direct Method)

Particulars	Basis of allocation	Sales department		Support department	
		Corporate sales (₹)	Consumer sales (₹)	Administrative (₹)	Information systems (₹)
Cost incurred		12,97,751	6,36,818	94,510	3,04,720
Re-allocation of cost of administrative department	Number of employees (6:4:–:–)	56,706	37,804	(94,510)	---
Re-allocation of costs of information systems department	Processing time (6:5:–:–)	1,66,211	1,38,509	---	(3,04,720)
Total		15,20,668	8,13,131		

(ii) Ranking of support departments based on percentage of their services rendered to other support departments

- Administration support department provides 23.077% $\left(\frac{21 \times 100}{42+28+21}\right)$ of its services to information systems support department. Thus 23.077% of ₹ 94,510 = ₹ 21,810.

- Information system support department provides 8.33% $\left(\frac{400}{2,400+2,000+400}\times 100\right)$ of its services to Administration support department. Thus 8.33% of ₹3,04,720 = ₹ 25,383.

Statement showing allocation of support costs
(By using step-down allocation method)

Particulars	Basis of allocation	Sales department		Support department	
		Corporate sales	Consumer sales	Administrative	Information systems.
		(₹)	(₹)	(₹)	(₹)
Cost incurred		12,97,751	6,36,818	94,510	3,04,720
Re-allocation of cost of administrative department	Number of employees (6:4:–:3)	43,620	29,080	(94,510)	21,810 3,26,530
Re-allocation of costs of information systems department	Processing time (6:5:–:–)	1,78,107	1,48,423		(3,26,530)
Total		15,19,478	8,14,321		

(iii) An alternative ranking is based on the rupee amount of services rendered to other service departments, using the rupee figures obtained under requirement (ii) This approach would use the following sequence of ranking.

- Allocation of information systems overheads as first (₹25,383 provided to administrative).
- Allocated administrative overheads as second (₹21,810 provided to information systems).

(iv) Working notes:

(1) Percentage of services provided by each service department to other service department and sales departments.

Particulars	Service departments		Sale departments	
	Administrative	Information system	Corporate Sales	Consumer Sales
Administrative	–	23.08%	46.15%	30.77%
Information systems	8.33%	–	50%	41.67%

(2) **Total cost of the support department:** *(By using simultaneous equation method).*

Let AD and IS be the total costs of support departments Administrative and Information systems respectively. These costs can be determined by using the following simultaneous equations:

	AD	=	94,510 + 0.0833 IS
	IS	=	3,04,720 + 0.2308 AD
Or,	AD	=	94,510 + 0.0833 {3,04,720 + 0.2308 AD}
Or,	AD	=	94,510 + 25,383 + 0.01922 AD
Or,	0.98077AD	=	1,19,893
Or,	AD	=	₹1,22,243
and	IS	=	₹3,32,934

Statement showing the allocation of support department costs to the sales departments (Using reciprocal allocation method)

Particulars	Sales department	
	Corporate sales (₹)	Consumer sales (₹)
Costs incurred	12,97,751	6,36,818
Re-allocation of cost administrative department (46.16% and 30.77% of ₹1,22,243)	56,427	37,614
Re-allocation of costs of information systems department (50% and 41.67% of ₹3,32,934)	1,66,467	1,38,734
Total	15,20,645	8,13,166

Question-13

ABC Ltd. has three production departments P_1, P_2 and P_3 and two service departments S_1 and S_2. The following data are extracted from the records of the Company for the month of October, 2013:

	(₹)
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:

	P_1	P_2	P_3	S_1	S_2
Direct wages (₹)	*37,500*	*25,000*	*37,500*	*18,750*	*6,250*
Horse Power of Machines used	*60*	*30*	*50*	*10*	*–*
Cost of machinery (₹)	*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 S_1 and S_2 are reapportioned as below:

	P_1	P_2	P_3	S_1	S_2
S_1	*20%*	*30%*	*40%*	*–*	*10%*
S_2	*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 P_1, P_2 and P_3 for 5 hours, 3 hours and 4 hours respectively, given that its direct material cost is ₹ 625 and direct labour cost is ₹ 375.

Solution:

Primary Distribution Summary

Item of cost	Basis of apportionment	Total (₹)	P_1 (₹)	P_2 (₹)	P_3 (₹)	S_1 (₹)	S_2 (₹)
Direct wages	Actual	25,000	--	--	--	18,750	6,250
Rent and Rates	Floor area (4 : 5 : 6 : 4 : 1)	62,500	12,500	15,625	18,750	12,500	3,125
General lighting	Light points (2 : 3 : 4 : 2 : 1)	7,500	1,250	1,875	2,500	1,250	625
Indirect wages	Direct wages (6 : 4 : 6 : 3 : 1)	18,750	5,625	3,750	5,625	2813	938
Power	Horse Power of machines used (6 : 3 : 5 : 1)	25,000	10,000	5,000	8,333	1,667	–
Depreciation of machinery	Value of machinery (12 : 16 : 20 : 1 : 1)	50,000	12,000	16,000	20,000	1,000	1,000
Insurance of machinery	Value of machinery (12 : 16 : 20 : 1 : 1)	20,000	4,800	6,400	8,000	400	400
		2,08,750	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

$S_1 = 38{,}380 + 0.10\ (12{,}338 + 0.10\ S_1)$

$S_1 = 38{,}380 + 1{,}233.80 + 0.01\ S_1$

$0.99\ S_1 = 39{,}613.80$

$\therefore S_1 \quad = ₹40{,}014.$

$\therefore S_2 \quad = 12{,}338 + 0.10 \times 40{,}014.$

$\quad\quad = ₹16{,}339$

Secondary Distribution Summary

Particulars	**Total (₹)**	**P_1 (₹)**	**P_2 (₹)**	**P_3 (₹)**
Allocated and Apportioned overheads as per primary distribution	1,58,033	46,175	48,650	63,208
S_1	40,014	8,003	12,004	16,006
S_2	16,339	6,536	3,268	4,902
		60,714	63,922	84,116

(i) Overhead rate per hour

	P_1	***P_2***	***P_3***
Total overheads cost	₹60,714	₹63,922	₹84,116
Production hours worked	6,225	4,050	4,100
Rate per hour (₹)	₹9.75	₹15.78	₹20.52

(ii) Cost of Product X

	(₹)
Direct material	625.00
Direct labour	375.00
Prime cost	1,000.00
Production on overheads	
P_1 5 hours × ₹9.75 = 48.75	

P_2	3 hours × ₹15.78 = 47.34	
P_3	4 hours × ₹20.52 = 82.08	178.17
Factory cost		1,178.17

Question-14

A company has three production departments (M_1, M_2 and A_1) and three service department, one of which Engineering service department, servicing the M_1 and M_2 only. The relevant information are as follows:

	Product X	***Product Y***
M_1	*10 Machine hours*	*6 Machine hours*
M_2	*4 Machine hours*	*14 Machine hours*
A_1	*14 Direct Labour hours*	*18 Direct Labour hours*

The annual budgeted overhead cost for the year are

	Indirect Wages (₹)	***Consumable Supplies(₹)***
M_1	*46,520*	*12,600*
M_2	*41,340*	*18,200*
A_1	*16,220*	*4,200*
Stores	*8,200*	*2,800*
Engineering Service	*5,340*	*4,200*
General Service	*7,520*	*3,200*

	(₹)	
– Depreciation on Machinery	*39,600*	
– Insurance of Machinery	*7,200*	
– Insurance of Building	*3,240*	*(Total building insurance cost for M_1 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 ₹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 (₹)*	*Area (Sq. ft.)*	*Effective H.P. hours %*	*Production Direct Labour hour*	*Capacity Machine hour*
M_1	*1,20,000*	*5,000*	*50*	*2,00,000*	*40,000*
M_2	*90,000*	*6,000*	*35*	*1,50,000*	*50,000*
A_1	*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:

(i) Prepare a overhead analysis sheet, showing the bases of apportionment of overhead to departments.

(ii) Allocate service department overheads to production department ignoring the apportionment of service department costs among service departments.

(iii) Calculate suitable overhead absorption rate for the production departments.

(iv) Calculate the overheads to be absorbed by two products, X and Y.

Solution:

(i) Summary of Apportionment of Overheads

(₹)

Items	Basis of Apportionment	Total Amount	Production Deptt.			Service Deptt.		
			M_1	M_2	A_1	Store Service	Engineering Service	General Service
Indirect wages	Allocation given	1,25,140	46,520	41,340	16,220	8,200	5,340	7,520
Consumable stores	Allocation given	45,200	12,600	18,200	4,200	2,800	4,200	3,200
Depreciation	Capital value of machine (20:15:5:2:6:2)	39,600	15,840	11,880	3,960	1,584	4,752	1,584
Insurance of Machine	Capital value of machine	7,200	2,880	2,160	720	288	864	288

	(20:15:5:2:6:2)							
Insurance on Building	1/3rd to M_1 Balance area basis (-:12:16:4:5:3)	3,240	1,080	648	864	216	270	162
Power	HP Hr% (10:7:1:-:2:-)	6,480	3,240	2,268	324	–	648	–
Light	Area (10:12:16:4:5:3)	5,400	1,080	1,296	1,728	432	540	324
Rent*	Area (10:12:16:4:5:-)	12,675	2,697	3,236	4,315	1,079	1,348	--
Total		2,44,935	85,937	81,028	32,331	14,599	17,962	13,078

*Rent to be apportioned among the departments which actually use the rented building. The notional rent is imputed cost and is not included in the calculation.

(ii) Allocation of service departments overheads

Service Deptt.	Basis of Apportionment	Production Deptt.			Service Deptt.		
		M_1	M_2	A_1	Store Service	Engineering Service	General Service
Store	Ratio of consumable value (126 :182 : 42)	5,256	7,591	1,752	(14,599)	–	–
Engineering service	In Machine hours Ratio of M_1 and M_2 (4 : 5)	7,983	9,979	–	–	(17,962)	–
General service	Labour hour Basis (20 : 15 : 30)	4,024	3,018	6,036	–	–	(13,078)
Production Department allocated in (i)		85,937	81,028	32,331			
Total		1,03,200	1,01,616	40,119			

(iii) Overhead Absorption rate

	M_1	M_2	A_1
Total overhead allocated	1,03,200	1,01,616	40,119
Machine hours	40,000	50,000	–

Labour hours	–	–	3,00,000
Rate per machine hour	2.58	2.032	–
Rate per Direct labour	–	–	0.134

(iv) Statement showing overhead absorption for Product X and Y

Machine Deptt.	*Absorption Rate*	*Product X*		*Product Y*	
		Hours	*(₹)*	*Hours*	*(₹)*
M_1	2.58	10	25.80	6	15.48
M_2	2.032	4	8.13	14	28.45
A_1	0.134	14	1.88	18	2.41
			35.81		46.34

Question-15

The following account balances and distribution of indirect charges are taken from the accounts of a manufacturing concern for the year ending on 31st March, 2014:

Item	Total Amount	Production Departments			Service Departments	
	(₹)	X (₹)	Y (₹)	Z (₹)	A (₹)	B (₹)
Indirect Material	*1,25,000*	*20,000*	*30,000*	*45,000*	*25,000*	*5,000*
Indirect Labour	*2,60,000*	*45,000*	*50,000*	*70,000*	*60,000*	*35,000*
Superintendent's Salary	*96,000*	-	-	*96,000*	-	-
Fuel & Heat	*15,000*					
Power	*1,80,000*					
Rent & Rates	*1,50,000*					
Insurance	*18,000*					
Meal Charges	*60,000*					
Depreciation	*2,70,000*					

The following departmental data are also available:

	Production Departments			Service Departments	
	X	Y	Z	A	B
Area (Sq. ft.)	*4,400*	*4,000*	*3,000*	*2,400*	*1,200*
Capital Value of					

Assets (₹)	*4,00,000*	*6,00,000*	*5,00,000*	*1,00,000*	*2,00,000*
Kilowatt Hours	*3,500*	*4,000*	*3,000*	*1,500*	*-*
Radiator Sections	*20*	*40*	*60*	*50*	*30*
No. of Employees	*60*	*70*	*120*	*30*	*20*

Expenses charged to the service departments are to be distributed to other departments by the following percentages:

	X	*Y*	*Z*	*A*	*B*
Department A (%)	*30*	*30*	*20*	*-*	*20*
Department B (%)	*25*	*40*	*25*	*10*	*-*

Prepare an overhead distribution statement to show the total overheads of production departments after re-apportioning service departments' overhead by using simultaneous equation method. Show all the calculations to the nearest rupee.

Solution:

Primary Distribution of Overheads

Item	Basis	Total Amount (₹)	Production Departments			Service Departments	
			X (₹)	Y (₹)	Z (₹)	A (₹)	B (₹)
Indirect Material	Actual	1,25,000	20,000	30,000	45,000	25,000	5,000
Indirect Labour	Actual	2,60,000	45,000	50,000	70,000	60,000	35,000
Superintendent's Salary	Actual	96,000	-	-	96,000	-	-
Fuel & Heat	Radiator Sections {2:4:6:5:3}	15,000	1,500	3,000	4,500	3,750	2,250
Power	Kilowatt Hours {7:8:6:3:-}	1,80,000	52,500	60,000	45,000	22,500	-
Rent & Rates	Area (Sq. ft.) {22:20:15:12:6}	1,50,000	44,000	40,000	30,000	24,000	12,000
Insurance	Capital Value of Assets {4:6:5:1:2}	18,000	4,000	6,000	5,000	1,000	2,000
Meal Charges	No. of Employees {6:7:12:3:2}	60,000	12,000	14,000	24,000	6,000	4,000

Depreciation	Capital Value of Assets {4:6:5:1:2}	2,70,000	60,000	90,000	75,000	15,000	30,000
Total overheads		11,74,000	2,39,000	2,93,000	3,94,500	1,57,250	90,250

Re-distribution of Overheads of Service Department A and B

Total overheads of Service Departments may be distributed using simultaneous equation method

Let, the total overheads of A = a and the total overheads of B= b

a = 1,57,250 + 0.10 b (i)

or, 10a - b = 15,72,500 [(i) x10]

b = 90,250 + 0.20 a (ii)

or, -0.20a + b = 90,250

Solving equation (i) & (ii)

$$\begin{aligned} 10a - \cancel{b} &= 15{,}72{,}500 \\ -0.20a + \cancel{b} &= 90{,}250 \\ \hline 9.8a &= 16{,}62{,}750 \end{aligned}$$

a = 1,69,668

Putting the value of a in equation (ii), we get

b = 90,250 + 0.20 x 1,69,668

b = 1,24,184

Secondary Distribution of Overheads

	Production Departments		
	X (₹)	**Y (₹)**	**Z (₹)**
Total overhead as per primary distribution	2,39,000	2,93,000	3,94,500
Service Department A (80% of 1,69,668)	50,900	50,900	33,934
Service Department B (90% of 1,24,184)	31,046	49,674	31,046
Total	3,20,946	3,93,574	4,59,480

Question-16

Arnav Ltd. has three production departments M, N and O and two service departments P and Q. The following particulars are available for the month of September, 2013:

	(₹)
Lease rental	*35,000*
Power & Fuel	*4,20,000*
Wages to factory supervisor	*6,400*
Electricity	*5,600*
Depreciation on machinery	*16,100*
Depreciation on building	*18,000*
Payroll expenses	*21,000*
Canteen expenses	*28,000*
ESI and Provident Fund Contribution	*58,000*

Followings are the further details available:

Particulars	**M**	**N**	**O**	**P**	**Q**
Floor space (square meter)	*1,200*	*1,000*	*1,600*	*400*	*800*
Light points (nos.)	*42*	*52*	*32*	*18*	*16*
Cost of machines (₹)	*12,00,000*	*10,00,000*	*14,00,000*	*4,00,000*	*6,00,000*
No. of employees (nos.)	*48*	*52*	*45*	*15*	*25*
Direct Wages (₹)	*1,72,800*	*1,66,400*	*1,53,000*	*36,000*	*53,000*
HP of Machines	*150*	*180*	*120*	*-*	*-*
Working hours (hours)	*1,240*	*1,600*	*1,200*	*1,440*	*1,440*

The expenses of service department are to be allocated in the following manner:

	M	**N**	**O**	**P**	**Q**
P	*30%*	*35%*	*25%*	*-*	*10%*
Q	*40%*	*25%*	*20%*	*15%*	*-*

You are required to calculate the overhead absorption rate per hour in respect of the three production departments.

Solution:

Primary Distribution Summary

Item of cost	**Basis of apportionment**	**Total**	**Production Dept.**			**Service Dept.**	
		(₹)	**M (₹)**	**N (₹)**	**O (₹)**	**P (₹)**	**Q (₹)**
Lease rental	Floor space	35,000	8,400	7,000	11,200	2,800	5,600

	(6 : 5 : 8 : 2 : 4)						
Power & Fuel	HP of Machines × Working hours (93: 144 : 72)	4,20,000	1,26,408	1,95,728	97,864	-	-
Supervisor's wages*	Working hours (31 : 40 : 30)	6,400	1,964	2,535	1,901	-	-
Electricity	Light points (21: 26: 16 : 9 : 8)	5,600	1,470	1,820	1,120	630	560
Depreciation on machinery	Value of machinery (6 : 5 : 7 : 2 : 3)	16,100	4,200	3,500	4,900	1,400	2,100
Depreciation on building	Floor space (6 : 5 : 8 : 2 : 4)	18,000	4,320	3,600	5,760	1,440	2,880
Payroll expenses	No. of employees (48: 52: 45: 15: 25)	21,000	5,448	5,903	5,108	1,703	2,838
Canteen expenses	No. of employees (48: 52: 45: 15: 25)	28,000	7,265	7,870	6,811	2,270	3,784
ESI and PF contribution	Direct wages (864: 832: 765: 180: 265)	58,000	17,244	16,606	15,268	3,593	5,289
		6,08,100	**1,76,719**	**2,44,562**	**1,49,932**	**13,836**	**23,051**

* Wages to supervisor is to be distributed to production departments only.

Let 'P' be the overhead of service department P and 'Q' be the overhead of service department Q.

P = 13,836 + 0.15 Q

Q = 23,051 + 0.10 P

Substituting the value of Q in P we get

P = 13,836 + 0.15 (23,051 + 0.10 P)

P = 13,836 + 3,457.65 + 0.015 P

0.985 P = 17,293.65

$\therefore$ P = ₹ 17,557

$\therefore$ Q = 23,051 + 0.10 $\times$ 17,557

= ₹ 24,806.70 or ₹ 24,807

Secondary Distribution Summary

Particulars	Total	M	N	O
	(₹)	(₹)	(₹)	(₹)
Allocated and Apportioned over-heads as per primary distribution	5,71,213	1,76,719	2,44,562	1,49,932
P (90% of ₹17,557)	15,801	5,267	6,145	4,389
Q (85% of ₹24,807)	21,086	9,923	6,202	4,961
		1,91,909	2,56,909	1,59,282

Overhead rate per hour

	M	N	O
Total overheads cost (₹)	1,91,909	2,56,909	1,59,282
Working hours	1,240	1,600	1,200
Rate per hour (₹)	154.77	160.57	132.74

Calculation of Overheads and Selling Price

Question-17

In the current quarter, a company 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 Administration 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. A profit of 20% on sales is required.

You are required to compute

(i) The rates of Factory overheads and Selling and Administration overheads to be charged.

(ii) The Selling price of the new order

Solution:

Working notes

1. Computation of total cost of jobs

Total cost of Job 1102 when 8% is the profit on Cost $= \frac{₹\ 1,07,325}{108} \times 100$

$= ₹\ 99,375$

Total cost of job 1108 when 12% is the profit on cost $= \frac{₹\ 1,57,920}{112} \times 100$

$= ₹1,41,000$

2. Factory overheads = F% of direct wages

Selling & Administrative overheads = A% of factory cost

(i) Computation of rates of factory overheads and selling and administration overheads to be charged.

Jobs Cost Sheet

	Job 1102 (₹)	**Job 1108 (₹)**
Direct materials	37,500	54,000
Direct wages	30,000	42,000
Prime cost	67,500	96,000
Add: Factory overheads	30,000F	42,000F
Factory cost (Refer to Working Note 2)	(67,500 + 30,000 F)	(96,000 + 42,000 F)
Add: Selling and Administration Overheads (Refer to Working Note 2)	(67,500 + 30,000 F) A	(96,000 + 42,000 F) A
Total Cost	(67,500 + 30,000 F)(1 + A)	(96,000 + 42,000 F)(1+A)

Since the total cost of jobs 1102 and 1108 are equal to ₹99,375 and ₹1,41,000 respectively, therefore we have the following equations *(Refer to Working Note 1)*

(67,500 + 30,000 F) (1 + A) = 99,375……………………….(i)

(96,000 + 42,000 F) (1 + A) = 1,41,000…………………….(ii)

Or, 67,500 + 30,000 F + 67,500 A + 30,000 FA = 99,375

Or, 96,000 + 42,000 F + 96,000 A + 42,000 FA = 1,41,000

Or, 30,000 F + 67,500 A + 30,000 FA = 31,875……………………..(iii)

42,000 F + 96,000 A + 42,000 FA = 45,000……………………..(iv)

On solving (iii) and (iv) we get : A = 0.25 and F = 0.40

Hence, A = 25% and F = 40%

(ii) Selling price of the new order:

	(₹)
Direct materials	64,000
Direct wages	50,000
Prime cost	1,14,000
Factory overheads (40% × ₹50,000)	20,000
Factory cost	1,34,000
Selling & Administration overheads (25% × ₹1,34,000)	33,500
Total cost	1,67,500

If selling price of new order is ₹100 then Profit is ₹20 and Cost is ₹80

Hence selling price of the new order = $\frac{₹1,67,500}{80} \times 100$ = ₹ 2,09,375

Question-18

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 ₹ 9,00,000 and budgeted variable costs are ₹ 4 per machine-hour. The following data are available:

	Cutting Department	***Welding Department***	***Total***
Actual Usage in 2012-13 (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 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	₹ 6
(₹ 9,00,000 ÷ 1,50,000 hours)	

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 (60,000 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 i.e.): (90,000 hours : 60,000 hours)	5,40,000 $\left(\frac{₹\ 9,00,000 \times 3}{5}\right)$	3,60,000 $\left(\frac{₹\ 9,00,000 \times 2}{5}\right)$	9,00,000
Variable cost (Based on actual usage of machine hours)	2,40,000 (60,000 hours × ₹ 4)	1,60,000 (40,000 hours × ₹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 (Refer to Working Note 1)	3,60,000 (60,000 hours × ₹ 6)	2,40,000 (40,000 hours × ₹ 6)	6,00,000
Variable cost (Based on actual usage)	2,40,000 (60,000 hours × ₹ 4)	1,60,000 (40,000 hours × ₹ 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 ₹ 3,00,000 (₹ 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.

Question-19

In a manufacturing company factory overheads are charged as fixed percentage basis on direct labour and office overheads are charged on the basis of percentage of factory cost. The following information are available related to the year ending 31st March, 2014 :

	Product A	*Product B*
Direct Materials	*₹ 19,000*	*₹ 15,000*
Direct Labour	*₹ 15,000*	*₹ 25,000*
Sales	*₹ 60,000*	*₹ 80,000*
Profit	*25% on cost*	*25% on sales price*

You are required to find out:

(i) The percentage of factory overheads on direct labour.

(ii) The percentage of office overheads on factory cost.

Solution:

Let, the percentage of factory overheads on direct labour is 'x' and the percentage of office overheads on factory cost is 'y', then the total cost of product A and product B will be as follows:

	Product A (₹)	***Product B (₹)***
Direct Materials	19,000	15,000
Direct labour	15,000	25,000
Prime Cost	34,000	40,000
Factory overheads (Direct labour × x)	150 x	250 x
Factory cost (i)	34,000 + 150 x	40,000 + 250 x
Office overheads (Factory cost × y) (ii)	340 y + 1.5 x y	400 *y* + 2.5 x y
Total Cost [(i) + (ii)]	34,000 + 150 x + 340 y + 1.5 x y	40,000 + 250 x +400 *y* + 2.5 x y

Total cost on the basis of sales is:

	Product A (₹)	***Product B (₹)***
Sales	60,000	80,000
Less: Profit		
Product A – 25% on cost or 20% on Sales	12,000	
Product B – 25% on sales		20,000
Total Cost	48,000	60,000

Thus,

Total Cost of A is 34,000 + 150x + 340y + 1.5 xy = 48,000

Or, 150x + 340y + 1.5 xy = 14,000……………………………(i)

Total Cost of B is 40,000 + 250x + 400y + 2.5 xy = 60,000

Or, 250x + 400y + 2.5 xy = 20,000……………………………(ii)

Equation (ii) multiplied by 0.6 and after deducting from equation (i), we get

150x + 340y + 1.5xy = 14,000……………………………(i)

_150x ± 240y ± 1.5xy = _12,000……………………………(ii)

100y = 2,000

Or, y = 20

Putting value of y in equation (i), we get

$150x + 340 \times 20 + 1.5x \times 20 = 14,000$

Or, 150x + 30x	= 14,000 – 6,800
Or, 180x	= 7,200
Or, *x*	= 40
Hence, (i) the factory overheads on direct labour	= 40% and
(ii) the office overheads on factory cost	= 20%.

Question-20

Maximum production capacity of JK Ltd. is 5,20,000 units per annum. Details of estimated cost of production are as follows:

- *Direct material ₹ 15 per unit.*
- *Direct wages ₹ 9 per unit (subject to a minimum of ₹ 2,50,000 per month).*
- *Fixed overheads ₹ 9,60,000 per annum.*
- *Variable overheads ₹ 8 per unit.*
- *Semi-variable overheads are ₹ 5,60,000 per annum up to 50 per cent capacity and additional ₹1,50,000 per annum for every 25 per cent increase in capacity or a part of it.*

JK Ltd. worked at 60 per cent capacity for the first three months during the year 2013-14, but it is expected to work at 90 per cent capacity for the remaining nine months.

The selling price per unit was ₹ 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 ₹15,62,500 for the whole year.

Solution:

Statement of Cost and Sales for the year 2013-14

(Maximum production capacity = 5,20,000 units per annum)

Particulars	First 3 months	Next 9 months	Total
Capacity utilized	60%	90%	
Production	$\frac{5{,}20{,}000 \times 3 \times 60\%}{12}$ = 78,000 units	$\frac{5{,}20{,}000 \times 9 \times 90\%}{12}$ = 3,51,000 units	4,29,000 units
	(₹)	(₹)	(₹)
Direct materials @ ₹15 per unit	11,70,000	52,65,000	64,35,000
Direct wages @ ₹ 9 per unit or ₹2,50,000 per month whichever is higher.	7,50,000	31,59,000	39,09,000

Prime cost (A)	19,20,000	84,24,000	1,03,44,000
Overheads			
Fixed	2,40,000	7,20,000	9,60,000
Variable @ ₹8 per unit	6,24,000	28,08,000	34,32,000
Semi Variable *(Refer to Working Note-1)*	1,77,500	6,45,000	8,22,500
Total overheads (B)	10,41,500	41,73,000	52,14,500
Total Cost (C) [(A + B)]	29,61,500	1,25,97,000	1,55,58,500
Profit during first 3 months (Bal. figure)	4,70,500		
Sales @ ₹44 per unit (78,000 x ₹ 44)	34,32,000		
Desired profit during next 9 months (₹15,62,500 – ₹4,70,500) (D)		10,92,000	
Sales required for next 9 months ………………………… (E) [(C + D)]		1,36,89,000	
Total profit			15,62,500
Total Sales			1,71,21,000

$$\text{Required selling price per unit for last 9 months} = \frac{\text{Total sales required for last 9 months}}{\text{Units produced during last 9 months}}$$

$$= \frac{₹\,1,36,89,000}{3,51,000\text{ units}} = ₹\ 39 \text{ per unit.}$$

Workings:

(1) Semi-variable overheads:

(a) For first 3 months at 60% capacity = ₹(5,60,000 + ₹1,50,000) × 3/12

= ₹7,10,000 × 3/12

= ₹1,77,500.

(b) For remaining 9 months at 90% capacity = ₹(5,60,000 + ₹3,00,000) × 9/12

= ₹8,60,000 × 9/12

= ₹ 6,45,000

Miscellaneous

Question-21

A machine was purchased from a manufacturer who claimed that his 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:

(a) Rated Capacity.

(b) Practical Capacity.

(c) Normal Capacity.

(d) Actual Capacity.

Solution:

(a) Rated capacity 36.5 tonnes

(Refers to the capacity of a machine or a plant as indicated by its manufacturer)

(b) Practical capacity 30.0 tonnes

[Defined as actually utilised capacity of a plant i.e. $\frac{36.5\,\text{tonnes}}{365\,\text{days}} \times (365 - 65)\,\text{days}$]

(c) Normal capacity 25.0 tonnes

(It is the capacity of a plant utilized based on sales expectancy)

(d) Actual capacity 25.2 tonnes

(Refers to the capacity actually achieved)

Question-22

Following information is available for the first and second quarter of the year 2013-14 of ABC Limited:

	Production (in units)	***Semi-variable cost (₹)***
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.

Solution:

(a) Variable Cost per Unit = $\frac{\text{Change in Semi - variable cost under two production level}}{\text{Change in production quantity in two levels}}$

$= \frac{₹3,10,000 - ₹2,80,000}{42,000 \text{ units} - 36,000 \text{ units}}$

= ₹ 5 per units

(b) Total Fixed Cost = Semi Variable Cost for 36,000 units – Variable cost for 36,000 units.

= ₹ 2,80,000 – (36,000 units × ₹ 5)

= ₹ 1,00,000

5 Non-integrated Accounts

Basic Concepts

Cost Control Accounts	These are accounts maintained for the purpose of exercising control over the costing ledgers and also to complete the double entry in cost accounts.
Integral System of Accounting	A system of accounting where both costing and financial transactions are recorded in the same set of books.
Non-integral System of Accounting	A system of accounting where two sets of books are maintained- (i) for costing transactions; and (ii) for financial transactions.
Reconciliation	In the Non-Integral System of Accounting, since the cost and financial accounts are kept separately, it is imperative that those should be reconciled; otherwise the cost accounts would not be reliable. The reason for differences in the cost & financial accounts can be of purely financial nature (Income and expenses) and notional nature.
	Principal Accounts Maintained in Non-integrated Accounting system
Cost Ledger Control Account	This account is also known as General Ledger Adjustment Account. This account is made to complete double entry. All items of expenditure are credited to this account. Sales are debited to this account and net profit/loss is transferred to this account. The balance in this account at the end of the particular period represents the net total of all the balances of the impersonal account.
Stores Ledger Control Account	This account is debited for the purchase of materials and credited for issue of materials from the stores. The balance in this account indicates the total balance of all the individual stores accounts. Abnormal losses or gains if any in this account are transferred to Costing Profit & Loss Account.

Wages Control Account	This account is debited with total wages paid (direct and indirect). Direct wages are further transferred to Work-in-Progress Account and indirect wages to Production Overhead or Administration Overhead or Selling & Distribution Overhead Account, as the case may be. Wages paid for abnormal idle time are transferred to Costing Profit & Loss Account either directly or through Abnormal Loss Account.
Production Overhead Control Account	This account is debited with indirect costs of production such as indirect material, indirect labour, indirect expenses (carriage inward etc.). Overhead recovered is credited to this Account. The difference between overhead incurred and overhead recovered (i.e. Under Absorption or Over Absorption of Overheads) is transferred to Overhead Adjustment Account.
Work-in-Progress Control Account	This account is debited with the total cost of production, which includes—direct materials, direct labour, direct expenses, production overhead recovered and is credited with the amount of finished goods completed and transferred. The balance in this account represents total balances of jobs/ works-in-progress, as shown by several job accounts.
Administrative Overhead Control Account	This account is debited with overhead incurred and credited with overhead recovered. The overhead recovered are debited to Finished Goods Control Account. The difference between Administrative Overhead incurred and recovered is transferred to Overhead Adjustment Account.
Finished Goods Control Account	This account is debited with the value of goods transferred from Work-in-Progress Control Account, administration costs recovered. This account is credited with the Cost of Goods sold and Cost of Sales Account is debited. The balance of this account represents the value of goods lying in hand.
Selling and Distribution Overhead Control Account	This account is debited with Selling and Distribution Overhead incurred and credited with the recovered Overhead. The difference between incurred and recovered overhead is transferred to Overhead Adjustment Account.
Cost of Sales Account	This account is debited with the cost of finished goods transferred from Finished Goods Control Account for sale as well as with the amount of selling and distribution overhead costs recovered. The balance of this account is ultimately transferred to Sales Account or Costing Profit & Loss Account.

Costing Profit & Loss Account	This account is debited with cost of goods sold, under-absorbed overheads and abnormal losses; and is credited with sales value, over-absorbed overhead and abnormal gains. The net profit or loss in this account is transferred to Cost Ledger Control Account.
Overhead Adjustment Account*	This account is to be debited for under-recovery of overhead and credited with over-recovery of overhead amount. The net balance in this account is transferred to Costing Profit & Loss Account. * *Sometimes, Overhead Adjustment Account is dispensed with and under/over absorbed overheads is directly transferred to Costing Profit & Loss Account from the respective overhead accounts.*
	Items of Costs which are included in Financial Accounts and Cost Accounts
Items included in Financial Accounts only	(a) *Purely Financial Expenses :* (i) Interest on loans or bank mortgages. (ii) Expenses and discounts on issue of shares, debentures etc. (iii) Other capital losses i.e., loss by fire not covered by insurance etc. (iv) Losses on the sales of fixed assets and investments (v) Goodwill written off. (vi) Preliminary expenses written off. (vii) Income tax, donations, subscriptions. (viii) Expenses of the company's share transfer office, if any. (b) *Purely Financial Income* (i) Interest received on bank deposits, loans and investments. (ii) Dividends received. (iii) Profits on the sale of fixed assets and investments. (iv) Transfer fee received. (v) Rent receivables.
Items included in the Cost Accounts only	(i) Charges in lieu of rent where premises are owned. (ii) Interest on capital at notional figure though not incurred. (iii) Salary for the proprietor at notional figure though not incurred. (iv) Notional Depreciation on the assets fully depreciated for which book value is nil.

Basic Formulae

<table>
<tr><td rowspan="2">Format of Reconciliation Statement</td><td>

RECONCILIATION STATEMENT

(When Profit as per Cost Accounts is taken as a starting point)

</td></tr>
<tr><td>

	Particulars	(₹)	(₹)
A.	Profit as per Cost Accounts		…..
B.	Add. Items having the effect of higher profit in financial accounts:		
	(a) Over-absorption of Factory Overheads/ Office & Adm. Overheads / Selling & Distribution Overheads in Cost Accounts	…..	
	(b) Over-valuation of Opening Stock of Raw Material / Work-in-progress / Finished goods in Cost Accounts	…..	
	(c) Under-valuation of Closing Stock of Raw Material / Work-in-progress / Finished Goods in Cost Accounts	…..	
	(d) Income excluded from Cost Accounts : (e.g.) Interest & Dividend on Investments	…..	
	Rent received	…..	
	Transfer Fees received etc.	…..	…..
C.	Less: Items having the effect of lower profit in financial accounts:		
	(a) Under-absorption of Factory Overheads/ Office & Adm. Overheads / Selling & Distribution Overheads in Cost Accounts	…..	
	(b) Under-valuation of Opening Stock of Raw Material / Work-in-progress / Finished goods in Cost Accounts	…..	
	(c) Over-valuation of Closing Stock of Raw Material / Work-in-progress / Finished Goods in Cost Accounts	…..	
	(d) Expenses excluded from Cost Accounts : (e.g.)		

</td></tr>
</table>

	Bad Debts written off ….. Preliminary Expenses / Discount on Issue, written off ….. Legal Charges ….. (…..) D. Profit as per Financial Accounts (A + B – C) ….. **Note:** In case of 'Loss', the amount shall appear as a minus item. **Note:** When profit as per Cost account is calculated from profit as per financial accounts, then items which are added above will be deducted and vice-versa.
	Journal Entries under Non-integrated Accounting System
Material Purchased and Material Issued	**At the time of purchase** (i) Dr. Stores Ledger Control A/c xxxx Cr. Cost Ledger Control A/c xxxx **If purchased on special requirement for a job** (ii) Dr. Work-in-Progress Control A/c xxxx Cr. Cost Ledger Control A/c xxxx **When Materials returned to vendor (Return outwards)** (i) Dr. Cost Ledger Control A/c xxxx Cr. Store Ledger Control A/c xxxx **When direct material issued to production** (i) Dr. Work-in-Progress Control A/c xxxx Cr. Store Ledger Control A/c xxxx **When indirect material issued to production** (i) Dr. Production Overhead Control A/c xxxx Cr. Store Ledger Control A/c xxxx **When Materials returned to Store (Return inwards)** (i) Dr. Store Ledger Control A/c xxxx Cr. Work-in-Progress Control A/c xxxx
Wages Paid	**When wages paid to workers** (i) Dr. Wages Control A/c xxxx Cr. Cost Ledger Control A/c xxxx **When wages (for direct labour) charged to the production** (i) Dr. Work-in-Progress Control A/c xxxx Cr. Wages Control A/c xxxx **When wages (for indirect labour) charged to the production** (i) Dr. Production Overhead Control A/c xxxx Cr. Wages Control A/c xxxx

Production Overheads	**When production overheads incurred** (i) Dr. Production Overhead Control A/c xxxx Cr. Cost Ledger Control A/c xxxx **When production overheads recovered (absorbed)** (i) Dr. Work-in-Progress Control A/c xxxx Cr. Production Overhead Control A/c xxxx
Administrative Overheads	**When administration overheads incurred** (i) Dr. Administrative Overhead Control A/c xxxx Cr. Cost Ledger Control A/c xxxx **When administration overheads recovered (absorbed)** (i) Dr. Finished Goods Ledger Control A/c xxxx Cr. Administration Overhead Control A/c xxxx
Selling and Distribution Overheads	**When selling and distribution overheads incurred** (i) Dr. Selling and Distribution Overhead Control A/c xxxx Cr. Cost Ledger Control A/c xxxx **When selling and distribution overheads recovered (absorbed)** (i) Dr. Cost of Sales A/c xxxx Cr. Selling and Distribution Overhead Control A/c xxxx
Transfer of under/ over absorbed Overheads	**In case of over absorption of overheads** (i) Dr. Production/Administration/Selling & Dist. Overhead Control A/c xxxx Cr. Cost Ledger Control A/c xxxx **In case of under absorption of overheads** (i) Dr. Cost Ledger Control A/c xxxx Cr. Production/ Administration/ Selling & Dist. Overhead Control A/c xxxx
Sales	(i) Dr. Cost Ledger Control A/c xxxx Cr. Costing Profit & Loss A/c xxxx
Profit/ Loss	**In case of Profit** (i) Dr. Costing Profit & Loss A/c xxxx Cr. Cost Ledger Control A/c xxxx **In case of Loss** (i) Dr. Cost Ledger Control A/c xxxx Cr. Costing Profit & Loss A/c xxxx

SECTION- A

Question-1

What are the essential pre-requisites of integrated accounting system?

Solution:

Essential pre-requisites of Integrated Accounting System: The essential pre-requisites of Integrated Accounting System include the following:

1. The management's decision about the extent of integration of the two sets of books. Some concerns find it useful to integrate upto the stage of primary cost or factory cost while other prefer full integration of the entire accounting records.
2. A suitable coding system must be made available so as to serve the accounting purposes of financial and cost accounts.
3. An agreed routine, with regard to the treatment of provision for accruals, prepaid expenses, other adjustment necessary for preparation of interim accounts.
4. Perfect coordination should exist between the staff responsible for the financial and cost aspects of the accounts and an efficient processing of accounting documents should be ensured.

Under this system there is no need for a separate cost ledger. Of course, there will be a number of subsidiary ledgers; in addition to the useful Customers Ledger and the Bought Ledger, there will be: (a) Stores Ledger; (b) Finished Stock Ledger and (c) W-I-P Ledger.

Question-2

What are the advantages of integrated accounting?

Solution:

Advantages of Integrated Accounting: Integrated Accounting is the name given to a system of accounting whereby cost and financial accounts are kept in the same set of books. Such a system will have to afford full information required for Costing as well as for Financial Accounts. In other words, information and data should be recorded in such a way so as to enable the firm to ascertain the cost (together with the necessary analysis) of each product, job, process, operation or any other identifiable activity. For instance, purchases are analysed by nature of material and its end-use. Purchases account is eliminated and direct postings are made to Stores Control Account, Work-in-Progress account, or Overhead Account. Payroll is straightway analysed into direct labour and overheads. It also ensures the ascertainment of marginal cost, variances, abnormal losses and gains. In fact all information that management requires from a system of Costing for doing its work properly is made available. The integrated accounts give full information in such a manner so that the profit and loss account and the balance sheet can be prepared according to the requirements of law and the management maintains full control over the liabilities and assets of its business.

The main advantages of Integrated Accounting are as follows:

(i) Since there is one set of accounts, thus there is one figure of profit. Hence the question of reconciliation of costing profit and financial profit does not arise.

(ii) There is no duplication of recording of entries and efforts to maintain separate set of books.

(iii) Costing data are available from books of original entry and hence no delay is caused in obtaining information.

(iv) The operation of the system is facilitated with the use of mechanized accounting.

(v) Centralization of accounting function results in economy.

Question-3

Why is it necessary to reconcile the Profits between the Cost Accounts and Financial Accounts?

Solution:

When the cost and financial accounts are kept separately, It is imperative that these should be reconciled, otherwise the cost accounts would not be reliable. The reconciliation of two set of accounts can be made, if both the sets contain sufficient detail as would enable the causes of differences to be located. It is therefore, important that in the financial accounts, the expenses should be analysed in the same way as in cost accounts. It is important to know the causes which generally give rise to differences in the costs & financial accounts. These are:

(i) Items included in financial accounts but not in cost accounts

- Income-tax
- Transfer to reserve
- Dividends paid
- Goodwill / preliminary expenses written off
- Pure financial items
- Interest, dividends
- Losses on sale of investments
- Expenses of Co’s share transfer office
- Damages & penalties

(ii) Items included in cost accounts but not in financial accounts

- Opportunity cost of capital
- Notional rent

(iii) Under / Over absorption of expenses in cost accounts

(iv) Different bases of inventory valuation

Motivation for reconciliation is:

- To ensure reliability of cost data
- To ensure ascertainment of correct product cost
- To ensure correct decision making by the management based on Cost & Financial data
- To report fruitful financial / cost data.

Question-4

What are the reasons for disagreement of profits as per cost accounts and financial accounts? Discuss.

Solution:

Reasons for disagreement of profits as per cost and financial accounts: The various reasons for disagreement of profits shown by the two sets of books viz., cost and financial may be listed as below:

1. *Items appearing only in financial accounts:* The following items of income and expenditure are normally included in financial accounts and not in cost accounts. Their inclusion in cost accounts might lead to unwise managerial decisions. These items are:

   (i) Income:

   (a) Profit on sale of assets

   (b) Interest received

   (c) Dividend received

   (d) Rent receivable

   (e) Share Transfer fees

   (ii) Expenditure

   (a) Loss on sale of assets

   (b) Uninsured destruction of assets

   (c) Loss due to scrapping of plan and machinery

   (d) Preliminary expenses written off

   (e) Goodwill written off

   (f) Underwriting commission and debenture discount written off

   (g) Interest on mortgage and loans

   (h) Fines and penalties

   (iii) Appropriation

   (a) Dividends

   (b) Reserves
   (c) Dividend equalization fund, Sinking fund etc.

2. *Items appearing only in cost accounts:* There are some items which are included in cost accounts but not in financial account. These are:
   (a) Notional interest on capital;
   (b) Notional rent on premises owned.
3. *Under or over-absorption of overhead:* In cost accounts overheads are charged to production at pre-determined rates where in financial accounts actual amount of overhead is charged, the difference gives rise under or over-absorption; causing a difference in profits.
4. *Different bases of stock valuation:* In financial books, stocks are valued at cost or market price, whichever is lower. In cost books, however, stock of materials may be valued on FIFO or LIFO basis and work-in-progress may be valued at prime cost or works cost. Differences in store valuation may thus cause a difference between the two profits.
5. *Depreciation:* The amount of depreciation charge may be different in the two sets of books either because of the different methods of calculating depreciation or the rates adopted. In company accounts, for instance, the straight line method may be adopted whereas in financial accounts it may be the diminishing balance method.

Question-5

List the Financial expenses which are not included in cost.

Solution:

Financial expenses which are not included in cost accounting are as follows:

- Interest on debentures and deposit
- Gratuity
- Pension
- Bonus of Employee,
- Income Tax,
- Preliminary Expenses
- Discount on issue of Share
- Underwriting Commissions.

Question-6

When is the reconciliation statement of Cost and Financial accounts not required?

Solution:

When the Cost and Financial Accounts are integrated - there is no need to have a separate reconciliation statement between the two sets of accounts. Integration means that the same set of accounts fulfil the requirement of both i.e., Cost and Financial Accounts.

Question-7

"Is reconciliation of cost accounts and financial accounts necessary in case of integrated accounting system?"

Solution:

In integrated accounting system cost and financial accounts are kept in the same set of books. Such a system will have to afford full information required for Costing as well as for Financial Accounts. In other words, information and data should be recorded in such a way so as to enable the firm to ascertain the cost (together with the necessary analysis) of each product, job, process, operation or any other identifiable activity. It also ensures the ascertainment of marginal cost, variances, abnormal losses and gains. In fact all information that management requires from a system of Costing for doing its work properly is made available. The integrated accounts give full information in such a manner so that the profit and loss account and the balance sheet can be prepared according to the requirements of law and the management maintains full control over the liabilities and assets of its business.

Since, only one set of books are kept for both cost accounting and financial accounting purpose so there is no necessity of reconciliation of cost and financial accounts

SECTION- B

Problems on Non-Integrated Accounting System

Question-1

Pass journal entries in the cost books, maintained on non-integrated system, for the following:

(i)	*Issue of materials:*	*Direct ₹ 5,50,000; Indirect ₹ 1,50,000*
(ii)	*Allocation of wages:*	*Direct ₹ 2,00,000; Indirect ₹ 40,000*
(iii)	*Under/Over absorbed overheads:*	*Factory (over) ₹ 20,000;* *Administration (under) ₹ 10,000*

Solution:

Journal Entries in Cost Books
Maintained on non-integrated system

		(₹)	(₹)
(i) Work-in-Progress Ledger Control A/c	Dr.	5,50,000	
Factory Overhead Control A/c	Dr.	1,50,000	
To Stores Ledger Control A/c			7,00,000
(Being issue of materials)			
(ii) Work-in Progress Ledger Control A/c	Dr.	2,00,000	
Factory Overhead control A/c	Dr.	40,000	
To Wages Control A/c			2,40,000
(Being allocation of wages and salaries)			
(i) Factory Overhead Control A/c	Dr.	20,000	
To Costing Profit & Loss A/c			20,000
(Being transfer of over absorption of overhead)			
Costing Profit & Loss A/c	Dr.	10,000	
To Administration Overhead Control A/c			10,000
(Being transfer of under absorption of overhead)			

Question-2

A Company operates separate cost accounting and financial accounting systems. The following is the list of opening balances as on 1.04.2013 in the Cost Ledger.

	Debit (₹)	*Credit (₹)*
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 30.06.2013 are as under:

	(₹)
Materials purchased	*26,700*
Materials issued to production	*40,000*

Materials issued to factory for repairs	*900*
Factory wages paid (including indirect wages ₹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 Cost of Sales. At the end of the quarter, WIP stocks increased by ₹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 30.06.2013.

Solution:

General Ledger Adj. A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Sales	2,56,000	By Balance b/d	1,88,750
To Balance c/d	1,80,150	By Stores ledger control A/c (Materials purchased)	26,700
		By Wages control A/c (Factory wages paid)	77,500
		By Factory Overheads control A/c (Production overhead incurred)	95,200
		By Costing Profit & Loss A/c	48,000
	4,36,150		4,36,150

Stores Ledger Control A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Balance b/d	53,375	By WIP control A/c (Materials issued to production)	40,000
To General ledger adj. A/c (Materials purchased)	26,700	By Factory overhead control A/c (Materials issued for repairing)	900
		By Balance c/d	39,175
	80,075		80,075

WIP Control A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,04,595	By Finished goods control A/c (Balancing figure)	2,02,900
To Stores ledger control A/c	40,000	By Balance c/d	1,12,095
To Wages control A/c	54,500		
To Factory Overhead control A/c	1,15,900		
	3,14,995		3,14,995

Finished Goods Control A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Balance b/d	30,780	By Cost of sales A/c *(Refer to note)*	2,04,800
To WIP control A/c	2,02,900	By Balance c/d	28,880
	2,33,680		2,33,680

Note: *Gross profit is 25% of Cost of Sales or 20% on sales.*

Hence cost of sales = ₹ 2,56,000 – 20% of ₹ 2,56,000 = ₹ 2,04,800

Factory Overhead Control A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Stores ledger control A/c	900	By Costing Profit & Loss A/c (Under-absorption of overhead)	3,200
To Wages control A/c	23,000	By WIP control A/c	1,15,900
To General ledger adj. A/c	95,200		
	1,19,100		1,19,100

Cost of Sales A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Finished goods control A/c	2,04,800	By Costing Profit & Loss A/c	2,04,800

Sales A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Costing Profit & Loss A/c	2,56,000	By GLA A/c	2,56,000

Wages Control A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To General ledger adj. A/c	77,500	By Factory overhead control A/c (Wages paid for direct labour)	23,000
		By WIP control A/c (Wages paid for indirect labour)	54,500
	77,500		77,500

Costing Profit & Loss A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Factory O/H Control A/c	3,200	By Sales A/c	2,56,000
To Cost of sales A/c	2,04,800		
To General ledger adj. A/c (Profit)	48,000		
	2,56,000		2,56,000

Trial Balance (as on 30.06.2013)

	Dr. (₹)	Cr. (₹)
Stores ledger control A/c	39,175	
WIP control A/c	1,12,095	
Finished goods control A/c	28,880	
To General ledger adjustment A/c		1,80,150
	1,80,150	1,80,150

Question-3

The Chief Cost Accountant of Omega Limited found to his surprise that the profit was the same as per cost accounts as well as the financial accounts. He asked his deputy to find out the reasons for the same. You are required to analyse and suggest a Reconciliation Statement is necessary or not.

Solution:

Chief Cost Account of M/s Omega Ltd. noticed that the profit of the concern under Cost and Financial Accounting Systems was the same. This fact indicates that the concern was using a non-integrated accounting system. The figure of profit under Cost and Financial accounts will be the same when the amount of total under charges equal to the amount of total overcharges in each set of books.

The statement of profit under Cost Accounts is usually prepared on the basis of standard/budgeted figures in respect of various elements of cost, whereas it is prepared on actual basis under financial accounts.

Consider the following assumed statements of profit as per Cost and Financial Accounts of M/s. Omega Ltd. to ascertain the reasons, which account for the figure of profit to be same under two sets of accounts.

Statement of Profit of M/s Omega Ltd. as per Cost A/c

	(₹)	(₹)
Direct Material (2,50,000 x ₹ 1.1)		2,75,000
Direct wages (2,50,000 x ₹ 0.75)		1,87,500
Prime Cost		4,62,500
Add: Factory overheads:		
Variable	60,000	
Fixed	75,000	1,35,000
Factory Cost		5,97,500
Add: Office Overheads:		50,000
Cost of Production:		6,47,500
Add: Selling & Dist Overhead		
Variable	30,000	
Fixed	63,500	93,500
Cost of Sales		7,41,000
Profit		9,000
Sales		7,50,000

Statement of Profit & Loss Account of M/s Omega Ltd.

	(₹)		(₹)
To Direct Materials	3,00,000	By Sales (2,50,000 units)	7,50,000
To Direct Wages	2,00,000		
To Factory expenses	1,20,000		
To Office express	40,000		
To Selling & Dist. Expenses	80,000		
To Legal expenses	1,000		
To Net profit	9,000		
	7,50,000		7,50,000

An analysis of Cost and Financial profit statement indicates the following facts:

(1) The profit of the concern under two sets of accounts is the same i.e. ₹ 9,000.

(2) A sum of ₹ 25,000 is under charged in Cost Accounts on account of direct material cost. The estimated cost on this account was ₹ 2,75,000 whereas actual cost incurred amounted to ₹ 3,00,000.

(3) Similarly, a sum of ₹ 12,500 is under charged in Cost Accounts on account of direct wages. Estimated costs were ₹ 1,87,500 whereas actual costs comes to ₹ 2,00,000.

(4) A sum of ₹ 1,000 towards legal expenses is only charged in financial accounts and was not shown in Cost Accounts.

(5) A sum of ₹ 15,000 difference between budgeted and actual factory overheads is over-charged in Cost Accounts.

(6) A sum of ₹ 10,000 difference between budgeted and actual office overheads is overcharged in Cost Accounts.

(7) A sum of ₹ 13,500 difference between budgeted and actual selling and distribution overheads is overcharged in Cost Accounts.

Thus, the total amount of under charges is equal to total amount of over charges in each set of books and it is equal to ₹ 38,500. As a result, the profit was the same as per cost accounts as well as the financial accounts. The above analysis also indicates that though the figure of profit under two sets of accounts is same but the figures of material, labour and overhead costs differ. It also points out items, which are present in financial accounts and not in cost accounts.

The statement of reconciliation is necessary, as the two sets of accounts are non-integrated. It is only the reconciliation statement which would indicate the amount of under charges and over-charges for different elements of cost. The knowledge of under charges and over-charges would enable the management to initiate necessary action for control purposes. For example, in the case of M/s Omega Ltd., the sum of ₹ 25,000 more has been spent on the materials for the manufacturing of 2,50,000 units of the product. This is known as material cost variance. This variance may arise either due to excess material usage or price. Information about the occurrence of variances is provided by a statement of reconciliation to the accountants, so that necessary control action may be taken. Such a statement also includes the items which have not been included in Cost Accounts but are present in Financial Accounts.

Question-4

As of 31st March, 2014, the following balances existed in a firm's cost ledger, which is maintained separately on a double entry basis:

	Debit (₹)	*Credit (₹)*
Stores Ledger Control A/c	*3,00,000*	–
Work-in-progress Control A/c	*1,50,000*	–

Finished Goods Control A/c	*2,50,000*	*–*
Manufacturing Overhead Control A/c	*–*	*15,000*
Cost Ledger Control A/c	*–*	*6,85,000*
	7,00,000	*7,00,000*

During the next quarter, the following items arose:

	(₹)
Finished Product (at cost)	*2,25,000*
Manufacturing overhead incurred	*85,000*
Raw material purchased	*1,25,000*
Factory wages	*40,000*
Indirect labour	*20,000*
Cost of sales	*1,75,000*
Materials issued to production	*1,35,000*
Sales returned (at cost)	*9,000*
Materials returned to suppliers	*13,000*
Manufacturing overhead charged to production	*85,000*

You are required to prepare the Cost Ledger Control A/c, Stores Ledger Control A/c, Work-in-progress Control A/c, Finished Stock Ledger Control A/c, Manufacturing Overhead Control A/c, Wages Control A/c, Cost of Sales A/c and the Trial Balance at the end of the quarter.

Solution:

Cost Ledger Control Account

Dr. Cr.

		(₹)			(₹)
To	Store Ledger Control A/c	13,000	By	Opening Balance	6,85,000
To	Balance c/d	9,42,000	By	Store ledger control A/c	1,25,000
			By	Manufacturing Overhead Control A/c	85,000
			By	Wages Control A/c	60,000
		9,55,000			9,55,000

Stores Ledger Control Account

Dr. Cr.

		(₹)			(₹)
To	Opening Balance	3,00,000	By	WIP Control A/c	1,35,000

To	Cost ledger control A/c	1,25,000	By	Cost ledger control A/c (Returns)	13,000
			By	Balance c/d	2,77,000
		4,25,000			4,25,000

WIP Control Account

Dr. Cr.

		(₹)			(₹)
To	Opening Balance	1,50,000	By	Finished Stock Ledger Control A/c	2,25,000
To	Wages Control A/c	40,000	By	Balance c/d	1,85,000
To	Stores Ledger Control A/c	1,35,000			
To	Manufacturing Overhead Control A/c	85,000			
		4,10,000			4,10,000

Finished Stock Ledger Control Account

Dr. Cr.

		(₹)			(₹)
To	Opening Balance	2,50,000	By	Cost of Sales	1,75,000
To	WIP Control A/c	2,25,000	By	Balance c/d	3,09,000
To	Cost of Sales A/c (Sales Return)	9,000			
		4,84,000			4,84,000

Manufacturing Overhead Control Account

Dr. Cr.

		(₹)			(₹)
To	Cost Ledger Control A/c	85,000	By	Opening Balance	15,000
To	Wages Control A/c	20,000	By	WIP Control A/c	85,000
			By	Under recovery c/d	5,000
		1,05,000			1,05,000

Wages Control Account

Dr. Cr.

		(₹)			(₹)
To	Transfer to Cost Ledger Control A/c	60,000	By	WIP Control A/c	40,000
			By	Manufacturing Overhead Control A/c	20,000
		60,000			60,000

Cost of Sales Account

Dr. Cr.

	(₹)		(₹)
To Finished Stock Ledger Control A/c	1,75,000	By Finished Stock Ledger Control A/c (Sales return)	9,000
		By Balance c/d	1,66,000
	1,75,000		1,75,000

Trial Balance

	(₹)	(₹)
Stores Ledger Control A/c	2,77,000	
WIP Control A/c	1,85,000	
Finished Stock Ledger Control A/c	3,09,000	
Manufacturing Overhead Control A/c	5,000	
Cost of Sales A/c	1,66,000	
Cost ledger control A/c	----	9,42,000
	9,42,000	9,42,000

Question-5

The following information have been extracted from the cost records of a manufacturing company:

		(₹)
	Stores	
*	*Opening balance*	*9,000*
*	*Purchases*	*48,000*
*	*Transfer from WIP*	*24,000*
*	*Issue to work-in-progress*	*48,000*
*	*Issue for repairs*	*6,000*
*	*Deficiency found in stock*	*1,800*
	Work-in-Progress:	
*	*Opening balance*	*18,000*
*	*Direct Wages applied*	*18,000*
*	*Overhead charged*	*72,000*
*	*Closing balance*	*12,000*

	Finished Production :	
*	*Entire production is sold at a profit of 10% on cost from work-in-progress*	
*	*Wages paid.*	*21,000*
*	*Overhead incurred*	*75,000*

Draw the Stores Leger Control A/c, Work-in-Progress Control A/c, Overheads Control A/c and Costing Profit and Loss A/c.

Solution:

Stores Ledger Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	9,000	By Work in Process	48,000
To General Ledger Adjustment A/c	48,000	By Overhead Control A/c	6,000
To Work in Process A/c	24,000	By Overhead Control A/c (Deficiency)	1,800*
		By Balance c/d	25,200
	81,000		81,000

*Deficiency assumed as normal (alternatively can be treated as abnormal loss)

Work in Progress Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	18,000	By Stores Ledger Control a/c	24,000
To Stores Ledger Control A/c	48,000	By Costing P/L A/c (Balancing figures being Cost of finished goods)	1,20,000
To Wages Control A/c	18,000	By Balance c/d	12,000
To Overheads Control a/c	72,000		
	1,56,000		1,56,000

Overheads Control A/c

Particulars	(₹)	Particulars	(₹)
To Stores Ledger Control A/c	6,000	By Work in Process A/c	72,000
To Stores Ledger Control A/c	1,800	By Balance c/d (Under absorption)	13,800
To Wages Control A/c (₹ 21,000- ₹18,000)	3,000		
To Gen. Ledger Adjust. A/c	75,000		
	85,800		85,800

Costing Profit & Loss A/c

Particulars	(₹)	Particulars	(₹)
To Work in progress	1,20,000	By Gen. ledger Adjust. A/c (Sales) (1,20,000+12,000)	1,32,000
To Gen. Ledger Adjust. A/c (Profit)	12,000		
	1,32,000		1,32,000

Question-6

Following information have been extracted from the cost records of XYZ Pvt. Ltd Stores:

	(₹)
Opening balance	*54,000*
Purchases	*2,88,000*
Transfer from WIP	*1,44,000*
Issue to WIP	*2,88,000*
Issue for repairs	*36,000*
Deficiency found in stock	*10,800*
Work-in-progress:	*(₹)*
Opening balance	*1,08,000*
Direct wages applied	*1,08,000*
Overheads charged	*4,32,000*
Closing balance	*72,000*
Finished Production:	*(₹)*
Entire production is sold at a profit of 15% on cost of WIP	
Wages paid	*1,26,000*
Overheads incurred	*4,50,000*

Draw the Stores Ledger Control Account, Work-in-Progress Control Account, Overheads Control Account and Costing Profit and Loss Account.

Solution

Stores Ledger Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	54,000	By Work in Process A/c	2,88,000
To General Ledger Adjustment A/c	2,88,000	By Overhead Control A/c	36,000

To Work in Process A/c	1,44,000	By Overhead Control A/c (Deficiency)	10,800*
		By Balance c/d	1,51,200
	4,86,000		4,86,000

*Deficiency assumed as normal (alternatively can be treated as abnormal loss)

Work in Progress Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,08,000	By Stores Ledger Control a/c	1,44,000
To Stores Ledger Control A/c	2,88,000	By Costing P/L A/c (Balancing figures being Cost of finished goods)	7,20,000
To Wages Control A/c	1,08,000	By Balance c/d	72,000
To Overheads Control a/c	4,32,000		
	9,36,000		9,36,000

Overheads Control A/c

Particulars	(₹)	Particulars	(₹)
To Stores Ledger Control A/c	36,000	By Work in Process A/c	4,32,000
To Stores Ledger Control A/c	10,800	By Balance c/d (Under absorption)	82,800
To Wages Control A/c (₹1,26,000- ₹1,08,000)	18,000		
To Gen. Ledger Adjust. A/c	4,50,000		
	5,14,800		5,14,800

Costing Profit & Loss A/c

Particulars	(₹)	Particulars	(₹)
To Work in progress	7,20,000	By Gen. ledger Adjust. A/c (Sales) (₹ 7,20,000 × 115%)	8,28,000
To Gen. Ledger Adjust. A/c (Profit)	1,08,000		
	8,28,000		8,28,000

Problem on Integrated Accounts

Question-7

Journalise the following transactions assuming cost and financial accounts are integrated :

		(₹)
(i)	*Materials issued :*	
	Direct	*3,25,000*
	Indirect	*1,15,000*
(ii)	*Allocation of wages (25% indirect)*	*6,50,000*
(iii)	*Under/Over absorbed overheads:*	
	Factory (Over)	*2,50,000*
	Administration (Under)	*1,75,000*
(iv)	*Payment to Sundry Creditors*	*1,50,000*
(v)	*Collection from Sundry Debtors*	*2,00,000*

Solution:

Journal Entries under Integrated system of accounting

	Particulars		(₹)	(₹)
(i)	Work-in-Progress Ledger Control A/c	Dr.	3,25,000	
	Factory Overhead Control A/c	Dr.	1,15,000	
	To Stores Ledger Control A/c			4,40,000
	(Being issue of Direct and Indirect materials)			
(ii)	Work-in Progress Ledger Control A/c	Dr.	4,87,500	
	Factory Overhead control A/c	Dr.	1,62,500	
	To Wages Control A/c			6,50,000
	(Being allocation of Direct and Indirect wages)			
(iii)	Factory Overhead Control A/c	Dr.	2,50,000	
	To Costing Profit & Loss A/c			2,50,000
	(Being transfer of over absorption of Factory overhead)			
	Costing Profit & Loss A/c	Dr.	1,75,000	
	To Administration Overhead Control A/c			1,75,000
	(Being transfer of under absorption of Administration overhead)			
(iv)	Sundry Creditors A/c	Dr.	1,50,000	

To Cash/ Bank A/c			1,50,000
(Being payment made to creditors)			
(v) Cash/ Bank A/c	Dr.	2,00,000	
To Sundry Debtors A/c			2,00,000
(Being payment received from debtors)			

Question-8

BPR Limited keeps books on integrated accounting system. The following balances appear in the books as on April 1, 2013.

	Dr. (₹)	***Cr. (₹)***
Stores Control A/c	*40,950*	–
Work-in-progress A/c	*38,675*	–
Finished Goods A/c	*52,325*	–
Bank A/c	–	*22,750*
Trade Payables A/c	–	*18,200*
Non-Current Assets A/c	*1,47,875*	–
Trade Receivables A/c	*27,300*	–
Share Capital A/c	–	*1,82,000*
Provision for 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*
*(*Reserve & Surplus)*	*3,17,100*	*3,17,100*

The transactions for the year ended March 31, 2014, were as given below:

	(₹)	***(₹)***
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*
Material 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 Trade Payables		*2,29,775*
Payment received from Trade Receivables		*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*

Required:

Write up accounts in the integrated ledger of BPR Limited and prepare a Trial balance.

Solution

Stores Control A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	40,950	By WIP A/c	2,50,250
To Trade Payables A/c	2,27,500	By Production overheads A/c	4,550
		By Balance c/d	13,650
	2,68,450		2,68,450

Wages Control A/c

Dr. Cr.

	(₹)		(₹)
To Bank (Direct wages)	1,97,925	By Work-in-Progress A/c	1,97,925
To Bank (Indirect wages)	11,375	By Production overheads A/c	11,375
	2,09,300		2,09,300

Work-in-Progress A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	38,675	By Finish goods A/c	4,89,125

To Wages control A/c	1,97,925	By Balance c/d	1,06,925
To Stores control A/c	2,50,250		
To Production overheads A/c	1,09,200		
	5,96,050		5,96,050

Production Overheads A/c

Dr. Cr.

	(₹)		(₹)
To Wages control A/c	11,375	By WIP A/c	1,09,200
To Stores control A/c	4,550	By Profit & Loss A/c	14,039
To Bank (₹ 91,000 – ₹ 6,250)	84,750	(Under-absorbed overheads Written off)	
To Production overheads outstanding	7,775		
To Provision for depreciation	14,789		
	1,23,239		1,23,239

Production overhead incurred = Payment made + Closing Outstanding + Prov. for Depreciation – Opening Outstanding

Finished Goods A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	52,325	By Cost of sales A/c	5,00,500
To Work-in-progress A/c	4,89,125	By Balance c/d	80,450
To Admin. overheads A/c	39,500		
	5,80,950		5,80,950

Administration Overheads A/c

Dr. Cr.

	(₹)		(₹)
To Pre-paid admin. overheads A/c	9,975	By Finished goods A/c	39,500
To Bank	27,300		
To Admin. overheads outstanding	2,225		
	39,500		39,500

Cost of Sales A/c

Dr. Cr.

	(₹)		(₹)
To Finished goods A/c	5,00,500	To Sales A/c	5,32,350

To Selling overheads	31,850		
	5,32,350		5,32,350

Sales A/c

Dr. Cr.

	(₹)		(₹)
To Cost of sales A/c	5,32,350	By Trade Receivables A/c	6,82,500
To Profit & Loss A/c	1,50,150		
	6,82,500		6,82,500

Factory Overheads / Production Overheads Outstanding A/c

Dr. Cr.

	(₹)		(₹)
To Bank	6,250	By Balance b/d	6,250
To Balance c/d	7,775	By Production overheads	7,775
	14,025		14,025

Prepaid Administration Overheads A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	9,975	By Admin. overheads A/c	9,975
	9,975		9,975

Provision for Depreciation A/c

Dr. Cr.

	(₹)		(₹)
To Balance c/d	26,164	By Balance b/d	11,375
		By Production overheads A/c	14,789
	26,164		26,164

Provision for Doubtful Debts A/c

Dr. Cr.

	(₹)		(₹)
To Balance c/d	4,590	By Balance b/d	3,725
		By Profit & Loss A/c	865
	4,590		4,590

Profit & Loss A/c

Dr. Cr.

	(₹)		(₹)
To Provision for doubtful debts	865	By Balance b/d	72,800
To Production overheads	14,039	By Sales A/c	1,50,150
To Balance c/d*	2,08,046		
	2,22,950		2,22,950

* Profit is transferred to Reserve & Surplus.

Trade Receivables A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	27,300	By Bank A/c	6,59,750
To Sales A/c	6,82,500	By Balance c/d	50,050
	7,09,800		7,09,800

Trade Payables A/c

Dr. Cr.

	(₹)		(₹)
To Bank	2,29,775	By Balance b/d	18,200
To Balance c/d	15,925	By Stores control/Ac	2,27,500
	2,45,700		2,45,700

Non Current Assets A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	1,47,875	By balance c/d	1,47,875

Bank A/c

Dr. Cr.

	(₹)		(₹)
To Trade Receivables	6,59,750	By Balance b/d	22,750
		By Direct wages	1,97,925
		By Indirect wages	11,375
		By Production overheads (₹ 84,750 + ₹6,250)	91,000
		By Admn. Overheads A/c	27,300
		By Selling overheads A/c	31,850

		By Trade Payables A/c	2,29,775
		By Balance c/d	47,775
	6,59,750		6,59,750

Trial Balance
As on March 31, 2014

	Dr. (₹)	Cr. (₹)
Stores control A/c	13,650	
Work in Progress A/c	1,06,925	
Finished goods A/c	80,450	
Bank A/c	47,775	
Trade Payables A/c		15,925
Non- current Assets A/c	1,47,875	
Trade Receivables A/c	50,050	
Share capital A/c		1,82,000
Provision for depreciation A/c		26,164
Reserve & Surplus (Profit & Loss A/c)		2,08,046
Production overheads outstanding A/c		7,775
Outstanding administrative overheads A/c		2,225
Provision for doubtful debt		4,590
	4,46,725	4,46,725

Reconciliation of Profits

Question-9

The financial books of a company reveal the following data for the year ended 31st March, 2014:

	(₹)
Opening Stock:	
Finished goods 875 units	*74,375*
Work-in-process	*32,000*
01.04.2013 to 31.3.2014	
Raw materials consumed	*7,80,000*
Direct Labour	*4,50,000*
Factory overheads	*3,00,000*
Goodwill written off	*1,00,000*
Administration overheads	*2,95,000*
Dividend paid	*85,000*

Bad Debts	*12,000*
Selling and Distribution Overheads	*61,000*
Interest received	*45,000*
Rent received	*18,000*
Sales 14,500 units	*20,80,000*
Closing Stock: Finished goods 375 units	*41,250*
Work-in-process	*38,667*

The cost records provide as under:

- *Factory overheads are absorbed at 60% of direct wages.*
- *Administration overheads are recovered at 20% of factory cost.*
- *Selling and distribution overheads are charged at ₹ 4 per unit sold.*
- *Opening Stock of finished goods is valued at ₹ 104 per unit.*
- *The company values work-in-process at factory cost for both Financial and Cost Profit Reporting.*

Required:

(i) *Prepare statements for the year ended 31st March, 2014 show*
  - *the profit as per financial records*
  - *the profit as per costing records.*

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

Solution:

(i) **Statement of Profit as per financial records**

OR

Profit & Loss Account of the company

(for the year ended March 31, 2014)

	(₹)		(₹)
To Opening stock:		By Sales	20,80,000
Finished Goods	74,375	By Closing stock:	
Work-in-process	32,000	Finished Goods	41250
To Raw materials consumed	7,80,000	Work-in-Process	38,667
To Direct labour	4,50,000	By Rent received	18,000
To Factory overheads	3,00,000	By Interest received	45,000
To Goodwill written off	1,00,000		
To Administration overheads	2,95,000		

To Selling & distribution overheads	61,000		
To Dividend paid	85,000		
To Bad debts	12,000		
To Profit	33,542		
	22,22,917		22,22,917

Statement of Profit as per costing records

(for the year ended March 31,2014)

	(₹)	(₹)
Sales revenue (14,500 units) (A)		20,80,000
Cost of Sales:		
Opening stock (875 units x ₹ 104)	91,000	
Add: Cost of production of 14,000 units (Refer to Working Note 1& 2)	17,92,000	
Less: Closing stock $\left(\frac{₹17,92,000 \times 375 \text{ units}}{14,000 \text{ units}}\right)$	(48,000)	
Production cost of goods sold (14,500 units)	18,35,000	
Selling & distribution overheads (14,500 units x ₹ 4)	58,000	
Cost of sales: (B)	18,93,000	18,93,000
Profit: {(A) – (B)}		1,87,000

(ii) Statement of Reconciliation

(Reconciling the profit as per costing records with the profit as per financial records)

	(₹)	(₹)
Profit as per Cost Accounts		1,87,000
Add: Admin. overheads over absorbed (₹ 2,98,667 – ₹ 2,95,000)	3,667	
Opening stock overvalued (₹ 91,000 – ₹ 74,375)	16,625	
Interest received	45,000	
Rent received	18,000	83,292
		2,70,292
Less: Factory overheads under recovery (₹ 2,98,667 – ₹ 2,95,000)	30,000	
Selling & distribution overheads under recovery (₹ 61,000 – ₹ 58,000)	3,000	
Closing stock overvalued (₹ 48,000 – ₹ 41,250)	6,750	

Goodwill written off	1,00,000	
Dividend	85,000	
Bad debts	12,000	2,36,750
Profit as per financial accounts		33,542

Working Notes:

1. **Number of units produced**

	Units
Sales	14,500
Add: Closing stock	375
Total	14,875
Less: Opening stock	875
Number of units produced	14,000

2. **Cost Sheet**

	(₹)	(₹)
Raw materials consumed		7,80,000
Direct labour		4,50,000
Prime cost		12,30,000
Factory overheads (60% of direct wages)		2,70,000
Factory cost		15,00,000
Add: Opening work-in-process		32,000
Less: Closing work-in-process		38,667
Factory cost of goods produced		14,93,333
Administration overheads (20% of factory cost)		2,98,667
Cost of production of 14,000 units		17,92,000

Cost of production per unit: $= \frac{\text{Total Cost of Production}}{\text{No. of units produced}} = \frac{₹\ 17,92,000}{14,000\ \text{units}} = ₹128$

Question-10

A manufacturing company disclosed a net loss of ₹ 3,47,000 as per their cost accounts for the year ended March 31,2014. The financial accounts however disclosed a net loss of ₹ 5,10,000 for the same period. The following information was revealed as a result of scrutiny of the figures of both the sets of accounts.

		(₹)
(i)	*Factory Overheads under-absorbed*	*40,000*
(ii)	*Administration Overheads over-absorbed*	*60,000*
(iii)	*Depreciation charged in Financial Accounts*	*3,25,000*
(iv)	*Depreciation charged in Cost Accounts*	*2,75,000*

(v)	*Interest on investments not included in Cost Accounts*	*96,000*
(vi)	*Income-tax provided*	*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

Solution:

Memorandum Reconciliation Accounts

Dr. Cr.

		(₹)			(₹)
To	Net Loss as per Costing books	3,47,000	By	Administration overheads over recovered in cost accounts	60,000
To	Factory overheads under absorbed in Cost Accounts	40,000	By	Interest on investment not included in Cost Accounts	96,000
To	Depreciation under charged in Cost Accounts	50,000	By	Transfer fees in Financial books	24,000
To	Income-Tax not provided in Cost Accounts	54,000	By	Stores adjustment (Credit in financial books)	14,000
To	Interest on Loan Funds in Financial Accounts	2,45,000	By	Dividend received in financial books	32,000
			By	Net loss as per Financial books	5,10,000
		7,36,000			7,36,000

Question-11

The following figures have been extracted from the cost records of a manufacturing unit:

	(₹)
Stores: Opening balance	*32,000*
Purchases of material	*1,58,000*
Transfer from work-in-progress	*80,000*
Issues to work-in-progress	*1,60,000*
Issues to repair and maintenance	*20,000*
Deficiencies found in stock taking	*6,000*
Work-in-progress: Opening balance	*60,000*

Direct wages applied	*65,000*
Overheads applied	*2,40,000*
Closing balance of W.I.P.	*45,000*

Finished products: Entire output is sold at a profit of 10% on actual cost from work-in-progress. Wages incurred ₹ 70,000, overhead incurred ₹ 2,50,000.

Items not included in cost records: Income from investment ₹ 10,000, Loss on sale of capital assets ₹ 20,000.

Draw up Store Control account, Work-in-progress Control account, Costing Profit and Loss account, Profit and Loss account and Reconciliation statement.

Solution:

(A) Costing books

Stores Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	32,000	By W.I.P. Control A/c	1,60,000
To General ledger adjustment A/c	1,58,000	By Work overhead control A/c	20,000
To Work in progress control A/c	80,000	By Costing Profit and Loss A/c	6,000
		By Balance c/d	84,000
	2,70,000		2,70,000

W.I.P. Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	60,000	By Stores control A/c	80,000
To Stores control A/c	1,60,000	By Costing profit and loss A/c (Cost of sales)	4,00,000
To Direct wages control A/c	65,000		
To Works overhead control A/c	2,40,000	By Balance c/d	45,000
	5,25,000		5,25,000

Works Overhead Control Account

Particulars	(₹)	Particulars	(₹)
To General ledger adjustment A/c	2,50,000	By W.I.P. Control A/c	2,40,000
To Store ledger control A/c	20,000	By Costing profit & loss A/c (under recovery)	30,000
	2,70,000		2,70,000

Costing Profit & Loss Account

Particulars	(₹)	Particulars		(₹)
To W.I.P. control A/c (Cost of sales)	4,00,000	By General ledger adjustment A/c		
To Works overhead control A/c	30,000	Cost of sales	4,00,000	
To Stores control A/c (shortage)	6,000	10% profit	40,000	4,40,000
To Profit	4,000			
	4,40,000			4,40,000

(B) Financial Books

Profit & Loss Account

Particulars		(₹)	Particulars		(₹)
To Opening stock			By Sales		4,40,000
Stores	32,000		By Closing stock:		
W.I.P.	60,000	92,000	Stores	84,000	
			W.I.P.	45,000	1,29,000
To Purchases		1,58,000	By Income from investment		10,000
To Wages incurred		70,000	By Loss		11,000
To Overheads incurred		2,50,000			
To Loss on sale of capital assets		20,000			
		5,90,000			5,90,000

Reconciliation statement

	(₹)	(₹)
Profit as per Cost Accounts		4,000
Add: Income from investment recorded in Financial accounts		10,000
		14,000
Less: Under absorption of wages in Cost accounts	5,000	
Loss on sales of capital asset only included in Financial accounts	20,000	25,000
Loss as per Financial accounts		11,000

Question-12

The following is the Trading and Profit & Loss Account of Omega Limited:

Dr. *Cr.*

Particulars	(₹)	Particulars		(₹)
To Materials consumed	23,01,000	By Sales (30,000 units)		48,75,000
To Direct wages	12,05,750	By Finished goods Stock (1,000 units)		1,30,000
To Production Overheads	6,92,250	By Work-in-progress:		
To Administration Overheads	3,10,375	Materials	55,250	
To Selling and Distribution Overheads	3,68,875	Wages	26,000	
To Preliminary Expenses written off	22,750	Production Overheads	16,250	97,500
To Goodwill written off	45,500			
To Fines	3,250	By Dividends received		3,90,000
To Interest on Mortgage	13,000	By Interest on bank deposits		65,000
To Loss on Sale of machine	16,250			
To Taxation	1,95,000			
To Net Profit for the year	3,83,500			
	55,57,500			55,57,500

Omega Limited manufactures a standard unit.

The Cost Accounting records of Omega Ltd. show the following:

(i) Production overheads have been charged to work-in-progress at 20% on Prime cost.

(ii) Administration Overheads have been recovered at ₹ 9.75 per finished Unit.

(iii) Selling & distribution Overheads have been recovered at ₹ 13 per Unit sold.

(iv) The Under- or Over-absorption of Overheads has not been transferred to costing P/L A/c.

Required:

(i) Prepare a proforma Costing Profit & Loss account, indicating net profit.

(ii) Prepare Control accounts for Production overheads, Administration Overheads and Selling & Distribution Overheads.

(iii) Prepare a statement reconciling the profit disclosed by the Cost records with that shown in Financial accounts.

Solution:

(i) Costing Profit & Loss A/c

		(₹)
	Materials	23,01,000
	Wages	12,05,750
	Prime Cost	35,06,750
	Production overheads (20% of Prime Cost)	7,01,350
		42,08,100
Less:	Work in Progress	97,500
	Manufacturing cost incurred during the period	41,10,600
Add:	Administration Overheads (₹9.75 x 31,000 units)	3,02,250
	Cost of Production	44,12,850
Less	Closing Finished goods stock($\left(₹44,12,850 \times \frac{1,000}{31,000}\right)$)	1,42,350
	Cost of Goods Sold	42,70,500
Add	Selling & Distribution Overheads (₹13 × 30,000 units)	3,90,000
	Cost of Sales	46,60,500
	Profit (Balancing figure)	2,14,500
	Sales	48,75,000

(ii) Production OH A/c

	(₹)		(₹)
To Gen ledger Adj. A/c	6,92,250	By WIP A/c	7,01,350
To Overhead adj. A/c (Over-absorption)	9,100		
	7,01,350		7,01,350

Administration Overheads A/c

	(₹)		(₹)
To Gen Ledger Adj. A/c	3,10,375	By Finished goods A/c	3,02,250
		By Overhead adj. A/c (Under-absorption)	8,125
	3,10,375		3,10,375

Selling & Distribution Overheads A/c

	(₹)		(₹)
To Gen. Ledger Adj A/c	3,68,875	By Cost of Sales A/c	3,90,000

To Overhead Adj. A/c (Over-absorption)	21,125		
	3,90,000		3,90,000

(iii) **Reconciliation Statement**

		(₹)	(₹)
	Profits as per cost accounts		2,14,500
Add:	Production Overheads- over absorbed	9,100	
	Selling & Distribution Overheads- over absorbed	21,125	
	Dividend received	3,90,000	
	Interest on bank deposits	65,000	4,85,225
			6,99,725
Less:	Administration Overheads- under-absorbed	8,125	
	Preliminary exp. Written off	22,750	
	Goodwill written off	45,500	
	Fines	3,250	
	Interest on Mortgage	13,000	
	Loss on sale of machinery	16,250	
	Taxation	1,95,000	
	Write-down of Finished stock (₹1,42,350 – ₹1,30,000)	12,350	(3,16,225)
	Profit as per Financial Accounts		3,83,500

Question-13

ABC Ltd. has furnished the following information from the financial books for the year ended 31st March, 2014:

Profit & Loss Account

		(₹)			(₹)
To	*Opening stock (500 units at ₹ 140 each)*	*70,000*	*By*	*Sales (10,250 units)*	*28,70,000*
To	*Material consumed*	*10,40,000*	*By*	*Closing stock*	
To	*Wages*	*6,00,000*		*(250 units at ₹ 200 each)*	*50,000*
To	*Gross profit c/d*	*12,10,000*			
		29,20,000			*29,20,000*
To	*Factory overheads*	*3,79,000*	*By*	*Gross profit b/d*	*12,10,000*
To	*Administration overheads*	*4,24,000*	*By*	*Interest*	*1,000*

To	*Selling expenses*	*2,20,000*	*By*	*Rent received*	*40,000*
To	*Bad debts*	*16,000*			
To	*Preliminary expenses*	*20,000*			
To	*Net profit*	*1,92,000*			
		12,51,000			*12,51,000*

The cost sheet shows the cost of materials at ₹ 104 per unit and the labour cost at ₹ 60 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 ₹ 24 per unit. The opening stock of finished goods is valued at ₹ 180 per unit.

You are required to prepare:

(i) A statement showing profit as per Cost accounts for the year ended 31st March, 2014; and

(ii) A statement showing the reconciliation of profit as disclosed in Cost accounts with the profit shown in Financial accounts.

Solution:

(i) Statement of Profit as per Cost Accounts

	Units	(₹)
Opening stock @ ₹ 180 per unit	500	90,000
Cost of production @ ₹ 240 per unit (Refer Working Note 1)	10,000	24,00,000
Total	10,500	24,90,000
Less: Closing stock @ ₹ 240 per unit	(250)	(60,000)
	10,250	24,30,000
Selling expenses @ ₹ 24 per unit		2,46,000
Cost of sales		26,76,000
Profit (Balancing figure)		1,94,000
Sales	10,250	28,70,000

Working Notes:

(i) Statement of Cost (10,000 units)

	Total cost (₹)	Cost per unit (₹)
Materials	10,40,000	104.00
Wages	6,00,000	60.00
Factory Overhead 60% of wages	3,60,000	36.00
Factory cost	20,00,000	200.00

Administrative overhead 20% of factory cost	4,00,000	40.00
Total cost	24,00,000	240.00

(ii) Statement of Differences between the two set of accounts:

	Financial A/c (₹)	Cost A/c (₹)	Difference (₹)	Remarks (₹)
Factory overhead	3,79,000	3,60,000	19,000	Under recovery
Administrative overhead	4,24,000	4,00,000	24,000	Under recovery
Selling expenses	2,20,000	2,46,000	26,000	Over recovery
Opening stock	70,000	90,000	20,000	Over recovery
Closing stock	50,000	60,000	10,000	Over recovery

(ii) Reconciliation Statement

		(₹)
Profit as per cost accounts		1,94,000
Add: Over-recovery of selling overhead in Cost A/c		26,000
Add: Over-valuation of opening stock in Cost A/c		20,000
Add: Income excluded from Cost A/c		
Interest	1,000	
Rent	40,000	41,000
Less: Under recovery of Overhead in Cost A/c		
Factory Overhead	19,000	
Administrative Overhead	24,000	(43,000)
Less: Over-valuation of closing stock in Cost A/c		(10,000)
Less: Expenses excluded from Cost A/c		
Bad debts	16,000	
Preliminary expenses	20,000	(36,000)
Profit as per financial account		1,92,000

Question-14

The following figures have been extracted from the cost records of a manufacturing company:

	(₹)
Stores :	
Opening Balance	*63,000*
Purchases	*3,36,000*

Transfer from Work-in-progress	*1,68,000*
Issues to Work-in-progress	*3,36,000*
Issues to Repairs and Maintenance	*42,000*
Deficiencies found in Stock taking	*12,600*
Work-in-progress:	
Opening Balance	*1,26,000*
Direct Wages applied	*1,26,000*
Overhead Applied	*5,04,000*
Closing Balance	*84,000*

Finished Products:

Entire output is sold at a Profit of 10% on actual cost from work-in-progress.

Others: Wages incurred ₹ 1,47,000; Overhead incurred ₹ 5,25,000.

Income from investment ₹ 21,000; Loss on sale of Fixed Assets ₹ 42,000.

Draw the stores control account, work-in-progress control account, costing profit and loss account, profit and loss account and reconciliation statement

Solution:

Stores Ledger Control Account

		(₹)			(₹)
To	Balance c/d	63,000	By	Work-in-progress	3,36,000
To	General Ledger Adjustment A/c	3,36,000	By	Overhead A/c	42,000
To	Work-in-progress A/c	1,68,000	By	Overhead A/c (Deficiency Assumed as Normal)	12,600
			By	Balance c/d	1,76,400
		5,67,000			5,67,000

Work-in-Progress Control Account

		(₹)			(₹)
To	Balance b/d	1,26,000	By	Stores Ledger Control A/c	1,68,000
To	Stores Ledger Control A/c	3,36,000	By	Costing Profits & Loss A/c (Finished goods at cost Balancing figure)	8,40,000
To	Wages Control A/c	1,26,000	By	Balance c/d	84,000

To	Overhead A/c (applied)	5,04,000		
		10,92,000		10,92,000

Costing Profit and Loss Account

		(₹)			(₹)
To	Work-in-Progress A/c	8,40,000	By	General Ledger Adjustment A/c Sales (₹ 8,40,000 + ₹ 84,000)	9,24,000
To	General Ledger Adjustment A/c (Profit)	84,000			
		9,24,000			9,24,000

Financial Profit and Loss Account

			(₹)				(₹)
To	Opening Stock			By	Sales		9,24,000
	Stores	63,000		By	Income from investment		21,000
	WIP	1,26,000	1,89,000				
To	Purchases		3,36,000	By	Closing Stock		
To	Wages		1,47,000		Stores	1,76,400	
To	Overhead		5,25,000		WIP	84,000	2,60,400
To	Loss on sale of fixed assets		42,000	By	Loss		33,600
			12,39,000				12,39,000

Reconciliation Statement

		(₹)
Profit as per Cost Account		84,000
Add: Income from investment		21,000
		1,05,000
Less: Under absorption of overhead	96,600	
Loss on sale of fixed assets	42,000	1,38,600
Loss as per financial account		33,600

Note: *Deficiency in stock taking may be treated as abnormal loss and it can be transferred from stores ledger Control Account to Costing Profit and Loss Account. Then consequential changes in accounting entries in overheads Control Account has to be done.*

Working Notes:

Overheads Control Account

		(₹)			(₹)
To	Stores Ledger Control A/c	42,000	By	Work-in-Progress	5,04,000
To	Stores Ledger Control A/c	12,600	By	Balanced c/d	96,600
To	Wages Control A/c Indirect Wages (₹1,47,000 – ₹1,26,000)	21,000			
To	General Ledger Adjustment A/c	5,25,000			
		6,00,600			6,00,600

Question-15

A manufacturing company has disclosed a net loss of ₹ 2,13,000 as per their cost accounting records for the year ended March 31, 2014. However, their financial accounting records disclosed a net loss of ₹ 2,58,000 for the same period. A scrutiny of data of both the sets of books of accounts revealed the following information:

		(₹)
(i)	*Factory overheads under-absorbed*	*5,000*
(ii)	*Administration overheads over-absorbed*	*3,000*
(iii)	*Depreciation charged in financial accounts*	*70,000*
(iv)	*Depreciation charged in cost accounts*	*80,000*
(v)	*Interest on investments not included in cost accounts*	*20,000*
(vi)	*Income-tax provided in financial accounts*	*65,000*
(vii)	*Transfer fees (credit in financial accounts)*	*2,000*
(viii)	*Preliminary expenses written off*	*3,000*
(ix)	*Over-valuation of closing stock of finished goods in cost accounts*	*7,000*

Prepare a Memorandum Reconciliation Account.

Solution:

Memorandum Reconciliation Account

	Particulars	(₹)		Particulars	(₹)
To	Net loss as per Costing books	2,13,000	By	Administrative overhead over absorbed in costs	3,000
To	Factory overheads under	5,000	By	Depreciation over charged in	10,000

	absorbed			Cost books (₹80,000 – ₹70,000)	
To	Income tax not provided in Cost books	65,000	By	Interest on investments not included in Cost books	20,000
To	Preliminary expenses written off in Financial books	3,000	By	Transfer fees not considered in Cost books	2,000
To	Over-valuation of Closing Stock of finished goods in Cost books	7,000	By	Net loss as per Financial books	2,58,000
		2,93,000			2,93,000

Question-16

You are given the following information of the cost department of a manufacturing company:

	(₹)
Stores:	
Opening Balance	*12,60,000*
Purchases	*67,20,000*
Transfer from work-in-progress	*33,60,000*
Issue to work-in-progress	*67,20,000*
Issue to repairs and maintenance	*8,40,000*
Shortage found in stock taking	*2,52,000*
Work-in-progress:	
Opening Balance	*25,20,000*
Direct wages applied	*25,20,000*
Overhead applied	*90,08,000*
Closing Balance	*15,20,000*

Finished products:

Entire output is sold at a profit of 12% on actual cost from work-in-progress.

Other information:

	(₹)
Wages incurred	*29,40,000*
Overhead incurred	*95,50,000*

Income from Investment	*4,00,000*
Loss on sale of fixed assets	*8,40,000*

Shortage in stock taking is treated as normal loss.

You are require to prepare:

(i) Stores control account;

(ii) Work-in-progress control account;

(iii) Costing Profit and Loss account;

(iv) Profit and Loss account and

(v) Reconciliation statement

Solution:

(a) Stores Leger Control Account

Dr. Cr.

	(₹)		(₹)
To Balance b/d	12,60,000	By Work-in-progress control A/c	67,20,000
To General ledger adjustment A/c	67,20,000	By Overhead control A/c	8,40,000
To Work-in progress Control A/c	33,60,000	By Overhead control A/c (Shortage)	2,52,000
		By Balance c/d	35,28,000
	1,13,40,000		1,13,40,000

W.I.P Control A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	25,20,000	By Stores ledger control A/c	33,60,000
To Stores ledger control A/c	67,20,000	By Costing P&L A/c (Cost of Sales) (Balancing figure)	1,58,88,000
To Direct wages Control A/c	25,20,000		
To Overhead control A/c	90,08,000	By Balance c/d	15,20,000
	2,07,68,000		2,07,68,000

Costing Profit and Loss A/c

Dr. Cr.

	(₹)			(₹)
To W.I.P Control A/c	1,58,88,000	By General Ledger Adj. A/c		
To General ledger Adj. A/c (Profit)	19,06,560	Cost of sales	1,58,88,000	
		Add 12%Profit	19,06,560	1,77,94,560
	1,77,94,560			1,77,94,560

Financial Profit and Loss A/c

Dr. Cr.

	(₹)	(₹)		(₹)	(₹)
To Opening stock : Stores	12,60,000		By Sales		1,77,94,560
W.I.P	25,20,000	37,80,000	By Income from investment		4,00,000
To Purchases		67,20,000	By Closing stock:		
To Wages		29,40,000	Stores	35,28,000	
			W.I.P	15,20,000	50,48,000
To Overhead		95,50,000	By loss		5,87,440
To Loss on sale of fixed assets		8,40,000			
		2,38,30,000			2,38,30,000

Reconciliation Statement

Dr. Cr.

	(₹)	(₹)
Profit as per Cost Accounts		19,06,560
Add: Income from investments		4,00,000
		23,06,560
Less : Loss on sale of fixed assets	8,40,000	
Under absorption of overheads (Refer to Working Note)	20,54,000	28,94,000
Loss as per Financial Accounts		5,87,440

Working Notes:

Overhead Control Account

Dr. Cr.

	(₹)		(₹)
To General Ledger Adj. A/c	95,50,000	By W.I.P control A/c	90,08,000
To Stores Ledger Control A/c	2,52,000	By Balance c/d (under absorption of overheads)	20,54,000
To Stores ledger control A/c	8,40,000		
To Wages control A/c Indirect wages (₹ 29,40,000- ₹25,20,000)	4,20,000		
	1,10,62,000		1,10,62,000

Question-17

R Limited showed a net loss of ₹ 35,400 as per their cost accounts for the year ended 31st March, 2014. However, the financial accounts disclosed a net profit of ₹ 67,800 for the same period. The following information were revealed as a result of scrutiny of the figures of cost accounts and financial accounts:

		(₹)
(i)	*Administrative overhead under recovered*	*25,500*
(ii)	*Factory overhead over recovered*	*1,35,000*
(iii)	*Depreciation under charged in Cost Accounts*	*26,000*
(iv)	*Dividend received*	*20,000*
(v)	*Loss due to obsolescence charged in Financial Accounts*	*16,800*
(vi)	*Income tax provided*	*43,600*
(vii)	*Bank interest credited in Financial Accounts*	*13,600*
(viii)	*Value of opening stock:*	
	In Cost Accounts	*1,65,000*
	In Financial Accounts	*1,45,000*
(ix)	*Value of closing stock:*	
	In Cost Accounts	*1,25,500*
	In Financial Accounts	*1,32,000*
(x)	*Goodwill written-off in Financial Accounts*	*25,000*

(xi) Notional rent of own premises charged in Cost Accounts 60,000

(xii) Provision for doubtful debts in Financial Accounts 15,000

Prepare a reconciliation statement by taking costing net loss as base.

Solution:

Statement of Reconciliation

Sl. No.	Particulars	*Amount (₹)*	*Amount (₹)*
	Net loss as per Cost Accounts		(35,400)
	Additions		
1.	Factory O/H over recovered	1,35,000	
2.	Dividend Received	20,000	
3.	Bank Interest received	13,600	
4.	Difference in Value of Opening Stock	20,000	
	(1,65,000 – 1,45,000)		
5.	Difference in Value of Closing Stock	6,500	
	(1,32,000 – 1,25,500)		
6.	Notional Rent of own Premises	60,000	2,55,100
	Deductions		
1.	Administration O/H under recovered	25,500	
2.	Depreciation under charged	26,000	
3.	Loss due to obsolescence	16,800	
4.	Income tax Provided	43,600	
5.	Goodwill written-off	25,000	
6.	Provision for doubtful debts	15,000	(1,51,900)
	Net Profit as per Financial A/c.		67,800

Question-18

A manufacturing company has disclosed net loss of ₹ 48,700 as per their cost accounting records for the year ended 31st March, 2014. However their financial accounting records disclosed net profit of ₹ 35,400 for the same period. A scrutiny of data of both the sets of books of accounts revealed the following information:

		(₹)
(i)	*Factory overheads under absorbed*	*30,500*
(ii)	*Administrative overheads over absorbed*	*65,000*
(iii)	*Depreciation charged in financial accounts*	*2,25,000*
(iv)	*Depreciation charged in cost accounts*	*2,70,000*

(v)		*Income-tax provision*	*52,400*
(vi)		*Transfer fee (credited in financial accounts)*	*10,200*
(vii)		*Obsolescence loss charged in financial accounts*	*20,700*
(viii)		*Notional rent of own premises charged in cost accounts*	*54,000*
(ix)		*Value of opening stock:*	
	(a)	*in cost accounts*	*1,38,000*
	(b)	*in financial accounts*	*1,15,000*
(x)		*Value of closing stock:*	
	(a)	*in cost accounts*	*1,22,000*
	(b)	*in financial accounts*	*1,12,500*

Prepare a Memorandum Reconciliation Account by taking costing loss as base.

Solution:

Memorandum Reconciliation Accounts

Dr. Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)
To Net Loss as per Cost Accounts	48,700	By Administration overheads over recovered in Cost Accounts	65,000
To Factory overheads under absorbed in Cost Accounts	30,500	By Depreciation overcharged in Cost Accounts (₹ 2,70,000 – ₹ 2,25,000)	45,000
To Provision for Income tax	52,400	By Transfer fees in Financial Accounts	10,200
To Obsolescence loss	20,700	By Notional Rent of own premises	54,000
To Overvaluation of closing stock in Cost Accounts**	9,500	By Overvaluation of Opening stock in Cost Accounts*	23,000
To Net Profit (as per Financial Accounts)	35,400		
	1,97,200		1,97,200

* Overvaluation of Opening Stock as per Cost Accounts

= Value in Cost Accounts – Value in Financial Accounts

= ₹ 1,38,000 – ₹ 1,15,000 = ₹ 23,000.

** Overvaluation of Closing Stock as per Cost Accounts

= Value in Cost Accounts – Value in Financial Accounts

= ₹ 1,22,000 – ₹ 1,12,500 = ₹ 9,500.

6 Job Costing & Batch Costing

Basic Concepts

Job Costing	According to this method costs are collected and accumulated according to jobs, contracts, products or work orders. Each job or unit of production is treated as a separate entity for the purpose of costing. Job costing is carried out for the purpose of ascertaining cost of each job and takes into account the cost of materials, labour and overhead etc.
Batch Costing	This is a form of job costing. Under job costing, executed job is used as a cost unit, whereas under batch costing, a lot of similar units which comprises the batch may be used as a cost unit for ascertaining cost. In the case of batch costing separate cost sheets are maintained for each batch of products by assigning a batch number.
Economic Batch Quantity	There is one particular batch size for which both set up and carrying costs are minimum. This size is known as economic or optimum batch quantity. $\text{E.B.Q} = \sqrt{\dfrac{2 \times \text{Annual Demand} \times \text{Setting - up Cost per batch}}{\text{Cost of carrying per unit of production per annum}}}$

SECTION-A

Question-1

Describe job Costing and Batch Costing giving example of industries where these are used?

Solution:

Job Costing: It is a method of costing which is used when the work is undertaken as per the customer's special requirement. When an inquiry is received from the customer, costs expected to be incurred on the job are estimated and on the basis of this estimate, a price is quoted to the customer. Actual cost of materials, labour and overheads are accumulated and on the completion of job, these actual costs are compared with the quoted price and thus the profit or loss on it is determined.

Job costing is applicable in printing press, hardware, ship-building, heavy machinery, foundry, general engineering works, machine tools, interior decoration, repairs and other similar work.

Batch Costing: It is a variant of job costing. Under batch costing, a lot of similar units which comprises the batch may be used as a unit for ascertaining cost. In the case of batch costing separate cost sheets are maintained for each batch of products by assigning a batch number. Cost per unit in a batch is ascertained by dividing the total cost of a batch by the number of units produced in that batch.

Such a method of costing is used in the case of pharmaceutical or drug industries, readymade garment industries, industries, manufacturing electronic parts of T.V. radio sets etc.

Question-2

Distinguish between Job Costing & Batch Costing?

Solution:

Job Costing and Batch Costing

Accounting to job costing, costs are collected and accumulated according to job. Each job or unit of production is treated as a separate entity for the purpose of costing. Job costing may be employed when jobs are executed for different customers according to their specification.

Batch costing is a form of job costing, a lot of similar units which comprises the batch may be used as a cost unit for ascertaining cost. Such a method of costing is used in case of pharmaceutical industry, readymade garments, industries manufacturing parts of TV, radio sets etc.

Question-3

Distinguish between Job Costing and Process Costing?

Solution:

The main points which distinguish Job Costing and Process Costing are as below:

	Job Costing	**Process Costing**
(i)	A Job is carried out or a product is produced by specific orders.	The process of producing the product has a continuous flow and the product produced is homogeneous.
(ii)	Costs are determined for each job.	Costs are compiled on time basis i.e., for production of a given accounting period for each process or department.
(iii)	Each job is separate and independent of	Products lose their individual identity as they

	Job Costing	Process Costing
	other jobs.	are manufactured in a continuous flow.
(iv)	Each job or order has a number and costs are collected against the same job number.	The unit cost of process is an average cost for the period.
(v)	Costs are computed when a job is completed. The cost of a job may be determined by adding all costs against the job.	Costs are calculated at the end of the cost period. The unit cost of a process may be computed by dividing the total cost for the period by the output of the process during that period.
(vi)	As production is not continuous and each job may be different, so more managerial attention is required for effective control.	Process of production is usually standardized and is therefore, quite stable. Hence control here is comparatively easier.

Question-4

Define Product costs. Describe three different purposes for computing product costs.

Solution:

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:

(i) *Preparation of financial statements:* Here focus is on inventoriable costs.

(ii) *Product pricing:* It is an important 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.

(iii) *Contracting with government agencies:* For this purpose government agencies may not allow the contractors to recover research and development and marketing costs under cost plus contracts.

Question-5

In Batch Costing, how is Economic Batch Quantity determined?

Solution:

Economic batch quantity in Batch Costing

In batch costing the most important problem is the determination of 'Economic Batch Quantity'

The determination of economic batch quantity involves two types of costs viz, (i) set up cost and (ii) carrying cost. With the increase in the batch size, there is an increase in the carrying cost but the set-up cost per unit of the product is reduced; this situation is reversed when the batch size is reduced. Thus there is one particular batch size for which both set up and carrying costs are minimum. This size of a batch is known as economic or optimum batch quantity.

Economic batch quantity can be determined with the help of a table, graph or mathematical formula. The mathematical formula usually used for its determination is as follows:

$$\text{EBQ} = \sqrt{\frac{2DS}{C}}$$

Where, D = Annual demand for the product

S = Setting up cost per batch

C = Carrying cost per unit of production per annum

Question-6

Z Ltd. Produces product ZZ in batches, management of the Z Ltd. wants to know the number of batches of product ZZ to be produced where the cost incurred on batch setup and carrying cost of production is at optimum level.

Solution:

Economic batch quantity in Batch Costing*:* In batch costing the most important problem is the determination of 'Economic Batch Quantity'. The determination of economic batch quantity involves two types of costs viz, (i) set up cost and (ii) carrying cost. With the increase in the batch size, there is an increase in the carrying cost but the set up cost per unit of product is reduced. This situation is reversed when the batch size is reduced. Thus there is one particular batch size for which both set up and carrying costs are minimum. This size of a batch is known as economic or optimum batch quantity.

Economic batch quantity can be determined with the help of table, graph or mathematical formula. The mathematical formula usually used for its determination is as follows:

$$\text{E.B.Q} = \sqrt{\frac{2DS}{C}}$$

Where, D= Annual demand for the product

S = Setting up cost per batch

C = Carrying cost per unit of production per annum

SECTION- B

Question-1

A factory incurred the following expenditure during the year 2013:

	(₹)	*(₹)*
Direct material consumed		*12,00,000*
Manufacturing Wages		*7,00,000*
Manufacturing overhead:		
Fixed	*3,60,000*	
Variable	*2,50,000*	*6,10,000*
		25,10,000

In the year 2014, following changes are expected in production and cost of production.

(i) Production will increase due to recruitment of 60% more workers in the factory.

(ii) Overall efficiency will decline by 10% on account of recruitment of new workers.

(iii) There will be an increase of 20% in Fixed overhead and 60% in Variable overhead.

(iv) The cost of direct material will be decreased by 6%.

(v) The company desire to earn a profit of 10% on selling price.

Ascertain the cost of production and selling price.

Solution:

Budgeted Cost Sheet for the year 2014

Particulars			**(Amount ₹)**
Direct material consumed		12,00,000	
Add: 44% due to increased output		5,28,000	
		17,28,000	
Less: 6% for decline in price		1,03,680	16,24,320
Direct wages (manufacturing)		7,00,000	
Add: 60% increase		4,20,000	11,20,000
Prime cost			27,44,320
Manufactured Overhead:			
Fixed	3,60,000		
Add: 20% increase	72,000		
		4,32,000	

Variable	2,50,000		
Add: 60% increase	1,50,000		
		4,00,000	8,32,000
Cost of production			35,76,320
Add: 1/9 of Cost or 10% on selling price			3,97,369
Selling price			39,73,689

Production will increase by 60% but efficiency will decline by 10%.

160 – 10% of 160 = 144%

So increase by 44%.

Note: If we consider that variable overhead once will change because of increase in production (From ₹ 2,50,000 to ₹ 4,00,000) then with efficiency declining by 10% it shall be ₹ 3,60,000 and then again as mentioned in point No. (iii) of this question it will increase by 60% then variable overhead shall be ₹3,60,000 × 160% = ₹ 5,76,000. Hence, total costs shall be ₹37,52,320 and profit shall be 1/9th of ₹37,52,320 = ₹4,16,924. Thus, selling price shall be ₹ 41,69,244.

Question-2

Ares Plumbing and Fitting Ltd. (APFL) deals in plumbing materials and also provides plumbing services to its customers. On 12th August, 2014, APFL received a job order for a students' hostel to supply and fitting of plumbing materials. The work is to be done on the basis of specification provided by the hostel owner. Hostel will be inaugurated on 5th September, 2014 and the work is to be completed by 3rd September, 2014. Following are the details related with the job work:

Direct Materials

APFL uses a weighted average method for the pricing of materials issues.

Opening stock of materials as on 12th August 2014:

- *15mm GI Pipe, 12 units of (15 feet size) @ ₹600 each*
- *20mm GI Pipe, 10 units of (15 feet size) @ ₹660 each*
- *Other fitting materials, 60 units @ ₹26 each*
- *Stainless Steel Faucet, 6 units @ ₹204 each*
- *Valve, 8 units @ ₹404 each*

Purchases:

On 16th August 2014:

- *20mm GI Pipe, 30 units of (15 feet size) @ ₹610 each*

- *10 units of Valve @ ₹402 each*

On 18th August 2014:

- *Other fitting materials, 150 units @ ₹28 each*
- *Stainless Steel Faucet, 15 units @ ₹209 each*

On 27th August 2014:

- *15mm GI Pipe, 35 units of (15 feet size) @ ₹628 each*
- *20mm GI Pipe, 20 units of (15 feet size) @ ₹660 each*
- *Valve, 14 units @ ₹424 each*

Issues for the hostel job:

On 12th August 2014:

- *20mm GI Pipe, 2 units of (15 feet size)*
- *Other fitting materials, 18 units*

On 17th August 2014:

- *15mm GI Pipe, 8 units of (15 feet size)*
- *Other fitting materials, 30 units*

On 28th August 2014:

- *20mm GI Pipe, 2 units of (15 feet size)*
- *15mm GI Pipe, 10 units of (15 feet size)*
- *Other fitting materials, 34 units*
- *Valve, 6 units*

On 30th August:

- *Other fitting materials, 60 units*
- *Stainless Steel Faucet, 15 units*

Direct Labour:

Plumber: 180 hours @ ₹50 per hour (includes 12 hours overtime)

Helper: 192 hours @ ₹35 per hour (includes 24 hours overtime)

Overtimes are paid at 1.5 times of the normal wage rate.

Overheads:

Overheads are applied @ ₹13 per labour hour.

Pricing policy:

It is company's policy to price all orders based on achieving a profit margin of 25% on sales price.

You are required to

(a) Calculate the total cost of the job.

(b) Calculate the price to be charged from the customer

Solution:

(a) Calculation of Total Cost for the Hostel Job:

Particulars	Amount (₹)	Amount (₹)
Direct Material Cost:		
- 15mm GI Pipe (Working Note- 1)	11,051.28	
- 20mm GI Pipe (Working Note- 2)	2,588.28	
- Other fitting materials (Working Note- 3)	3,866.07	
- Stainless steel faucet 15 units × $\left(\frac{6 \times ₹\,204 + 15 \times ₹\,209}{21 \text{units}}\right)$	3,113.57	
- Valve 6 units × $\left(\frac{8 \times ₹\,404 + 10 \times ₹\,402 + 14 \times ₹\,424}{32 \text{units}}\right)$	2,472.75	23,091.95
Direct Labour:		
- Plumber [(180 hours × ₹ 50) + (12 hours × ₹ 25)]	9,300.00	
- Helper [(192 hours × ₹ 35) + (24 hours × ₹ 17.5)]	7,140.00	16,440.00
- Overheads [₹ 13 × (180 + 192) hours]		4,836.00
Total Cost		44,367.95

(b) Price to be charged for the job work:

	Amount (₹)
Total Cost incurred on the job	44,367.95
Add: 25% Profit on Job Price $\left(\frac{44,367.95}{75\%} \times 25\%\right)$	14,789.32
	59,157.27

Working Note:

1. Cost of 15mm GI Pipe

Date		Amount (₹)
17-08-2014	8 units × ₹ 600	4,800.00
28-08-2014	10 units × $\left(\frac{4 \times ₹ 600 + 35 \times ₹ 628}{39 \text{units}}\right)$	6,251.28
		11,051.28

2. Cost of 20mm GI Pipe

Date		Amount (₹)
12-08-2014	2 units × ₹ 660	1,320.00
28-08-2014	2 units × $\left(\frac{8 \times ₹ 660 + 30 \times ₹ 610 + 20 \times ₹ 660}{58 \text{units}}\right)$	1,268.28
		2,588.28

3. Cost of Other fitting materials

Date		Amount (₹)
12-08-2014	18 units × ₹ 26	468.00
17-08-2014	30 units × ₹ 26	780.00
28-08-2014	34 units × $\left(\frac{12 \times ₹ 26 + 150 \times ₹ 28}{162 \text{units}}\right)$	946.96
30-08-2014	60 units × $\left(\frac{12 \times ₹ 26 + 150 \times ₹ 28}{162 \text{units}}\right)$	1,671.11
		3,866.07

Question-3

Arnav Motors Ltd. manufactures pistons used in car engines. As per the study conducted by the Auto Parts Manufacturers Association, there will be a demand of 80 million pistons in the coming year. Arnav Motors Ltd. is expected to have a market share of 1.15% of the total market demand of the pistons in the coming year. It is estimated that it costs ₹1.50 as inventory holding cost per piston per month and that the set-up cost per run of piston manufacture is ₹ 3,500.

(i) What would be the optimum run size for piston manufacturing?

(ii) Assuming that the company has a policy of manufacturing 40,000 pistons per run, how much extra costs the company would be incurring as compared to the optimum run suggested in (i) above?

Solution:

(i) Optimum run size or Economic Batch Quantity (EBQ) = $\sqrt{\dfrac{2 \times D \times S}{C}}$

Where, D = Annual demand i.e. 1.15% of 8,00,00,000 = 9,20,000 units

S = Set-up cost per run = ₹ 3,500

C = Inventory holding cost per unit per annum

= ₹1.5 × 12 months = ₹ 18

EBQ = $\sqrt{\dfrac{2 \times 9{,}20{,}000\,\text{units} \times ₹3{,}500}{₹\,18}}$ = 18,915 units

(ii) Calculation of Total Cost of set-up and inventory holding

	Batch size	**No. of set-ups**	**Set-up Cost (₹)**	**Inventory holding cost (₹)**	**Total Cost (₹)**
A	40,000 units	23 $\left(\dfrac{9{,}20{,}000}{40{,}000}\right)$	80,500 (23 × ₹ 3,500)	3,60,000 $\left(\dfrac{40{,}000 \times ₹18}{2}\right)$	4,40,500
B	18,915 units	49 $\left(\dfrac{9{,}20{,}000}{18{,}915}\right)$	1,71,500 (49 × ₹3,500)	1,70,235 $\left(\dfrac{18{,}915 \times \text{Rs.}18}{2}\right)$	3,41,735
	Extra Cost (A – B)				98,765

7 Contract Costing

Basic Concepts

Contract Costing	Contract costing is a form of specific order costing where job undertaken is relatively large and normally takes period longer than a year to be getting completed.
Sub-contract	When a contract either completely or partly ***given to another contractor*** by the principal contractor (to whom contractee has entered into an agreement) to get the work completed is known as sub-contracting and work given is known as sub-contract work.
Extra work	Any work ***in addition to the original work*** for which a contract has been entered into between the contractor and contractee in known as extra work. For the extra work the contractee has to pay separately in addition to original contract value. If the extra work is substantial in volume or value it is treated as separate contract.
Work Certified	The portion of work which is ***certified as complete*** by architecture, surveyor, engineer or any other person as may be agreed between the contractor and contractee is called work certified.
Value of Work Certified	The proportion of work certified to the ***value*** of contract (contract price) is called value of work certified.
Cost of work certified	The proportion of work certified to the total ***cost*** incurred to date is called cost of work certified.
Work uncertified	It represents the ***cost*** of the work which has been carried out by the contractor but has not been certified by the architect. It is always shown at cost price.
Progress Payment	Contractors receive payments from the contractees periodically for the work done on the contract. This is known as progress payment or running payment. This is paid on the basis of certificate of work completion issued by the architect or surveyor.

Retention Money	Retention money is a part of the value of work certified which though certified but is not paid by the contractee. Retention amount is kept by the contractee as security amount against any damage.
Work-in-progress	In Contract Accounts, the value of the work-in-progress consists of (i) Value of work certified and (ii) the cost of work uncertified.
Notional profit	It represents the ***difference between*** the ***value*** of work certified ***and cost*** of work certified
Estimated profit	It is the excess of the contract price over the estimated total cost of the contract.
Cost plus contract	Under Cost plus contract, the contract price is ascertained by adding a percentage of profit to the total cost of the work. Such type of contracts are entered into when it is not possible to estimate the contract cost with reasonable accuracy due to unstable condition of material, labour services, etc.
Escalation Clause	Escalation clause is a clause written in the agreement (contract) between the contractor and contractee which states that in case of increase in the prices of materials, wages or other supplies beyond a certain level the contract price will be increased by an agreed amount.
Profits on incomplete contracts	Profits on incomplete contracts are recognised on prudent basis. The overriding principle being that there can be no attributable profit until the outcome of a contract can reasonably be foreseen.

Basic Formulae

Value of work certified	= Value of Contract × Percentage of work certified.
Cost of work certified	= Cost of work to date - (Cost of work uncertified + Materials at site + Plant at site)
Cost of work uncertified	= Cost of work to date – Cost of work certified
Estimated Profit	= Value of Contract – Total estimated cost of contract completion.
Percentage of work Completed	$= \frac{\text{Value of Work Certified}}{\text{Contract Value}} \times 100$
	Profits on Incomplete Contracts

When work on contract has not reasonably advanced	No profit is calculated when work certified is less than 25% of the value of the contract. No Profit is taken
When work certified is 25% or more but less than 50% of the contract price	$\frac{1}{3} \times \text{Notional profit} \times \frac{\text{Cash recieved}}{\text{Work certified}}$
When work certified is 50% or more but less than 90% of the contract price.	$\frac{2}{3} \times \text{Notional profit} \times \frac{\text{Cash received}}{\text{Work certified}}$
When the contract is almost complete i.e. 90% or more of the contract price.	An estimated total profit is determined by deducting aggregate of cost to date and estimated additional expenditure from contract price. A portion of this estimated total profit is credited to profit and loss account. The figure to be credited to profit and loss account is ascertained by adopting any of the following formulae: $\text{Estimated total profit} \times \frac{\text{Work certified}}{\text{Contract price}}$ Or, $\text{Estimated total profit} \times \frac{\text{Cash received}}{\text{Contract price}}$ Or, $\text{Estimated total profit} \times \frac{\text{Cost of Work to date}}{\text{Estimated total cost}}$ Or, $\text{Estimated total profit} \times \frac{\text{Cost of Work to date}}{\text{Estimated total cost}} \times \frac{\text{Cash received}}{\text{Work certified}}$
Note: "Students are requested to refer the Study Material and Practice Manual of 'Accounting' (Paper-1 CA-Intermediate) to see and learn accounting perspective of contract accounting and applicability of Accounting Standard- 7. Here only specific aspect of Contract Costing is discussed."	

SECTION-A

Question-1

Write note on cost-plus-contracts.

Solution:

These contracts provide for the payment by the contractee of the actual cost of construction plus a stipulated profit, mutually decided between the two parties.

The main features of these contracts are as follows:

1. The practice of cost-plus contracts is adopted in the case of those contracts where the probable cost of the contracts cannot be ascertained in advance with a reasonable accuracy.
2. These contracts are preferred when the cost of material and labour is not steady and the contract completion may take number of years.
3. The different costs to be included in the execution of the contract are mutually agreed, so that no dispute may arise in future in this respect. Under such type of contracts, contractee is allowed to check or scrutinize the concerned books, documents and accounts.
4. Such a contract offers a fair price to the contractee and also a reasonable profit to the contractor.

The contract price here is ascertained by adding a fixed and mutually pre-decided component of profit to the total cost of the work.

Question-2

Write notes on Escalation Clause.

Solution:

Escalation Clause: This clause is usually provided in the contracts as a safeguard against any likely changes in the price or utilization of material and labour. If during the period of execution of a contract, the prices of materials or labour rise beyond a certain limit, the contract price will be increased by an agreed amount. Inclusion of such a term in a contract deed is known as an 'escalation clause'.

An escalation clause usually relates to change in price of inputs, it may also be extended to increased consumption or utilization of quantities of materials, labour etc (where it is beyond the control of the contractor). In such a situation the contractor has to satisfy the contractee that the increased utilization is not due to his inefficiency.

Question-3

Discuss briefly the principles to be followed while taking credit for profit on incomplete contracts.

Solution:

Principles to be followed while taking credit for profit on incomplete contracts:

The portion of profit to be credited to, Costing profit and loss account should depend on the stage of completion of the contract. This stage of completion of the contract should refer to the certified work only. For this purpose, uncertified work should not be considered as far as possible. For determining the credit for profit, all the incomplete contracts should be classified into the following four categories.

(i) Contract less than 25% complete

(ii) Contracts is 25% or more but less than 50% complete

(iii) Contracts is 50% or more but less than 90% complete

(iv) Contracts nearing completion, say between 90% and 100% complete.

The transfer of profit to the costing profit and loss account in each of the above cases is done as under:

(i) *Contract less than 25% complete:* If the contract has just started or it is less than 25% complete, no profit should be taken into account.

(ii) *Contract is 25% or more but less than 50% complete:* In this case one third of the notional profit reduced in the ratio of cash received to work certified, may be transferred to the profit and loss account. The amount of profit to be transferred to the profit and loss account may be determined by using the following formula:

$$\frac{1}{3} \times \text{Notional profit} \times \frac{\text{Cash received}}{\text{Work certified}}$$

(iii) *Contract is 50% or more but less than 90% complete:* In this case, two third of the notional profit, reduced by the portion of cash received to work certified may be transferred to the profit and loss account. In this case the formula to be used is as under:

$$\frac{2}{3} \times \text{Notional profit} \times \frac{\text{Cash received}}{\text{Work certified}}$$

(iv) *Contracts nearing completion, say between 90% and 100% complete:* When a contract is nearing completion or 90% or more work has been done on a contract. The amount of profit to be credited to costing profit and loss account may be determined by using any one of the following formula.

(a) $\text{Estimated profit} \times \frac{\text{Work certified}}{\text{Contract price}}$

(b) $\text{Estimated profit} \times \frac{\text{Work certified}}{\text{Contract price}} \times \frac{\text{Cash received}}{\text{Work certified}}$

or Estimated profit × $\dfrac{\text{Cash Received}}{\text{Contract price}}$

(c) Estimated Profit × $\dfrac{\text{Cost of work to date}}{\text{Estimated total cost}}$

(d) Estimated profit × $\dfrac{\text{Cost of work to date}}{\text{Estimated total cost}} \times \dfrac{\text{Cash received}}{\text{Work certified}}$

(e) Notional profit × $\dfrac{\text{Work certified}}{\text{Contract price}}$

Question-4

Explain the following:

(i) Notional profit in Contract costing

(ii) Retention money in Contract costing

Solution:

(i) Notional profit in Contract costing: It represents the difference between the value of work certified and cost of work certified.

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

(ii) Retention Money in Contract Costing: A contractor does not receive the full payment of the work certified by the surveyor. Contractee retains some amount to be paid after some time, when it is ensured that there is no default in the work done by the contractor. If any deficiency or defect is noticed, it is to be rectified by the contractor before the release of the retention money. Thus, the retention money provides a safeguard against the default risk in the contracts.

Question 5

What is cost plus contract? State its advantages.

Solution

Cost plus contract: Under cost plus contract, the contract price is ascertained by adding a percentage of profit to the total cost of the work. Such types of contracts are entered into when it is not possible to estimate the contract cost with reasonable accuracy due to unstable condition of material, labour services etc.

Following are the advantages of cost plus contract:

(i) The contractor is assured of a fixed percentage of profit. There is no risk of incurring any loss on the contract.

(ii) It is useful specially when the work to be done is not definitely fixed at the time of making the estimate.

(iii) Contractee can ensure himself about the 'cost of contract' as he is empowered to examine the books and documents of the contractor to ascertain the veracity of the cost of contract.

Question 6

Explain the importance of an Escalation Clause in contract cost.

Solution

During the execution of a contract, the prices of materials, or labour etc., may rise beyond a certain limit. In such a case the contract price will be increased by an agreed amount. Inclusion of such a clause in a contract deed is called an Escalation Clause.

SECTION- B

Question 1

Arnav Construction Ltd. commenced a contract on November 1, 2012. The total contract was for ₹ 39,37,500. It was decided to estimate the total profit on the contract and to take to the credit of Costing Profit & Loss A/c that proportion of estimated profit on cash basis, which work completed bore to the total contract. Actual expenditure for the period November 1, 2012 to October 31, 2013 and estimated expenditure for November 1, 2013 to March 31, 2014 are given below:

	November 1,2012 to October 31, 2013 (Actual) (₹)	November 1,2013 to March 31 , 2014 (Estimated) (₹)
Material issued	6,75,000	12,37,500
Labour Paid	4,50,000	5,62,500
Prepaid	25,000	---
Outstanding	---	2,500
Plant purchased	3,75,000	---
Expenses Paid	2,00,000	3,50,000
Outstanding	50,000	25,000

Plant returned to store (Historical cost)	*75,000 (on March 31, 2013)*	*3,00,000 (on March 31, 2014)*
Work certified	*20,00,000*	*Full*
Work uncertified	*75,000*	*---*
Cash received	*17,50,000*	*---*
Material at site	*75,000*	*37,500*

The plant is subject to annual depreciation @ 33.33% on written down value method. The contract is likely to be completed on March 31, 2014.

Required

Prepare the Contract A/c. Determine the profit on the contract for the year November, 2012 to October, 2013 on prudent basis, which has to be credited to Costing Profit & Loss A/c.

Solution

Arnav Construction Ltd. Contract A/c
(November 1, 2012 to Oct. 31, 2013)

Dr. Dr.

Particulars	Amount (₹)	Amount (₹)	Particulars	Amount (₹)	Amount (₹)
To Materials issued		6,75,000	By Plant returned to store on 31/03/13 at cost	75,000	
To Labour paid	4,50,000		Less: Depreciation for 5 months @ 33.33%	(10,417)	64,583
Less: Prepaid wages	(25,000)	4,25,000	By W-I-P:		
To Plant purchased & issued		3,75,000	Work certified	20,00,000	
To Expenses paid	2,00,000		Work un-certified	75,000	20,75,000
Add: Outstanding exp.	50,000	2,50,000	By Plant at site (₹ 3,75,000 – ₹ 75,000)	3,00,000	
			Less: Depreciation @33.33%	1,00,000	2,00,000
To Notional profit c/d		6,89,583	By Material at site		75,000
		24,14,583			24,14,583
To Costing P & L A/c (Working Note-1)		1,48,580	By Notional Profit b/d		6,89,583
To Work-in –progress (Profit transferred to reserve)		5,41,003			
		6,89,583			6,89,583

Arnav Construction Ltd. Contract A/c (November 1, 2012 to March 31, 2014)

(For computing estimated profit)

Dr. Cr.

Particulars	Amount (₹)	Particulars		Amount (₹)
To Material issued (₹ 6,75,000 + ₹ 12,37,500)	19,12,500	By Material at site		37,500
To Labour (Paid & Outstanding) (₹4,25,000 + ₹5,87,500 +₹2,500)	10,15,000	By Plant returned to stores on 31/03/13		64,583
To Plant purchased	3,75,000	By Plant returned to stores on 31/03/14		
To Expenses (2,50,000 + 3,25,000)	5,75,000	WDV on 31/10/2013	2,00,000	
		Less: Depreciation for 5 months @ 33.33%	(27,778)	1,72,222
To Estimated profit	3,34,305	By Contractee A/c		39,37,500
	42,11,805			42,11,805

Working Note:

Profit to be taken to Costing Profit & Loss A/c on prudent basis:

$$\text{Estimated profit} \times \frac{\text{Cash received}}{\text{Work certified}} \times \frac{\text{Work certified}}{\text{Total Contract}}$$

$$₹\ 3,34,305 \times \frac{₹\,17,50,000}{₹\,20,00,000} \times \frac{₹\,20,00,000}{₹\,39,37,500} = ₹\ 1,48,580$$

Question 2

Paramount Engineers are engaged in construction and erection of a bridge under a long-term contract. The cost incurred upto 31.03.2014 was as under:

	Amount (₹) in lakhs
Fabrication Costs:	
Direct Materials	*280*
Direct Labour	*100*
Overheads	*60*
	440
Erection Cost to date	*110*
	550

The contract price is ₹11 crores and the cash received on account till 31.03.2014 was ₹6 crores.

The technical estimate of the contract indicates the following degree of completion of work. Fabrication – Direct Material – 70%, Director Labour and Overheads 60% Erection – 40%.

You are required to estimate the profit that could be taken to Costing Profit and Loss Account against this partly completed contract as at 31.03.2014.

Solution

Estimation of Profit to be taken to Profit and Loss Account against partly completed contract as at 31.03.2014.

$$\text{Profit to be taken to P/L Account} = \frac{2}{3} \times \text{Notional profit} \times \frac{\text{Cash received}}{\text{Work certified}}$$

$$= \frac{2}{3} \times ₹\ 92.48 \text{ lakhs} \times \frac{₹\ 600 \text{ lakhs}}{₹\ 642.48 \text{ lakhs}} = ₹57.58 \text{ lakhs}$$

(Refer to Working Notes 1,2,3 & 4)

Working Notes :

1. **Statement showing estimated profit to date and future profit on the completion of contract**

Particulars	Cost to date		Further Costs		Total Cost (₹) (a) + (b)
	(%) Completion to date	Amount (₹) (a)	(%) completion to be done	Amount (₹) (b)	
Fabrication costs:					
Direct material	70	280.00	30	120.00	400.00
Direct labour	60	100.00	40	66.67	166.67
Overheads	60	60.00	40	40.00	100.00
Total Fabrication cost (A)		440.00		226.67	666.67
Erection cost: (B)	40	110.00	60	165.00	275.00
Total estimated costs (A+B)		550.00		391.67	941.67
Profit		92.48		65.85	158.33
		642.48		457.52	1,100.00

2. **Profit to date (Notional Profit) and future profit are calculated as below:**

$$\text{Profit to date (Notional Profit)} = \frac{\text{Estimated profit on the whole contract} \times \text{Cost to date}}{\text{Total Cost}}$$

$$= \frac{₹\ 158.33 \times ₹\ 550}{₹\ 941.67} = ₹\ 92.48 \text{ (lakhs)}$$

Future Profit $= ₹\ 158.33 - ₹\ 92.48 = ₹\ 65.85$

3. Work certified:

= Cost of the contract to date + Profit to date

= ₹ 550 + ₹ 92.48 = ₹ 642.48 lakhs

4. Degree of Completion of Contract to date:

$$= \frac{\text{Work Certified}}{\text{Contract Price}} \times 100 = \frac{₹\ 642.48 \text{ lakhs}}{₹\ 1{,}100 \text{ lakhs}} \times 100 = 58.40\%$$

Question 3

A construction company undertook a contract at an estimated price of ₹ 108 lakhs, which includes a budgeted profit of ₹ 18 lakhs. The relevant data for the year ended 31.03.2014 are as under:

	(₹'000)
Materials issued to site	*5,000*
Direct wages paid	*3,800*
Plant hired	*700*
Site office costs	*270*
Materials returned from site	*100*
Direct expenses	*500*
Work certified	*10,000*
Progress payment received	*7,200*

A special plant was purchased specifically for this contract at ₹ 8,00,000 and after use on this contract till the end of 31.02.2014, it was valued at ₹ 5,00,000. This cost of materials at site at the end of the year was estimated at ₹ 18,00,000. Direct wages accrued as on 31.03.2014 was ₹ 1,10,000.

Required

Prepare the Contract Account for the year ended 31st March, 2014 and compute the profit to be taken to the Costing Profit and Loss account.

Solution

Contract Account for the year ended 31st March, 2014

	(₹'000)		(₹' 000)
To Material issued to site	5,000	By Material at site	1,800
To Direct wages 3,800		By Material returned	100
Add: Outstanding wages 110	3,910	By Cost of contract	8,780
To Plant hire	700		
To Site office cost	270		
To Direct expenses	500		
To Depreciation (special plant)	300		
	10,680		10,680
To Cost of contract	8,780	By Work certified	10,000
To Profit & Loss A/c	1,200		
To W-I-P (Profit in reserve) c/d	20		
	10,000		10,000

Working Notes

1. Percentage of contract completion = $\frac{\text{Value of work cetified}}{\text{Value of the contract}} \times 100 = \frac{100 \text{ lakhs}}{108 \text{ lakhs}} \times 100 = 92.59\%$

2. Since the percentage of Contract completion is more than 90% therefore the profit to be taken to Profit and Loss Account can be computed by using the following formula.

   Profit to be taken to P & L A/c

   $= \text{Budged/ Estimated Profit} \times \frac{\text{Cash received}}{\text{Work certified}} \times \frac{\text{Work certified}}{\text{Contract price}}$

   $= 1,800 \times \frac{7,200}{10,000} \times \frac{10,000}{10,800} = ₹\ 1,200 \text{ lakhs.}$

Question 4

Modern Construction Ltd. obtained a contract No. B-37 for ₹ 40 lakhs. The following balances and information relate to the contract for the year ended 31st March, 2014:

	1.4.2013 (₹)	*31.3.2014 (₹)*
Work-in-progress:		
Work certified	*9,40,000*	*30,00,000*
Work uncertified	*11,200*	*32,000*

Materials at site	*8,000*	*20,000*
Accrued wages	*5,000*	*3,000*

Additional information relating to the year 2013-2014 are:

	(₹)
Materials issued from store	*4,00,000*
Materials directly purchased	*1,50,000*
Wages paid	*6,00,000*
Architect's fees	*51,000*
Plant hire charges	*50,000*
Indirect expenses	*10,000*
Share of general overheads for B-37	*18,000*
Materials returned to store	*25,000*
Materials returned to supplier	*15,000*
Fines and penalties paid	*12,000*

The contractee pays 80% of work certified in cash. You are required to prepare:

(i) Contract Account showing clearly the amount of profits transferred to Profit and Loss Account.

(ii) Contractee's Account.

(iii) Balance Sheet

Solution:

Books of Modern Constructions Ltd.

Contract No. B-37 Account for the year ended 31st March, 2014

Particulars	**(₹)**	**Particulars**	**(₹)**
To WIP b/d:		By Materials returned to Store	25,000
- Work certified	9,40,000	By Material returned to suppliers	15,000
- Work uncertified	11,200	By WIP c/d :	
To Stock (Materials) b/d	8,000	Work Certified 30,00,000	
To Materials issued	4,00,000	Uncertified work 32,000	30,32,000
To Materials purchased	1,50,000	By Materials stock c/d	20,000
To Wages paid 6,00,000			
Less: Opening O/s (5,000)			
Add: Closing O/s 3,000	5,98,000		

To Architect's fees	51,000			
To Plant Hire charges	50,000			
To Indirect expenses	10,000			
To General overheads	18,000			
To Notional profit c/d	8,55,800			
	30,92,000			30,92,000
To Profit and Loss A/c $\left(\frac{2}{3} \times ₹\,8{,}55{,}800 \times \frac{80}{100}\right)$	4,56,427	By Notional Profit b/d		8,55,800
To WIP Reserve c/d	3,99,373			
	8,55,800			8,55,800

Note: Fines and penalties are not shown in contract accounts.

Contractee's Account

	(₹)		(₹)
To Balance c/d	24,00,000	By Balance b/d (80% of 9,40,000)	7,52,000
		By Bank	16,48,000
	24,00,000		24,00,000

Balance Sheet (Extract) as on 31.3.2014

		(₹)			(₹)
P & L A/c	4,56,427		Materials stock at site		20,000
Less: Fines	12,000	4,44,427	Materials stock in store		25,000
Outstanding wages		3,000	WIP:		
			Work Certified	30,00,000	
			Work Uncertified	32,000	
				30,32,000	
			Less: Advance	24,00,000	
				6,32,000	
			Less: WIP Reserve	3,99,373	2,32,627

Question 5

Compute a conservative estimate of profit on contract (which has been 90% complete) from the following particulars:

	(₹)
Total expenditure to date	*22,50,000*
Estimated further expenditure to complete the contract (including contingencies)	*2,50,000*
Contract Price	*32,50,000*
Work certified	*27,50,000*
Work uncertified	*1,75,000*
Cash received	*21,25,000*

Solution:

The contract is 90% complete; the method used for transfer of profit to Costing Profit and Loss Account for the current year will be on the basis of estimated profit on completed contract basis.

Profit to be credited in Costing Profit & Loss Account

$$= \text{Estimated profit} \times \frac{\text{Work certified}}{\text{Contract price}} \times \frac{\text{Cash received}}{\text{Work certified}}$$

Estimated profit on completed contract basis

= Contract Price – (Total expenditure to date + Estimated further expenditure to complete contract)

= ₹ 32,50,000 – (₹ 22,50,000 + ₹ 2,50,000)

= ₹ 7,50,000.

$$\text{Credit to Costing Proift \& Loss Account} = 7{,}50{,}000 \times \frac{27{,}50{,}000}{32{,}50{,}000} \times \frac{21{,}25{,}000}{27{,}50{,}000} = ₹\ 4{,}90{,}385$$

Question 6

A contract expected to be completed in year 4, exhibits the following information:

End of Year	***Value of work certified***	***Cost of work to date***	***Cost of work not yet certified***	***Cash received***
	(₹)	***(₹)***	***(₹)***	***(₹)***
1.	*0*	*50,000*	*50,000*	*0*
2.	*3,00,000*	*2,30,000*	*10,000*	*2,75,000*
3.	*8,00,000*	*6,60,000*	*20,000*	*7,50,000*

The contract price is ₹ 10,00,000 and the estimated profit is 20%.

You are required to calculate, how much profit should have been credited to the Profit and Loss A/c by the end of years 1, 2 and 3.

Solution:

End of year	Value of work certified (₹)	Cost of work certified* (₹)	Notional profit** (₹)	Amount that should have been credited to Profit and Loss A/c by the end of year (₹)
1	0	0	0	0
2	3,00,000	2,20,000	80,000	$\frac{1}{3}\times 80{,}000\times\frac{2{,}75{,}000}{3{,}00{,}000}=24{,}444$
3	8,00,000	6,40,000	1,60,000	$\frac{2}{3}\times 1{,}60{,}000\times\frac{7{,}50{,}000}{8{,}00{,}000}=1{,}00{,}000$

Workings:

End of year	Completion of Contract	Profit credited to P & L Account
Year 1	less than 25 per cent.	No profit credited
Year 2	25 per cent or more than 25 per cent but less than 50 per cent.	$\text{Cumulative profit}=\frac{1}{3}\times\text{notional profit}\times\frac{\text{Cash received}}{\text{Value of work certified}}$
Year 3	50 per cent or more than 50 per cent but less than 90 per cent.	$\text{Cumulative profit}=\frac{2}{3}\times\text{notional profit}\times\frac{\text{Cash received}}{\text{Value of work certified}}$

* Cost of Work Certified = Cost of work to date – Cost of work not yet certified

** Notional Profit = Value of Work Certified – (Cost of Work to date – Cost of Work not yet certified)

Question 7

A contract is estimated to be 80% complete in its first year of construction as certified. The contractee pays 75% of value of work certified, as and when certified and makes the final payment on the completion of contract. Following information is available for the first year:

	(₹)
Cost of work-in-progress uncertified	*8,000*
Profit transferred to Costing P & L A/c at the end of year- I on incomplete contract	*6,000*
Cost of work to date	*88,000*

Calculate the value of work- in-progress certified and amount of contract price.

Solution:

As the contract is 80% complete, so 2/3rd of the notional profit on cash basis has been transferred to Profit & Loss A/c in the first year of contract.

$\therefore$ Amount transferred to Profit & Loss A/c = $\frac{2}{3}$ × Notional Profit × % of cash received

Or , 6,000 = $\frac{2}{3}$ × Notional Profit × $\frac{75}{100}$

Or, Notional Profit = $\frac{6,000 \times 3 \times 100}{2 \times 75}$ = ₹12,000

Computation of Value of Work Certified

	(₹)
Cost of work to date	88,000
Add: Notional profit	12,000
	1,00,000
Less: Cost of work uncertified	8,000
Value of work certified	92,000

Computation of Contract price:

Since the Value of Work Certified is 80% of the Contract Price, therefore

Contract Price = $\frac{\text{Value of Work Certified}}{80\%}$

= $\frac{₹92,000}{80\%}$ = ₹1,15,000.

Question 8

SB Constructions Limited has entered into a big contract at an agreed price of ₹ 1,50,00,000 subject to an escalation clause for material and labour as spent out on the contract and corresponding actual are as follows:

Material:	***Standard***		***Actual***	
	Quantity (Tons)	***Rate per Ton (₹)***	***Quantity (Tons)***	***Rate per Ton (₹)***
A	*3,000*	*1,000*	*3,400*	*1,100*
B	*2,400*	*800*	*2,300*	*700*
C	*500*	*4,000*	*600*	*3,900*
D	*100*	*30,000*	*90*	*31,500*

Labour:	*Hours*	*Hourly Rate (₹)*	*Hours*	*Hourly Rate (₹)*
L_1	*60,000*	*15*	*56,000*	*18*
L_2	*40,000*	*30*	*38,000*	*35*

You are required to:

(i) Give your analysis of admissible escalation claim and determine the final contract price payable.

(ii) Prepare the contract account, if the all expenses other than material and labour related to the contract are ₹ 13,45,000.

Solution

In case of escalation clause in a contract, a contractor is paid for the any increase in price of materials and rate of labours which are beyond the control of the contractor. Any increase in the cost due to inefficiencies in usage of the materials and labours are not admissible. Thus any increase in cost due to usage in excess of standard quantity or hours are not paid.

(i) Statement showing Additional claim due to Escalation clause.

	Standard Qty / Hours	Std. Rate (₹)	Actual Rate (₹)	Variation in Rate (₹)	Escalation claim (₹)
	(a)	(b)	(c)	(d) = (c-b)	(e) = (a × d)
Material:					
A	3,000	1,000	1,100	+100	+3,00,000
B	2,400	800	700	-100	-2,40,000
C	500	4,000	3,900	-100	-50,000
D	100	30,000	31,500	+1,500	+1,50,000
		Material escalation claim			1,60,000
Labour:					
L_1	60,000	15	18	+3	+1,80,000
L_2	40,000	30	35	+5	+2,00,000
		Labour escalation claim			3,80,000

Statement showing Final Contract Price

	(₹)	(₹)
Agreed contract price		1,50,00,000
Add: Agreed escalation claim:		
Material Cost	1,60,000	
Labour Cost	3,80,000	5,40,000
Final Contract Price		1,55,40,000

(ii) Contract Account

Dr. Cr.

Particulars		**(₹)**	**Particulars**	**(₹)**
To Material:			By Contractee's A/c	1,55,40,000
A – (3,400 × ₹ 1,100)	37,40,000			
B – (2,300 × ₹ 700)	16,10,000			
C – (600 × ₹ 3,900)	23,40,000			
D – (90 × ₹ 31,500)	28,35,000	1,05,25,000		
To Labour:				
L_1 – (56,000 × ₹18)	10,08,000			
L_2 – (38,000 × ₹35)	13,30,000	23,38,000		
To Other expenses		13,45,000		
To Estimated Profit		13,32,000		
		1,55,40,000		1,55,40,000

Question 9

PQR Construction Ltd. commenced a contract on April 1, 2013. The total contract was for ₹ 27,12,500. It was decided to estimate the total profit and to take to the credit of Costing P & L A/c the proportion of estimated profit on cash basis which work completed bear to the total contract. Actual expenditure in 2013-14 and estimated expenditure in 2014-15 are given below:

	2013-14	***2014-15***
	Actual (₹)	***Estimated (₹)***
Material issued	*4,56,000*	*8,14,000*
Labour : Paid	*3,05,000*	*3,80,000*
: Outstanding at end	*24,000*	*37,500*
Plant purchased	*2,25,000*	*-*
Expenses : Paid	*1,00,000*	*1,75,000*
: Outstanding at the end	*-*	*25,000*
: Prepaid at the end	*22,500*	*-*
Plant returned to stores (a historical stores)	*75,000*	*1,50,000 (on Dec. 31 2014)*
Material at site	*30,000*	*75,000*
Work-in progress certified	*12,75,000*	*Full*
Work-in-progress uncertified	*40,000*	*----*
Cash received	*10,00,000*	*Full*

The plant is subject to annual depreciation @ 20% of WDV cost. The contract is likely to be completed on December 31, 2014.

Required:

(i) Prepare the Contract A/c for the year 2013-14.

(ii) Estimate the profit on the contract for the year 2013-14 on prudent basis which has to be credited to Costing P & L A/c.

Solution

PQR Construction Ltd.
Contract A/c
(April 1, 2013 to March 31, 2014)

Particulars		Amount (₹)	Particulars		Amount (₹)
To Materials Issued		4,56,000	By Plant returned to Stores (Working Note 1)		60,000
To Labour	3,05,000		By Materials at Site		30,000
Add: Outstanding	24,000	3,29,000	By W.I.P.		
To Plant Purchased		2,25,000	Certified	12,75,000	
To Expenses	1,00,000		Uncertified	40,000	13,15,000
Less: Prepaid	22,500	77,500	By Plant at Site (Working Note 2)		1,20,000
To Notional Profit c/d		4,37,500			
		15,25,000			15,25,000
To Costing Profit & Loss A/c (Refer to Working Note 5)		1,59,263	By Notional Profit b/d		4,37,500
To Work-in-Progress A/c (Profit-in-reserve)		2,78,237			
		4,37,500			4,37,500

PQR Construction Ltd.
Contract A/c
(April 1, 2013 to December 31, 2014)
(For Computing estimated profit)

Particulars	Amount (₹)	Particulars	Amount (₹)
To Materials Issued (₹ 4,56,000+ ₹ 8,14,000)	12,70,000	By Material at Site	75,000
To Labour Cost (₹ 3,05,000 + ₹ 24,000 + ₹ 3,56,000* + ₹ 37,500)	7,22,500	By Plant returned to Stores on 31.3.2014.	60,000

To Plant purchased	2,25,000	By Plant returned to Stores on 31.12.2014 (Working Note 3)	1,02,000
To Expenses (₹ 77,500 + ₹ 1,97,500 + ₹25,000)	3,00,000	By Contractee A/c	27,12,500
To Estimated profit	4,32,000		
	29,49,500		29,49,500

* Labour paid in 2014-15: ₹ 3,80,000 – ₹ 24,000 = ₹ 3,56,000

Working Notes

	(₹)
1. **Value of the Plant returned to Stores on 31.03.2014** Historical Cost of the Plant returned Less: Depreciation @ 20% of WDV for one year	 75,000 (15,000) 60,000
2. **Value of Plant at Site 31.03.2014** Historical Cost of Plant at Site (₹ 2,25,000 – ₹ 75,000) Less: Depreciation @ 20% on WDV for one year	 1,50,000 (30,000) 1,20,000
3. **Value of Plant returned to Stores on 31.12.2014** Value of Plant (WDV) on 31.3.2014 Less: Depreciation @ 20% of WDV for a period of 9 months	 1,20,000 (18,000) 1,02,000
4. **Expenses Paid for the year 2013-14** Total expenses paid Less: Pre-paid at the end	 1,00,000 (22,500) 77,500
5. **Profit to be credited to Costing Profit & Loss A/c** on March 31,2014 for the Contract likely to be completed on December 31,2014. Estimated Profit × $\frac{\text{Work Certified}}{\text{Total Contract Price}} \times \frac{\text{Cash received}}{\text{Work Certified}}$ = ₹4,32,000 × $\frac{12,75,000}{27,12,500} \times \frac{10,00,000}{12,75,000}$	1,59,263

Question 10

A contractor commenced a contract on 01-07-2013. The costing records concerning the said contract reveal the following information as on 31-03-2014.

	Amount (₹)
Material sent to site	*7,74,300*
Labour paid	*10,79,000*
Labour outstanding as on 31-03-2014	*1,02,500*
Salary to Engineer	*20,500 per month*
Cost of plant sent to site (01-07-2013)	*7,71,000*
Salary to Supervisor (3/4 time devoted to contract)	*9,000 per month*
Administration & other expenses	*4,60,600*
Prepaid Administration expenses	*10,000*
Material in hand at site as on 31-03-2014	*75,800*

Plant used for the contract has an estimated life of 7 years with residual value at the end of life ₹ 50,000. Some of material costing ₹ 13,500 was found unsuitable and sold for ₹ 10,000. Contract price was ₹ 45,00,000. On 31-03-2014 two third of the contract was completed. The architect issued certificate covering 50% of the contract price and contractor has been paid ₹ 20,00,000 on account. Depreciation on plant is charged on straight line basis.

Prepare Contract Account.

Solution:

Contract Account

(For the period 01.07.13 to 31.03.14)

Particulars		**Amount (₹)**	**Particulars**	**Amount (₹)**
To Material Issued		7,74,300	By Material (Sold)	10,000
To Labour	10,79,000		By Costing P&L A/c (Loss) (₹ 13,500- ₹10,000)	3,500
Add: Outstanding	1,02,500	11,81,500	By Material in hand	75,800
To Salary to engineer (₹20,500 x 9 months)		1,84,500	By Cost of Contract c/d	26,39,600
To Salary to Supervisor ($₹\, 9{,}000 \times \frac{3}{4} \times 9$ months)		60,750		
To Administration & other				
expenses	4,60,600			
Less: Prepaid	10,000	4,50,600		

To Depreciation on Plant (Working Note 1)	77,250		
	27,28,900		27,28,900
To Cost of Contract b/d	26,39,600	By Work-in Progress:	
To Notional Profit c/d	2,70,300	-Work certified (50% of ₹45,00,000)	22,50,000
		-Work uncertified (Working Note 2)	6,59,900
	29,09,900		29,09,900
To Costing P&L A/c (Working Note 3)	1,60,178	By Notional Profit b/d	2,70,300
To Work-in-progress (transferred to Reserve)	1,10,122		
	2,70,300		2,70,300

Working Note

1. Calculation of depreciation on Plant

$$\frac{\text{Cost of the plant - Residual value}}{7\text{ years}} \times \frac{9\text{ months}}{12\text{ months}}$$

$$\frac{₹\ 7{,}71{,}000 - ₹\ 50{,}000}{7\text{ years}} \times \frac{9\text{ months}}{12\text{ months}} = ₹\ 77{,}250$$

2. Cost of the Work uncertified = (Cost incurred to date) – (50% of the total cost of contract)

$$= ₹26{,}39{,}600 - \left(₹\ 26{,}39{,}600 \times \frac{3}{2} \times \frac{1}{2}\right) = ₹6{,}59{,}900$$

3. Calculation of Profit to be transferred = $\frac{2}{3} \times ₹\ 2{,}70{,}300 \times \frac{₹\ 20{,}00{,}000}{₹\ 22{,}50{,}000} = ₹\ 1{,}60{,}178$

Question 11

From the following particulars compute a conservative estimate of profit by 4 methods on a contract which has 80 percent complete:

	(₹)
Total expenditure to date	*8,50,000*
Estimate further expenditure to complete the contract	*1,70,000*

Contract Price	*15,30,000*
Work Certified	*10,00,000*
Work not certified	*85,000*
Cash received	*8,16,000*

Solution:

Working Notes:

(i) Calculation of Notional Profit

= (Work certified + work not certified) – Total expenditure to date

= (₹ 10,00,000 + ₹ 85,000) – ₹ 8,50,000 = ₹ 2,35,000

(ii) Calculation of Estimated Profit

Contract Price – (Expenditure to date + Further expenditure to be incurred)

= ₹15,30,000 – ₹ (8,50,000 + 1,70,000) = ₹ 5,10,000

Computation of Conservative Estimate of Profit by following methods:

1. Notional Profit x $\frac{2}{3}$ x $\frac{\text{Cash received}}{\text{work certified}}$

$$= ₹\ 2,35,000 \times \frac{2}{3} \times \frac{₹\ 8,16,000}{₹\ 10,00,000} = ₹\ 1,27,840$$

2. Estimated Profit x $\frac{\text{Cost of work done}}{\text{Estimated total Cost}} \times \frac{\text{Cash received}}{\text{work certified}}$

$$= ₹\ 5,10,000 \times \frac{8,50,000}{(8,50,000+1,70,000)} \times \frac{8,16,000}{10,00,000} = ₹\ 3,46,800$$

3. Estimated Profit x $\frac{\text{Cash received}}{\text{Contract Price}}$

$$= ₹\ 5,10,000\ x\ \frac{8,16,000}{15,30,000} = ₹\ 2,72,000$$

4. Notional Profit x $\frac{\text{Work Certified}}{\text{Contract Price}}$ x $\frac{\text{Cash Received}}{\text{Work Certified}}$

$$= ₹\ 2,35,000 \times \frac{10,00,000}{15,30,000} \times \frac{8,16,000}{10,00,000} = ₹\ 1,25,333$$

5. Estimated Profit x $\frac{\text{Work Certified}}{\text{Contract Price}}$ = ₹ 5,10,000 x $\frac{10,00,000}{15,30,000}$ = ₹ 3,33,333

6. Estimated Profit x $\frac{\text{Cost of work done}}{\text{Estimated total Cost}}$ = ₹ 5,10,000 x $\frac{8,50,000}{10,20,000}$ = ₹ 4,25,000

7. Notional Profit x $\frac{\text{Work Certified}}{\text{Contract Price}}$ = ₹ 2,35,000 x $\frac{10,00,000}{15,30,000}$ = ₹ 1,53,595

Most conservative Profit is ₹ 1,25,333, therefore profit to be transferred to Profit and Loss a/c is ₹ 1,25,333.

Question 12

M/s ABID Constructions undertook a contract at a price of ₹ 171.00 lacs. The relevant data for the year ended 31st March, 2014 are as under:

	(₹000)
Material issued at site	*7700*
Direct Wages paid	*3300*
Site office cost	*550*
Material return to store	*175*
Work certified	*12650*
Work uncertified	*225*
Progress Payment Received	*10120*
Prepaid site office cost as on 31-03-2014	*50*
Direct wages outstanding as on 31-03-2014	*100*
Material at site as on 31-03-2014	*110*

Additional Information:

(a) *A plant was purchased for the contract at ₹ 8,00,000 on 01-12-2013.*

(b) *Depreciation @ 15% per annum is to be charged.*

(c) *Material which cost ₹ 1,30,000 was destroyed by fire.*

Prepare:

(i) *Contract Account for the year ended 31st March, 2014 and compute the profit to be taken to the Profit & Loss Account.*

(ii) *Account of Contractee.*

(iii) *Profit & Loss Account showing the relevant items.*

(iv) *Balance Sheet showing the relevant items.*

Solution:

(i) Contract Account

Particulars		Amount (₹ in '000)	Particulars		Amount (₹ in '000)
To Material issued		7,700	By Material returned		175
To Direct wages	3,300		By Profit & Loss A/c (Material Destroyed by fire)		130
Add: Outstanding	100	3,400	By W-I-P:		
To Site Office Cost	550		- Work uncertified	225	
Less: Prepaid	50	500	- Work certified	12,650	12,875
To Depreciation*		40	By Material at site		110
To Notional Profit		1,650			
		13,290			13,290
To Profit & Loss A/c (Working Note -2)		880	By Notional Profit		1,650
To W-I-P (Reserve)		770			
		1,650			1,650

$$\text{* Depreciation on plant} = ₹\ 8,00,000 \times 15\% \times \frac{4 \text{ months}}{12 \text{ months}} = ₹\ 40,000$$

(ii) Contractee's Account

Particulars	Amount (₹ in '000)	Particulars	Amount (₹ in '000)
To Balance c/d	10,120	By Bank A/c	10,120
	10,120		10,120

(iii) Relevant items of Profit & Loss Account

Particulars	Amount (₹ in '000)	Particulars	Amount (₹ in '000)
To Contract A/c (loss of material due to fire)	130	By Contract A/c (Profit on contract)	880
To Net Profit	750		
	880		880

(iv) Balance Sheet (Extracts) as on 31st March, 2014 **(Amount in '000)**

Liabilities	Amount (₹)	Amount (₹)	Assets	Amount (₹)	Amount (₹)
			Plant at cost	800	
Add: Profit	750		*Less:* Dep.	40	760
			Contract W-I-P:		
Outstanding Wages		100	-Uncertified	225	
			-Certified	12,650	
			-Reserve	(770)	
			Less: Advances	(10,120)	1,985
			Materials at site		110
			Prepaid exp.		50

Working Notes:

1. Percentage of Completion = $\frac{\text{Work Certified}}{\text{Value of ontract}} \times 100$

$$= \frac{₹1,26,50,000}{₹1,71,00,000} \times 100 = 73.98\%$$

2. Profit from the incomplete contract

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

$$= ₹\ 16,50,000 \times \frac{2}{3} \times \frac{₹1,01,20,000}{₹1,26,50,000}$$

$$= ₹\ 8,80,000$$

Question 13

Z Limited obtained a contract No. 999 for ₹ 50 lacs. The following details are available in respect of this contract for the year ended March 31, 2014:

	(₹)
Materials purchased	*1,60,000*
Materials issued from stores	*5,00,000*
Wages and salaries paid	*7,00,000*
Drawing and maps	*60,000*
Sundry expenses	*15,000*

Electricity charges	*25,000*
Plant hire expenses	*60,000*
Sub-contract cost	*20,000*
Materials returned to stores	*30,000*
Materials returned to suppliers	*20,000*

The following balances relating to the contract No. 999 for the year ended on March 31, 2013 and March 31, 2014 are available:

	as on 31st March, 2013	***as on 31st March, 2014***
Work certified	*12,00,000*	*35,00,000*
Work uncertified	*20,000*	*40,000*
Materials at site	*15,000*	*30,000*
Wages outstanding	*10,000*	*20,000*

The contractor receives 75% of work certified in cash.

Prepare Contract Account and Contractee's Account.

Solution:

Contract No. 999 Account for the year ended 31st March, 2014

Dr. Cr.

Particulars		**Amount (₹)**	**Particulars**	**Amount (₹)**
To Work in progress b/d:			By Material returned to store	30,000
- Work certified		12,00,000	By Material returned to suppliers	20,000
- Work uncertified		20,000	By Stock (Material) c/d	30,000
To Stock (Materials) b/d		15,000	By Work in progress c/d:	
To Material purchased		1,60,000	- Work certified	35,00,000
To Material issued		5,00,000	- Work uncertified	40,000
To Wages paid	7,00,000			
Less: Opening O/s	(10,000)			
Add: Closing O/s	20,000	7,10,000		
To Drawing and maps*		60,000		
To Sundry expenses		15,000		
To Electricity charges		25,000		
To Plant hire expenses		60,000		

To Sub- contract cost	20,000		
To Notional profit c/d (balancing figure)	8,35,000		
	36,20,000		36,20,000
To Costing P& L A/c (W.N.-1)	4,17,500	By Notional profit b/d	8,35,000
To WIP Reserve (balancing figure)	4,17,500		
	8,35,000		8,35,000

*Assumed that expenses incurred for drawing and maps are used exclusively for this contract only.

Dr. **Contractee's Account** Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance c/d (₹ 35,00,000 × 75%)	26,25,000	By Balance b/d (75% of ₹ 12,00,000)	9,00,000
		By Bank A/c	17,25,000
	26,25,000		26,25,000

Working Note:

1. Profit to be Transferred to Costing Profit & Loss account:

(a) Percentage of completion = $\frac{\text{Work certfied}}{\text{Value of contract}} \text{x} 100$

$$= \frac{₹\ 35,00,000}{₹\ 50,00,000} \text{x} 100 = 70\%$$

(b) Profit to be transferred to Costing Profit & Loss Account

$$= \frac{2}{3} \times \text{Notional profit} \times \frac{\text{Cash received}}{\text{Work certified}}$$

$$= \frac{2}{3} \times ₹\ 8,35,000 \times \frac{75}{100} = ₹\ 4,17,500$$

Question 14

Dream house (P) Ltd. is engaged in building two residential housing projects in the city. Particulars related to two housing projects are as below:

	HP-1 (₹)	*HP-2 (₹)*
Work in Progress on 1st April 2013	*7,80,000*	*2,80,000*

Materials Purchased	*6,20,000*	*8,10,000*
Land purchased near to the site to open an office	*-*	*12,00,000*
Brokerage and registration fee paid on the above purchase	*-*	*60,000*
Wages paid	*85,000*	*62,000*
Wages outstanding as on 31st March, 2014	*12,000*	*8,400*
Donation paid to local clubs	*5,000*	*2,500*
Plant hire charges paid for three years effecting from 1st April 2013	*72,000*	*57,000*
Value of materials at site as on 31st March, 2014	*47,000*	*52,000*
Contract price of the projects	*48,00,000*	*36,00,000*
Value of work certified	*20,50,000*	*16,10,000*
Work not certified	*1,90,000*	*1,40,000*

A concrete mixture machine was bought on 1st April 2013 for ₹ 8,20,000 and used for 180 days in HP-1 and for 100 days in HP-2. Depreciation is provided @ 15% p.a.(this machine can be used for any other projects)

As per the contract agreement contractee shall retain 20% of work certified as retention money.

Prepare contract account for the two housing projects showing the profit or loss on each project for the year ended 31st March, 2014.

Solution:

Dr. **Contract Account for the year ended 31st March, 2014** Cr.

Particulars	HP-1 (₹)	HP-2 (₹)	Particulars	HP-1 (₹)	HP-2 (₹)
To Balance b/d: W-I-P	7,80,000	2,80,000	By Closing material at site	47,000	52,000
To Material purchased	6,20,000	8,10,000	By W-I-P:		
To Wages: (₹85,000+₹12,000) (₹62,000+₹8,400)	97,000	70,400	Value of work certified Cost of work not certified	20,50,000 1,90,000	16,10,000 1,40,000
To Donation to local club*	5,000	2,500			
To Plant hire charges: (₹72,000x1/3) (₹57,000x1/3)	24,000	19,000			
To Depreciation on concrete mixture**:					

(`8,20,000x15%x180/365) (`8,20,000x15%x100/365)	60,658	 33,699			
To Notional profit (balance c/d)	7,00,342	5,86,401			
	22,87,000	18,02,000		22,87,000	18,02,000
To Costing P & L A/c (WN-2)	1,86,758	1,56,374	By Notional profit (balance b/d)	7,00,342	5,86,401
To Costing P& L Reserve A/c.	5,13,584	4,30,027			
	7,00,342	5,86,401		7,00,342	5,86,401

* Assuming donation paid to local club was exclusively for the above projects, hence included in the contract account.

** Depreciation on concrete mixture machine is charged on the basis of number of days used for the projects, as it is clearly mentioned in the question that this machine can be used for other projects also.

Working Notes:

1 Computation of Stage of completion of the projects:

$$\frac{\text{Value of work certified}}{\text{Value of contract}} \times 100$$

$$\text{HP}-1 = \frac{₹\ 20,50,000}{₹\ 48,00,000} \times 100 = 42.71\%$$

$$\text{HP}-2 = \frac{₹\ 16,10,000}{₹\ 36,00,000} \times 100 = 44.72\%$$

2 Computation of profit to be recognized in the Costing profit & loss A/c.

$$\frac{1}{3} \times \text{ Notional profit } \times \frac{\text{Cash Received}}{\text{Value of work certified}}$$

$$\text{HP}-1 \quad = \frac{1}{3} \times ₹\ 7,00,342 \times 80\% = ₹1,86,758$$

$$\text{HP}-2 \quad = \frac{1}{3} \times ₹\ 5,86,401 \times 80\% = ₹1,56,374$$

(Land purchased and brokerage and registration fee paid for this purpose cannot be charged to contract account, hence not included in the contract account)

Question 15

PVK Constructions commenced a contract on 1st April, 2014. Total contract value was ₹ 100 lakhs. The contract is expected to be completed by 31st December, 2016. Actual expenditure during the period 1st April, 2014 to 31st March, 2015 and estimated expenditure for the period 1st April, 2015 to 31st December, 2016 are as follows:

	Actual (₹)	Estimated (₹)
	1st April, 2014 to 31st March, 2015	1st April, 2015 to 31st Dec. 2016
Material issued	15,30,000	21,00,000
Direct Wages paid	10,12,500	12,25,000
Direct Wages outstanding	80,000	1,15,000
Plant purchased	7,50,000	-
Expenses paid	3,25,000	5,40,000
Prepaid Expenses	68,000	-
Site office expenses	3,00,000	-

Part of the material procured for the contract was unsuitable and was sold for ₹ 2,40,000 (cost being ₹ 2,55,000) and a part of plant was scrapped and disposed of for ₹ 80,000. The value of plant at site on 31st March, 2015 was ₹ 2,50,000 and the value of material at site was ₹ 73,000. Cash received on account to date was ₹ 36,00,000, representing 80% of the work certified. The cost of work uncertified was valued at ₹ 5,40,000.

Estimated further expenditure for completion of contract is as follows:

- *An additional amount of ₹ 4,62,500 would have to be spent on the plant and the residual value of the plant on the completion of the contract would be ₹ 67,500.*
- *Site office expenses would be the same amount per month as charged in the previous year.*
- *An amount of ₹ 1,57,500 would have to be incurred towards consultancy charges.*

Required:

Prepare Contract Account and calculate estimated total profit on this contract.

Solution:

PVK Constructions

Contract Account for the year 2014-15

Particulars	(₹)	Particulars	(₹)
To Materials issued	15,30,000	By Material sold	2,40,000

To Direct wages	10,12,500		By Costing P & L Account (loss on sale of material)		15,000
Add: Outstanding	80,000	10,92,500	By Plant sold		80,000
To Plant purchased		7,50,000	By Plant at site		2,50,000
To Expenses	3,25,000		By Material at site		73,000
Less: Prepaid	(68,000)	2,57,000	By Work-in-progress:		
To Site office expenses		3,00,000	-Work certified	45,00,000	
To Notional profit c/d		17,68,500	- Work uncertified	5,40,000	50,40,000
		56,98,000			56,98,000
To Costing P&L A/c (transfer) (Refer Working note)		4,11,967*	By Notional profit b/d		17,68,500
To Work-in-progress (reserve)		13,56,533#			
		17,68,500			17,68,500

Calculation of Estimated Profit (April 2014 to December 2016)

Particulars	Amount (₹)	Amount (₹)	Amount (₹)
Total Value of the Contract (A)			1,00,00,000
(i) Materials Costs:			
Materials Consumed in 2014-2015:			
- Materials issued in 2014-15	15,30,000		
- *Less:* Closing Materials at site	(73,000)		
- *Less:* Unsuitable Materials sold	(2,55,000)	12,02,000	
Add: Materials to be Consumed			
- Materials to be issued	21,00,000		
- *Add:* Opening materials at site	73,000	21,73,000	33,75,000
(ii) Direct Wages Cost:			
Direct wages for 2014-15:			
- Wages paid	10,12,500		
- *Add:* Outstanding at closing	80,000	10,92,500	
Direct wages to be incurred:			
- Wages to be paid	12,25,000		
- *Less:* Outstanding at opening	(80,000)		
- *Add:* Outstanding at closing	1,15,000	12,60,000	23,52,500

(iii)	Plant Cost			
	Plant used during 2014-15:			
	- Plant purchased	7,50,000		
	- *Less:* Plant disposed off	(80,000)		
	- *Less:* Closing plant at site	(2,50,000)	4,20,000	
	Plant to be used			
	- Additional amount to be spent	4,62,500		
	- *Add:* Opening plant at site	2,50,000		
	- *Less:* Residual value of plant	(67,500)	6,45,000	10,65,000
(iv)	Expenses			
	Expenses incurred during 2014-15:			
	- Expenses paid	3,25,000		
	- *Less:* Prepaid at closing	(68,000)	2,57,000	
	Expenses to be incurred			
	- Expenses to be paid	5,40,000		
	- *Add:* Prepaid at opening	68,000	6,08,000	8,65,000
(v)	Site office expenses paid in 2014-15		3,00,000	
	- *Add:* To be paid {(3,00,000÷12) × 21 months}		5,25,000	8,25,000
(vi)	Consultancy charges to be paid			1,57,500
Total Estimated Cost of the Contract				86,40,000
Estimated Profit (A – B)				13,60,000

* The profit to be transferred can be calculated using various formulae given in the working note, however, in this solution following the conservative approach, the lowest amount has been taken.

Profit transferred to the reserve will vary depending upon the formula of profit calculation adopted.

Workings:

Profit to be transferred to Costing Profit and Loss Account

$$= \text{Estimated Profit} \times \frac{\text{Work certified}}{\text{Contract price}} \times \frac{\text{Cash received}}{\text{Work certified}}$$

$$= ₹13,60,000 \times \frac{₹45,00,000}{₹1,00,00,000} \times \frac{₹36,00,000}{₹45,00,000} = ₹4,89,600$$

Or

$$= \text{Estimated Profit} \times \frac{\text{Cost of work to date}}{\text{Estimated total cost}} \times \frac{\text{Cash received}}{\text{Work certified}}$$

$$= ₹13{,}60{,}000 \times \frac{₹32{,}71{,}500^*}{₹86{,}40{,}000} \times \frac{₹36{,}00{,}000}{₹45{,}00{,}000} = ₹\ 4{,}11{,}967$$

Or

$$= \text{Estimated Profit} \times \frac{\text{Cost of work to date}}{\text{Estimated total cost}} = ₹13{,}60{,}000 \times \frac{₹32{,}71{,}500^*}{₹86{,}40{,}000} = ₹\ 5{,}14{,}958.33$$

Or

$$= \text{Estimated Profit} \times \frac{\text{Value of Work Certified}}{\text{Value of Contract}} = ₹13{,}60{,}000 \times \frac{₹45{,}00{,}000}{₹1{,}00{,}00{,}000} = ₹\ 6{,}12{,}000$$

*[Material Consumed + Direct Wages + Plant used + Expenses + Site office expenses]

[₹ 12,02,000 + ₹ 10,92,500 + ₹ 4,20,000 + ₹2,57,000 + ₹ 3,00,000 = ₹ 32,71,500]

Since, in the question estimated cost information is given, hence, the profit to be transferred in the Costing Profit & Loss account for the year 2014-15, will be on the basis of estimated profit calculated as above.

Profit to be transferred in Costing Profit & Loss account for the year 2014-15 on percentage of completion method as below:

$$\text{Notional Profit} \times \frac{1}{3} \times \frac{\text{Cash Received}}{\text{Value of Work Certified}} = ₹17{,}68{,}500 \times \frac{1}{3} \times \frac{₹36{,}00{,}000}{₹45{,}00{,}000} = ₹\ 4{,}71{,}600$$

The detailed calculations have been shown for better understanding of the students.

8 Operating Costing

Basic Concepts

Operating Costing	It is a method of ascertaining costs of providing or operating a service. This method of costing is applied by those undertakings which provide services rather than production of commodities.
Cost Units	Transport service – Passenger km., quintal km., or tone-km. Supply service – Kw hr., Cubic metre, per kg., per litre. Hospital – Patient per day, room per day or per bed, per operation etc. Canteen – Per item, per meal etc. Cinema – Per ticket. Composite units i.e. tonnes km., quintal km. etc. may be computed in two ways.
Composite Units	Two different units are composed into a single unit. Examples are Passenger-km., Kilowatt-hour, Tonne-km. etc.
Absolute Tonne-km.	This is a weighted average of distance travelled and weight carried.
Commercial Tonne-km.	This is a simple average of weight carried multiplied by total distance travelled.
Round-trip	Travelling to a destination and return back to the starting point.

SECTION-A

Question-1

Explain briefly, what do you understand by Operating Costing. How are composite units computed?

Solution:

Operating Costing: It is method of ascertaining costs of providing or operating a service. This method of costing is applied by those undertakings which provide services rather than production of commodities. This method of costing is used by transport companies, gas and water works departments, electricity supply companies, canteens, hospitals, theatres, schools etc.

Composite units may be computed in two ways:

(a) Absolute (weighted average) tones- km., quintal- km. etc.

(b) Commercial (simple average) tonnes- km., quintal-km. etc.

Absolute tonnes-km. are the sum total of tonnes-km. arrived at by multiplying various distances by respective load quantities carried.

Commercial tonnes-km., are arrived at by multiplying total distance km., by average load quantity.

Question-2

What do you understand by Operating Costs? Describe its essential features and state where it can be usefully implemented?

Solution:

Operating Costs are the costs incurred by undertakings which do not manufacture any product but provide a service. Such undertakings for example are — Transport concerns, Gas agencies; Electricity Undertakings; Hospitals; Theatres etc. Because of the varied nature of activities carried out by the service undertakings, the cost system used is obviously different from that followed in manufacturing concerns.

The essential features of operating costs are as follows:

(1) The operating costs can be classified under three categories. For example in the case of transport undertaking these three categories are as follows:

   (a) Operating and running charges: It includes expenses of variable nature. For example expenses on petrol, diesel, lubricating oil, and grease etc.

   (b) Maintenance charges: These expenses are of semi-variable nature and includes the cost of tyres and tubes, repairs and maintenance, spares and accessories, overhaul, etc.

   (c) Fixed or standing charges: These includes garage rent, insurance, road licence, depreciation, interest on capital, salary of operating manager, etc.

(2) The cost unit used is composite like passenger-mile; Kilowatt-hour, etc.

It can be implemented in all firms of transport, airlines, bus-service, etc., and by all firms of distribution undertakings.

Question-3

Distinguish between Operating Costing and Operation Costing.

Solution:

Operating Costing: It is a method of costing applied by undertakings which provide service rather than production of commodities. Like unit costing and process costing, operating costing is thus a form of operation costing.

The emphasis under operating costing is on the ascertainment of cost of rendering services rather than on the cost of manufacturing a product. It is applied by transport companies, gas and water works, electricity supply companies, canteens, hospitals, theatres, school etc. Within an organisation itself certain departments too are known as service departments which provide ancillary services to the production departments. For example maintenance department; power house, boiler house, canteen, hospital, internal transport etc.

Operation Costing: It represents a refinement of process costing. In this each operation instead of each process of stage of production is separately costed. This may offer better scope for control. At the end of each operation, the unit operation cost may be computed by dividing the total operation cost by total output.

SECTION – B

Calculation of Absolute Tonne-Km and Commercial Tonne-Km.

Question 1

Calculate total passenger kilometres from the following information:

Number of buses 6, number of days operating in a month 25, trips made by each bus per day 8, distance covered 20 kilometres (one side), capacity of bus 40 passengers, normally 80% of capacity utilization.

Solution:

Calculation of passenger kilometer:

= 6 buses × 25 days × 8 trips × 2 sides × 20 k.m. × 40 passengers × 80%

= 15,36,000 passenger km.

Question 2

A lorry starts with a load of 24 tonnes of goods from station A. It unloads 10 tonnes at station B and rest of goods at station C. It reaches back directly to station A after getting reloaded with 18 tonnes of goods at station C. The distance between A to B, B to C and then from C to A are 270 kms, 150 kms and 325 kms respectively. Compute 'Absolute tonnes km.' and 'Commercial tones-km'.

Solution:

Absolute tonnes km.:

= Weight in tonnes × Distance in km.

= From A to B + from B to C + from C to A

= (24 tonnes × 270 km.) + (14 tons × 150 km.) + (18 tonnes × 325 km.)

= 6,480 tonnes-km. + 2,100 tonnes-km. + 5,850 tonnes-km.

= 14,430 tonnes-km.

Commercial Tonnes km.

= Average weight load × Total distance (km.) travelled

$= \left(\frac{24+14+18}{3}\right)$ Tonnes × 745 km.

= 13,906.67 Tonnes km

Costing for Transport Agencies

Question 3

A Mineral is transported from two mines – 'A' and 'B' and unloaded at plots in a Railway Station. Mine A is at a distance of 10 km., and B is at a distance of 15 km. from railhead plots. A fleet of lorries of 5 tonne carrying capacity is used for the transport of mineral from the mines. Records reveal that the lorries average a speed of 30 km. per hour, when running and regularly take 10 minutes to unload at the railhead. At mine 'A' loading time averages 30 minutes per load while at mine 'B' loading time averages 20 minutes per load.

Drivers' wages, depreciation, insurance and taxes are found to cost ₹ 9 per hour operated. Fuel, oil, tyres, repairs and maintenance cost ₹ 1.20 per km.

Draw up a statement, showing the cost per tonne-kilometer of carrying mineral from each mine.

Solution:

Statement showing the cost per tonne-kilometre of carrying mineral from each mine

	Mine A (₹)	Mine B (₹)
Fixed cost per trip: (Refer to working note 1)		
(Driver's wages, depreciation, insurance and taxes)		
A: 1 hour 20 minutes @ ₹ 9 per hour	12.00	
B: 1 hour 30 minutes @ ₹ 9 per hour		13.50
Running and maintenance cost:		
(Fuel, oil, tyres, repairs and maintenance)		
A: 20 km. ₹ 1.20 per km.	24.00	
B: 30 km. ₹ 1.20 per km.		36.00
Total cost per trip	36.00	49.50
Cost per tonne – km (Refer to working note 2)	0.72 $\left(\frac{₹36}{50\,\text{tonne} - \text{km}}\right)$	0.66 $\left(\frac{₹49.50}{75\,\text{tonne} - \text{km}}\right)$

Working notes

	Mine- A	Mine- B
(1) Total operated time taken per trip		
Running time to & fro	40 minutes $\left(20\,\text{km.} \times \frac{60\,\text{minutes}}{30\,\text{km.}}\right)$	60 minutes $\left(30\,\text{km.} \times \frac{60\,\text{minutes}}{30\,\text{km.}}\right)$
Un-loading time	10 minutes	10 minutes
Loading time	30 minutes	20 minutes
Total operated time	80 minutes or 1 hour 20 minutes	90 minutes or 1 hour 30 minutes
(2). Effective tones – km.	50 (5 tonnes × 10 km.)	75 (5 tonnes × 15 km.)

Question 4

EPS is a Public School having 25 buses each plying in different directions for the transport of its school students. In view of large number of students availing of the bus service, the buses work two shifts daily both in the morning and in the afternoon. The buses are garaged in the *school. The workload of the students has been so arranged that in the morning, the first trip picks up senior students and the second trip plying an hour later picks up junior students. Similarly, in the afternoon, the first trip takes the junior students and an hour later the second trip takes the senior students home.*

The distance travelled by each bus, one way is 16 km. The school works 24 days in a month and remains closed for vacation in May and June. The bus fee, however, is payable by the students for all the 12 months in a year.

The details of expenses for the year 2013-2014 are as under:

Driver's salary – payable for all the 12 in months.	*₹ 5,000 per month per driver.*
Cleaner's salary payable for all the 12 months	*₹ 3,000 per month per cleaner*
(one cleaner has been employed for every five buses).	
Licence Fees, Taxes etc.	*₹ 2,300 per bus per annum*
Insurance Premium	*₹ 15,600 per bus per annum*
Repairs and Maintenance	*₹ 16,400 per bus per annum*
Purchase price of the bus	*₹ 16,50,000 each*
Life of the bus	*16 years*
Scrap value	*₹ 1,50,000*
Diesel Cost	*₹ 18.50 per litre*

Each bus gives an average of 10 km. per litre of diesel. The seating capacity of each bus is 60 students. The seating capacity is fully occupied during the whole year.

The school follows differential bus fees based on distance traveled as under:

Students picked up and dropped within the range of distance from the school	***Bus fee***	***Percentage of students availing this facility***
4 km.	*25% of Full*	*15%*
8 km.	*50% of Full*	*30%*
16 km.	*Full*	*55%*

Ignore interest. Since the bus fees has to be based on average cost, you are required to

(i) Prepare a statement showing the expenses of operating a single bus and the fleet of 25 buses for a year.

(ii) Work out average cost per student per month in respect of:

(a) Students coming from a distance of upto 4 km. from the school.

(b) Students coming from a distance of upto 8 km. from the school; and

(c) Students coming from a distance of upto 16 km. from the school.

Solution:

(i) **EPS Public School**

Statement showing the expenses of operating a single bus and the fleet of 25 buses for a year

Particulars	Per bus per annum (₹)	Fleet of 25 buses per annum (₹)
Running costs : (A)		
Diesel (Refer to working note 1)	56,832	14,20,800
Repairs & maintenance costs: (B)	16,400	4,10,000
Fixed charges:		
Driver's salary (₹ 5,000 × 12 months)	60,000	15,00,000
Cleaners salary (₹3,000 × $^1/_{5}$th × 12 months)	7,200	1,80,000
Licence fee, taxes etc.	2,300	57,500
Insurance	15,600	3,90,000
Depreciation	93,750	23,43,750
Total fixed charges: (C)	1,78,850	44,71,250
Total expenses: (A+B+C)	2,52,082	63,02,050

(ii) Average cost per student per month in respect of students coming from a distance of:

(a) 4 km. from the school {₹ 2,52,082 / (354 students × 12 months)} (Refer to Working Note 2)	₹ 59.34
(b) 8 km. from the school (₹ 59.34 ×2)	₹ 118.68
(c) 16 km. from the school (₹ 59.34 × 4)	₹ 237.36

Working Notes:

1. Calculation of diesel cost per bus:

No. of trips made by a bus each day	4
Distance travelled in one trip both ways (16 km. × 2 trips)	32 km.
Distance traveled per day by a bus (32 km. × 4 shifts)	128 km.
Distance traveled during a month (128 km. × 24 days)	3,072 km.

Distance traveled per year (3,072 km. × 10 months)	30,720 km.
No. of litres of diesel required per bus per year (30,720 km. ÷ 10 km.)	3,072 litres
Cost of diesel per bus per year (3,072 litres × ₹ 18.50)	₹ 56,832

2. Calculation of number of students per bus:

Bus capacity of 2 trips (60 students × 2 trips)	120 students
$^{1}/_{4}$th fare students (15% × 120 students)	18 students
½ fare 30% students (equivalent to $^{1}/_{4}$th fare students)	72 students
Full fare 55% students (equivalent to $^{1}/_{4}$th fare students)	264 students
Total $^{1}/_{4}$th fare students	354 students

Question 5

A transport company has a fleet of three trucks of 10 tonnes capacity each plying in different directions for transport of customer's goods. The trucks run loaded with goods and return empty. The distance travelled, number of trips made and the load carried per day by each truck are as under:

Truck No.	*One way Distance Km*	*No. of trips per day*	*Load carried per trip / day tonnes*
1	16	4	6
2	40	2	9
3	30	3	8

The analysis of maintenance cost and the total distance travelled during the last two years is as under

Year	*Total distance travelled*	*Maintenance Cost ₹*
1	1,60,200	46,050
2	1,56,700	45,175

The following are the details of expenses for the year under review:

Diesel	*₹ 10 per litre. Each litre gives 4 km per litre of diesel on an average.*
Driver's salary	*₹ 2,000 per month*
Licence and taxes	*₹ 5,000 per annum per truck*
Insurance	*₹ 5,000 per annum for all the three vehicles*

Purchase Price per truck	*₹ 3,00,000, Life 10 years. Scrap value at the end of life is ₹ 10,000.*
Oil and sundries	*₹ 25 per 100 km run.*
General Overhead	*₹ 11,084 per annum*

The vehicles operate 24 days per month on an average.

Required

(i) Prepare an Annual Cost Statement covering the fleet of three vehicles.

(ii) Calculate the cost per km. run.

(iii) Determine the freight rate per tonne km. to yield a profit of 10% on freight.

Solution:

(i) Annual Cost Statement of three vehicles

	(₹)
Diesel {(1,34,784 km. ÷ 4 km) × ₹ 10) (Refer to Working Note 1)	3,36,960
Oil & sundries {(1,34,784 km. ÷ 100 km.) × ₹ 25}	33,696
Maintenance {(1,34,784 km. × ₹ 0.25) + ₹ 6,000} (Refer to Working Note 2)	39,696
Drivers' salary {(₹ 2,000 × 12 months) × 3 trucks}	72,000
Licence and taxes (₹ 5,000 × 3 trucks)	15,000
Insurance	5,000
Depreciation {(₹ 2,90,000 ÷ 10 years) × 3 trucks}	87,000
General overhead	11,084
Total annual cost	6,00,436

(ii) Cost per km. run

$$\text{Cost per kilometer run} = \frac{\text{Total annual cost of vehicles}}{\text{Total kilometre travelled annually}} \text{ (Refer to Working Note 1)}$$

$$= \frac{₹\ 6,00,436}{1,34,784 \text{ Kms}} = ₹\ 4.4548$$

(iii) Freight rate per tonne km (to yield a profit of 10% on freight)

$$\text{Cost per tonne km.} = \frac{\text{Total annual cost of three vehicles}}{\text{Total effective tonnes kms. per annum}} \text{ (Refer to Working Note 1)}$$

$$= \frac{₹\ 6,00,436}{5,25,312 \text{ kms}} = ₹\ 1.143$$

Freight rate per tonne km. $\left(\frac{₹\ 1.143}{0.9}\right) \times 1$ = ₹ 1.27

Working Notes:

1. Total kilometre travelled and tonnes kilometre (load carried) by three trucks in one year

Truck number	One way distance in kms	No. of trips	Total distance covered in km per day	Load carried per trip / day in tonnes	Total effective tonnes km
1	16	4	128	6	384
2	40	2	160	9	720
3	30	3	180	8	720
Total			468		1,824

Total kilometre travelled by three trucks in one year
(468 km. × 24 days × 12 months) = 1,34,784
Total effective tonnes kilometre of load carried by three trucks during one year
(1,824 tonnes km. × 24 days × 12 months) = 5,25,312

2. Fixed and variable component of maintenance cost:

Variable maintenance cost per km= $\frac{\text{Difference in maintenance cost}}{\text{Difference in distance travelled}}$

$$= \frac{₹\ 46,050 - ₹\ 45,175}{1,60,200 \text{ kms} - 1,56,700 \text{ kms}}$$

= ₹ 0.25

Fixed maintenance cost = Total maintenance cost–Variable maintenance cost
= ₹ 46,050 – 1,60,200 kms × ₹ 0.25 = ₹ 6,000

Question 6

A transport company has 20 vehicles, which capacities are as follows:

No. of Vehicles	*Capacity per vehicle*
5	*9 tonne*
6	*12 tonne*

7	*15 tonne*
2	*20 tonne*

The company provides the goods transport service between stations 'A' to station 'B'. Distance between these stations is 200 kilometres. Each vehicle makes one round trip per day an average. Vehicles are loaded with an average of 90 per cent of capacity at the time of departure from station 'A' to station 'B' and at the time of return back loaded with 70 per cent of capacity. 10 per cent of vehicles are laid up for repairs every day. The following information are related to the month of October, 2013:

Salary of Transport Manager	*₹ 30,000*
Salary of 30 drivers	*₹ 4,000 each driver*
Wages of 25 Helpers	*₹ 2,000 each helper*
Wages of 20 Labourers	*₹ 1,500 each labourer*
Consumable stores	*₹ 45,000*
Insurance (Annual)	*₹ 24,000*
Road Licence (Annual)	*₹ 60,000*
Cost of Diesel per litre	*₹ 35*
Kilometres run per litre each vehicle	*5 Km.*
Lubricant, Oil etc.	*₹ 23,500*
Cost of replacement of Tyres, Tubes, other parts etc.	*₹ 1,25,000*
Garage rent (Annual)	*₹ 90,000*
Transport Technical Service Charges	*₹ 10,000*
Electricity and Gas charges	*₹ 5,000*
Depreciation of vehicles	*₹ 2,00,000*

There is a workshop attached to transport department which repairs these vehicles and other vehicles also. 40 per cent of transport manager's salary is debited to the workshop. The transport department is charged ₹ 28,000 for the service rendered by the workshop during October, 2013. During the month of October, 2013 operation was 25 days.

You are required:

(i) Calculate per ton-km operating cost.

(ii) Find out the freight to be charged per ton-km, if the company earned a profit of 25 per cent on freight.

Solution:

(i) Operating Cost Sheet for the month of October, 2013

	Particulars	Amount (₹)
A.	Fixed Charges:	
	Manager's salary (₹ 30,000 × 60%)	18,000
	Drivers' Salary (₹ 4,000 × 30 drivers)	1,20,000
	Helpers' wages (₹ 2,000 × 25 helpers)	50,000
	Labourer wages (₹ 1,500 × 20 labourers)	30,000
	Insurance (₹ 24,000 ÷ 12 months)	2,000
	Road licence (₹ 60,000 ÷ 12 months)	5,000
	Garage rent (₹ 90,000 ÷ 12 months)	7,500
	Transport Technical Service Charges	10,000
	Share in workshop expenses	28,000
	Total (A)	2,70,500
B.	Variable Charges:	
	Cost of diesel (Working Note 1)	12,60,000
	Lubricant, Oil etc.	23,500
	Depreciation	2,00,000
	Replacement of Tyres, Tubes & other parts	1,25,000
	Consumable Stores	45,000
	Electricity and Gas charges	5,000
	Total (B)	16,58,500
C.	Total Cost (A + B)	19,29,000
D.	Total Ton-Kms. (Working Note 2)	18,86,400
E.	Cost per ton-km. (C ÷ D)	1.022

(ii) Calculation of Chargeable Freight

Cost per ton-km.	₹ 1.022
Add: Profit @ 25% on freight or 33⅓% on cost	₹ 0.341
Chargeable freight per ton-km.	₹ 1.363 or ₹ 1.36

Working Notes:

1. Cost of Diesel:

Distance covered by each vehicle during October, 2013

= 200 k.m. × 2 × 25 days × 90 % = 9,000 km.

Consumption of diesel = $\frac{9,000\,\text{k.m.} \times 20\,\text{vehicles}}{5\,\text{k.m.}} = 36,000$ litres.

Cost of diesel = 36,000 litres × ₹ 35 = ₹ 12,60,000.

2. Calculation of total ton-km:

Total Ton-Km. = Total Capacity × Distance covered by each vehicle × Average Capacity Utilisation ratio.

$$= \left[(5 \times 9\,\text{ton}) + (6 \times 12\,\text{ton}) + (7 \times 15\,\text{ton}) + (2 \times 20\,\text{ton})\right] \times 9,000\,\text{k.m.} \times \frac{(90\% + 70\%)}{2}$$

$$= (45 + 72 + 105 + 40) \times 9,000\,\text{k.m.} \times 80\%$$

= 262 × 9,000 × 80%.

= 18,86,400 ton-km.

Question 7

A transport company has been given a 40 kilometre long route to run 5 buses. The cost of each bus is ₹ 6,50,000. The buses will make 3 round trips per day carrying on an average 80 percent passengers of their seating capacity. The seating capacity of each bus is 40 passengers. The buses will run on an average 25 days in a month. The other information for the year 2013-14 are given below:

Garage rent	*₹ 4,000 per month*
Annual repairs and maintenance	*₹ 22,500each bus*
Salaries of 5 drivers	*₹ 3,000 each per month*
Wages of 5 conductors	*₹ 1,200 each per month*
Manager's salary	*₹ 7,500 per month*
Road tax, permit fee, etc.	*₹ 5,000 for a quarter*
Office expenses	*₹ 2,000 per month*
Cost of diesel per litre	*₹ 33*
Kilometre run per litre for each but	*6 kilometres*
Annual depreciation	*15% of cost*
Annual Insurance	*3% of cost*

You are required to calculate the bus fare to be charged from each passenger per kilometre, if the company wants to earn profits of $33^1/_3$ percent on taking (total receipts from passengers).

Solution:

Operating Cost Sheet for the year 2013- 14

	Particulars	Total Cost (₹)
A.	Fixed Charges:	
	Garage rent (₹4,000 × 12 months)	48,000
	Salary of drivers (₹3,000 × 5 drivers ×12 months)	1,80,000
	Wages of Conductors (₹1,200 × 5 conductors × 12 months)	72,000
	Manager's salary (₹ 7,500 × 12 months)	90,000
	Road Tax, Permit fee, etc. (₹ 5,000 × 4 quarters)	20,000
	Office expenses (₹ 2,000 × 12 months)	24,000
	Insurance (₹ 6,50,000 × 5 buses × 3%)	97,500
	Total (A)	5,31,500
B.	Variable Charges:	
	Repairs and Maintenance (₹ 22,500 × 5 buses)	1,12,500
	Depreciation (₹ 6,50,000 × 5 buses × 15%)	4,87,500
	Diesel {(3,60,000 km. ÷ 6 km.) × ₹33}	19,80,000
	Total (B)	25,80,000
	Total Cost (A+B)	31,11,500
	Add: 33 $^1/_3$ % Profit on takings or 50% on cost	15,55,750
	Total Takings (Total bus fare collection)	46,67,250
	Total Passenger-km. (Working Note 2)	1,15,20,000
	Bus fare to be charged from each passenger per km.	0.405

Working Notes:

1. Total Kilometres to be run during the year 2013-14

   = 40 km.× 2 sides × 3 trips × 25 days × 12 months × 5 buses = 3, 60,000 Kilometres

2. Total passenger Kilometres

   = 3,60,000 km. × 40 passengers × 80% = 1,15,20,000 Passenger- km.

Question 8

The following information relates to a bus operator:

Cost of the bus	₹	*18,00,000*
Insurance charges		*3% p.a.*

Manager-cum accountant's salary	₹	*8,000 p.m.*
Annual Tax	₹	*50,000*
Garage Rent	₹	*2,500 p.m.*
Annual repair & maintenance	₹	*1,50,000*
Expected life of the bus		*15 years*
Scrap value at the end of 15 years	₹	*1,20,000*
Driver's salary	₹	*15,000 p.m.*
Conductor's salary	₹	*12,000 p.m.*
Stationery	₹	*500 p.m.*
Engine oil, lubricants (for 1200 km.)	₹	*2,500*
Diesel and oil (for 10 km.)	₹	*52*
Commission to driver and conductor (shared equally)		*10% of collections*
Route distance		*20 km long*

The bus will make 3 round trips for carrying on the average 40 passengers in each trip. Assume 15% profit on collections. The bus will work on the average 25 days in a month.

Calculate fare for passenger-km

Solution:

Working Notes:

(i) Calculation of Depreciation of Bus (Per month)

$$= \frac{\text{Cost of the bus} - \text{Scrap value at the end of the 15 years}}{\text{Expected life of the bus}}$$

$$= \frac{₹18,00,000 - ₹1,20,000}{15 \text{ years}}$$

= ₹ 1,12,000 p.a.

$$\text{Depreciation per month} = \frac{₹1,12,000}{12 \text{ months}} = ₹9,333.33$$

(ii) Calculation of total distance travelled and Passenger-km. per month

Total distance = 3 trips × 2 × 20 k.m. × 25 days = 3,000 k.m.

Total Passenger-km. = 3 trips × 2 × 20 k.m. × 25 days × 40 passengers

= 1,20,000 Passenger-k.m.

(iii) Cost of Engine oil, Lubricants and Diesel & oil (Per month)

Engine oil & lubricants $= \dfrac{\text{Total distance travelled}}{1,200 \text{ K.m.}} \times ₹\,2,500$

$= \dfrac{3,000 \text{ K.m.}}{1,200 \text{ K.m.}} \times ₹\,2,500 \quad = ₹\,6,250$

Diesel and Oil $= \dfrac{\text{Total distance travelled}}{10 \text{ K.m.}} \times ₹\,52$

$= \dfrac{3,000 \text{ K.m.}}{10 \text{ K.m.}} \times ₹\,52 \quad = ₹15,600$

Statement showing the Operating Cost per Passenger-km.

		(₹)	(₹)
(i)	*Standing Charges:*		
	Depreciation {Working Note- (i)}	9,333.33	
	Insurance Charge $\left(\frac{₹18,00,000}{12} \times 3\%\right)$	4,500	
	Manager-cum-accountant's salary	8,000	
	Annual Tax (p.m.) $\left(\frac{₹50,000}{12}\right)$	4,166.67	
	Garage Rent	2,500	28,500
(ii)	*Maintenance Charges:*		
	Repair & Maintenance per month $\left(\frac{₹1,50,000}{12}\right)$		12,500
(iii)	*Running Cost:*		
	Driver's Salary	15,000	
	Conductor's Salary	12,000	
	Stationery	500	
	Engine oil & Lubricants {Working Note- (iii)}	6,250	
	Diesel and oil {Working Note- (iii)}	15,600	
	Total running cost before deducting commission to driver and conductor	49,350	49,350
	Total cost excluding commission to driver and conductor		90,350

Driver's commission on collection*		6,023.34
Conductor's commission on collection*		6,023.33
Total Cost (i) +(ii) + (iii)		1,02,396.67
Add: Profit**		18,070
Total Collection		1,20,466.67

Working Note:

Total costs before commission on collection and net profit is ₹ 90,350.

Commission on collection to driver and conductor is 10% of collection and Profit is 15% of collection means

100% - (10% + 15%) i.e. 75% = ₹ 90,350

So, Total collection $= \frac{₹\,90,350}{75} \times 100 = ₹\,1,20,466.67$

*Total Commission on collection = 10% × ₹ 1,20,466.67 = ₹ 12,046.67

Driver's share = 50% × ₹ 12,046.67 = 6,023.34

Conductor's share = 50% × ₹ 12,046.67 = 6,023.33

** Profit on collection = ₹ 1,20,466.67 × 15% = ₹ 18,070

Fare per Passenger-km. $= \frac{\text{Total Collection}}{\text{Total Passenger - km. \{Working Note (ii)\}}}$

$= \frac{₹\,1,20,466.67}{1,20,000}$

= ₹ 1.004 (appx.)

Question 9

Voyager Cabs Pvt. Ltd. is a New Delhi based cab renting company, provides cab facility on rent for cities Delhi, Agra and Jaipur to the tourists. To attract more tourists it has launched a new three days tour package for Delhi-Jaipur-Agra-Delhi. Following are the relevant information regarding the package:

Distance between Delhi to Jaipur (Km.)	*274*
Distance between Delhi to Agra (Km.)	*242*
Distance between Agra to Jaipur (Km.)	*238*
Price of diesel in Delhi	*₹ 54 per litre*
Price of diesel in Jaipur	*₹ 56 per litre*

Price of diesel in Agra	*₹ 58 per litre*
Mileage of cab per litre of diesel (Km.)	*16*
Chauffeur's salary	*₹ 12,000 per month*
Cost of the cab	*₹ 12,00,000*
Expected life of the cab	*24,00,000 kms.*
Servicing cost	*₹ 30,000 after every 50,000 kilometres run.*
Chauffeur's meal allowance	*₹ 50 for every 200 kilometres of completed journey*
Other set up and office cost	*₹ 2,400 per month.*

Voyager Cabs has made tie-up with fuel service centres at Agra, Jaipur and Delhi to fill diesel to its cabs on production of fuel passbook to the fuel centre. Company has a policy to get fuel filled up sufficient to reach next destination only.

You are required to calculate the price inclusive of service tax @ 12.36% to be quoted for the package if company wants to earn profit of 25% on its net takings i.e. excluding service tax.

Solution:

Calculation of Price of the Delhi-Jaipur-Agra-Delhi tour package

Particulars	**Amount (₹)**	**Amount (₹)**
Diesel Cost (Working Note-2)		2,635.00
Servicing Cost $\left(\frac{₹\,30,000}{50,000\text{kms}} \times 754\text{kms.}\right)$		452.40
Chauffeur's meal cost (three 200 km. completed journey × ₹ 50)		150.00
Other Allocable costs:		
Depreciation $\left(\frac{₹12,00,000}{24,00,000\text{kms}} \times 754\text{kms.}\right)$	377.00	
Other set-up and office cost $\left(\frac{₹\,2,400}{30\text{days}} \times 3\text{days}\right)$	240.00	
Chauffeur's salary $\left(\frac{₹12,000}{30\text{days}} \times 3\text{days}\right)$	1,200.00	1,817.00
Total Cost		5,054.40
Add: Profit (25% of net takings or 1/3rd of total cost)		1,684.80
		6,739.20
Add: Service Tax @12.36%		832.97
Price of the package (inclusive of service tax)		**7,572.17**

Working Notes

(1) Total distance of journey

From	To	Distance (in Km.)
Delhi	Jaipur	274
Jaipur	Agra	238
Agra	Delhi	242
Total Distance		754

(2) Cost of Diesel

From	To	Distance (in Km.)	Price of diesel per litre (₹)	Total diesel Cost (₹)
I	II	III	IV	V= (III ÷ 16 km) × IV
Delhi	Jaipur	274	54	924.75
Jaipur	Agra	238	56	833.00
Agra	Delhi	242	58	877.25
Total cost				2,635.00

Question 10

Gopal Milk Co-Operative Society (GMCS) collects raw milk from the farmers of Ramgarh, Pratapgarh and Devgarh panchayats and processes these milk to make various dairy products. GMCS has its own vehicles (tankers) to collect and bring the milk to the processing plant. Vehicles are parked in the GMCS's garage situated within the plant compound. Following are the some information related with the vehicles:

	Ramgarh	*Pratapgarh*	*Devgarh*
No. of vehicles assigned	*4*	*3*	*5*
No. of trips a day	*3*	*2*	*2*
One way distance from the processing plant	*24 k.m.*	*34 k.m.*	*16 k.m.*
Toll tax paid p.m. (₹)	*2,850*	*3,020*	*---*

All the 5 vehicles assigned to Devgarh panchayat, were purchased five years back at a cost of ₹ 9,25,000 each. The 4 vehicles assigned to Ramgarh panchayat, were purchased two years back at a cost of ₹ 11,02,000 each and the remaining vehicles assigned to Pratapgarh were purchased last year at a cost of ₹ 13,12,000 each. With the purchase of each vehicle a two years free servicing warranty is provided. A vehicle gives 10 kmpl mileage in the first two year of purchase, 8 kmpl in next two years and 6 kmpl afterwards. The vehicles are subject to depreciation of 10% p.a. on straight line basis irrespective of usage. A vehicle has the *capacity to carry 25,000 litres of milk but on an average only 70% of the total capacity is utilized.*

The following expenditure is related with the vehicles:

Salary of Driver (a driver for each vehicle)	*₹ 18,000 p.m.*
Salary to Cleaner (a cleaner for each vehicle)	*₹ 11,000 p.m.*
Allocated garage parking fee	*₹ 1,350 per vehicle per month*
Servicing cost	*₹ 3,000 for every complete 5,000 k.m. run.*
Price of diesel per litre	*₹ 58.00*

From the above information you are required to calculate

(i) Total operating cost per month for each vehicle. (Take 30 days for the month)

(ii) Vehicle operating cost per litre of milk.

Solution:

(i) Calculation of Operating Cost per month for each vehicle

	Ramgarh	Pratapgarh	Devgarh	Total
A. Running Costs:				
- Cost of diesel (Working Note- 2)	1,25,280	70,992	92,800	2,89,072
- Servicing cost (Working Note- 3)	9,000	---	3,000	12,000
	1,34,280	70,992	95,800	3,01,072
B. Fixed Costs:				
- Salary to drivers	72,000 (4 drivers × ₹ 18,000)	54,000 (3 drivers × ₹ 18,000)	90,000 (5 drivers × ₹ 18,000)	2,16,000
- Salary to cleaners	44,000 (4 cleaners × ₹ 11,000)	33,000 (3 cleaners × ₹ 11,000)	55,000 (5 cleaners × ₹ 11,000)	1,32,000
- Allocated garage parking fee	5,400 (4 vehicles × ₹ 1,350)	4,050 (3 vehicles × ₹ 1,350)	6,750 (5 vehicles × ₹ 1,350)	16,200
- Depreciation (Working Note- 4)	36,733	32,800	38,542	1,08,075
- Toll tax passes	2,850	3,020	---	5,870

	1,60,983	1,26,870	1,90,292	4,78,145
Total [A + B]	2,95,263	1,97,862	2,86,092	7,79,217
Operating Cost per vehicle	73,815.75 (₹ 2,95,263 ÷ 4 vehicles)	65,954 (₹ 1,97,862 ÷ 3 vehicles)	57,218.40 (₹ 2,86,092 ÷ 5 vehicles)	64,934.75 (₹ 7,79,217 ÷ 12 vehicles)

(ii) Vehicle operating cost per litre of milk

$$\frac{\text{Total Operating Cost per month}}{\text{Total milk carried a month}} = \frac{₹7,79,217}{1,47,00,000 \text{ Litres (Working Note} - 5)} = ₹\ 0.053$$

Working Notes:

1. Distance covered by the vehicles in a month

Route		Total Distance (in K.M.)
Ramgarh	(4 vehicles × 3 trips × 2 × 24 km. × 30 days)	17,280
Pratapgarh	(3 vehicles × 2 trips × 2 × 34 km. × 30 days)	12,240
Devgarh	(5 vehicles × 2 trips × 2 × 16 km. × 30 days)	9,600

2. Cost of diesel consumption

	Ramgarh	Pratapgarh	Devgarh
Total distance travelled (K.M.)	17,280	12,240	9,600
Mileage per litre of diesel	8 kmpl	10 kmpl	6 kmpl
Diesel consumption (Litre)	2,160 (17,280 ÷ 8)	1,224 (12,240 ÷ 10)	1,600 (9,600 ÷ 6)
Cost of diesel consumption @ ₹ 58 per litre (₹)	1,25,280	70,992	92,800

3. Servicing Cost

	Ramgarh	Pratapgarh	Devgarh
Total distance travelled (K.M.)	17,280	12,240	9,600
Covered under free service warranty	No	Yes	No
No. of services required	3 (17,280 k.m. ÷ 5,000 k.m.)	2 (12,240 k.m. ÷ 5,000 k.m.)	1 (9,600 k.m. ÷ 5,000 k.m.)
Total Service Cost (₹)	9,000 (₹ 3,000 × 3)	---	3,000 (₹ 3,000 × 1)

4. Calculation of Depreciation

	Ramgarh	Pratapgarh	Devgarh
No. of vehicles	4	3	5
Cost of a vehicle	11,02,000	13,12,000	9,25,000
Total Cost of vehicles	44,08,000	39,36,000	46,25,000
Depreciation per month	36,733 $\left(\frac{₹44,08,000 \times 10\%}{12\,\text{months}}\right)$	32,800 $\left(\frac{₹39,36,000 \times 10\%}{12\,\text{months}}\right)$	38,542 $\left(\frac{₹46,25,000 \times 10\%}{12\,\text{months}}\right)$

5. Total volume of Milk Carried

Route		Milk Qty. (Litre)
Ramgarh	(25,000 ltr. × 0.7 × 4 vehicles × 3 trips × 30 days)	63,00,000
Pratapgarh	(25,000 ltr. × 0.7 × 3 vehicles × 2 trips × 30 days)	31,50,000
Devgarh	(25,000 ltr. × 0.7 × 5 vehicles × 2 trips × 30 days)	52,50,000
		1,47,00,000

Question 11

A mini-bus, having a capacity of 32 passengers, operates between two places - 'A' and 'B'. The distance between the place 'A' and place 'B' is 30 km. The bus makes 10 round trips in a day for 25 days in a month. On an average, the occupancy ratio is 70% and is expected throughout the year.

The details of other expenses are as under:

	Amount (₹)	
Insurance	*15,600*	*Per annum*
Garage Rent	*2,400*	*Per quarter*
Road Tax	*5,000*	*Per annum*
Repairs	*4,800*	*Per quarter*
Salary of operating staff	*7,200*	*Per month*
Tyres and Tubes	*3,600*	*Per quarter*
Diesel: (one litre is consumed for every 5 km)	*13*	*Per litre*
Oil and Sundries	*22*	*Per 100 km run*
Depreciation	*68,000*	*Per annum*

Passenger tax @ 22% on total taking is to be levied and bus operator requires a profit of 25% on total taking.

Prepare operating cost statement on the annual basis and find out the cost per passenger kilometer and one way fare per passenger.

Solution:

Operating Cost Statement

	Particulars	Total Cost Per annum (₹)
A.	Fixed Charges:	
	Insurance	15,600
	Garage rent (₹ 2,400 × 4 quarters)	9,600
	Road Tax	5,000
	Salary of operating staff (₹ 7,200 × 12 months)	86,400
	Depreciation	68,000
	Total (A)	1,84,600
B.	Variable Charges:	
	Repairs (₹ 4,800 × 4 quarters)	19,200
	Tyres and Tubes (₹ 3,600 × 4 quarters)	14,400
	Diesel {(1,80,000 km. ÷ 5 km.) × ₹13}	4,68,000
	Oil and Sundries {(1,80,000 km. ÷ 100 km.) × ₹22}	39,600
	Total (B)	5,41,200
	Total Operating Cost (A+B)	7,25,800
	Add: Passenger tax (Refer to WN-1)	3,01,275
	Add: Profit (Refer to WN-1)	3,42,359
	Total takings	13,69,434

Calculation of Cost per passenger kilometre and one way fare per passenger:

Cost per Passenger-Km. $= \dfrac{\text{Total Operating Cost}}{\text{Total Passenger} - \text{Km.}}$

$$= \frac{₹\ 7,25,800}{40,32,000 \text{ Passenger} - \text{Km.}} = ₹\ 0.18$$

One way fare per passenger $= \frac{\text{Total Takings}}{\text{Total Passenger} - \text{Km.}} \times 30 \text{ Km.}$

$= \frac{₹\ 13,69,434}{40,32,000 \text{ Passenger} - \text{Km.}} \times 30 \text{ km} = ₹\ 10.20$

Working Notes:

1. Let total taking be X then Passenger tax and profit will be as follows:

   X = ₹ 7,25,800 + 0.22 X + 0.25X

   X – 0.47 X = ₹ 7,25,800

   $X = \frac{₹7,25,800}{0.53} = ₹\ 13,69,434$

   Passenger tax = ₹ 13,69,434 × 0.22 = ₹ 3,01,275

   Profit = ₹ 13,69,434 × 0.25 = ₹ 3,42,359

2. Total Kilometres to be run during the year

   = 30 km.× 2 sides × 10 trips × 25 days × 12 months = 1,80,000 Kilometres

3. Total passenger Kilometres

   = 1,80,000 km. × 32 passengers × 70% = 40,32,000 Passenger- km.

Costing for Airlines

Question 12

In order to develop tourism, ABCL airline has been given permit to operate three flights in a week between X and Y cities (both side). The airline operates a single aircraft of 160 seats capacity. The normal occupancy is estimated at 60% through out the year of 52 weeks. The one-way fare is ₹7,200. The cost of operation of flights are:

Fuel cost (variable)	*₹96,000 per flight*
Food served on board on non-chargeable basis	*₹125 per passenger*
Commission	*5% of fare applicable for all booking*
Fixed cost:	
Aircraft lease	*₹3,50,000 per flight*
Landing Charges	*₹72,000 per flight*

Required:

(i) Calculate the net operating income per flight.

(ii) The airline expects that its occupancy will increase to 108 passengers per flight if the fare is reduced to ₹ 6,720. Advise whether this proposal should be implemented or not.

Solution:

(i) No. of passengers 160 seats × 60% = 96

	(₹)	(₹)
Fare collection (96 passengers × ₹7,200)		6,91,200
Variable costs:		
Fuel	96,000	
Food (96 passengers × ₹125)	12,000	
Commission (5% of ₹6,91,200)	34,560	1,42,560
Contribution per flight		5,48,640
Fixed costs:		
Aircraft Lease	3,50,000	
Landing charges	72,000	4,22,000
Net income per flight		1,26,640

(ii)

Fare collection (108 passengers × ₹ 6,720)		7,25,760
Variable costs:		
Fuel	96,000	
Food (108 passengers × ₹125)	13,500	
Commission (5% of ₹ 7,25,760)	36,288	1,45,788
Contribution		5,79,972

There is an increase in contribution by ₹ 31,332. Hence the proposal is acceptable.

Costing for Clubs and Library

Question 13

A Club runs a library for its members. As part of club policy, an annual subsidy of upto ₹ 5 per member including cost of books may be given from the general funds of the club. The management of the club has provided the following figures for its library department.

Number of Club members	*5,000*
Number of Library members	*1,000*

Library fee per member per month	*₹ 100*
Fine for late return of books	*₹ 1 per book per day*
Average No. of books returned late per month	*500*
Average No. of days each book is returned late	*5 days*
Number of available old books	*50,000 books*
Cost of new books	*₹ 300 per book*
Number of books purchased per year	*1,200 books*
Cost of maintenance per old book per year	*₹ 10*

Staff details	***No.***	***Per Employee Salary per month (₹)***
Librarian	*01*	*10,000*
Assistant Librarian	*03*	*7,000*
Clerk	*01*	*4,000*

You are required to calculate:

(i) the cost of maintaining the library per year excluding the cost of new books;

(ii) the cost incurred per member per month on the library excluding cost of new books; and

(iii) the net income from the library per year.

If the club follows a policy that all new books must be purchased out of library revenue

(a) What is the maximum number of books that can be purchased per year and

(b) How many excess books are being purchased by the library per year?

Also, comment on the subsidy policy of the club

Solution:

	(₹)	**(₹)**
Total Revenue		
Library fees per month (1,000 members × ₹100)		1,00,000
Late fees per month (500 times × 5 books × ₹1)		2,500
Total Revenue per month		1,02,500
Total Revenue per annum (₹ 1,02,500 × 12 months)		12,30,000
Total Cost		
Staff Costs:		
Librarian (₹10,000 × 1 person × 12 months)	1,20,000	

Assistant Librarian (₹ 7,000 × 3 persons × 12 months)	2,52,000	
Clerk (₹ 4,000 × 1 person × 12 months)	48,000	4,20,000
Books maintenance cost (50,000 books × ₹ 10)		5,00,000
Total maintenance cost per annum excluding cost of new books		9,20,000
Cost incurred *per library member per annum* (₹ 9,20,000 ÷1,000)		920
Cost incurred *per library member per month* on the library excluding cost of new books (₹ 920 ÷12 months)		76.67
Cost incurred *per club member per annum* (₹ 9,20,000 ÷ 5,000)		184
Cost incurred *per club member per month* (₹184 ÷12 months)		15.33
Net income from the library per annum (₹ 12,30,000 – ₹ 9,20,000)		3,10,000
Cost per new book		300
Maximum number of new books per annum (₹ 3,10,000 ÷ ₹300)		1,033.33 nos.
Number of books purchased		1,200 nos.
Excess books purchased (1,200 nos. – 1,033.33 nos.)		166.67 nos.
Subsidy being given per annum on excess purchase (166.67 books × ₹ 300)		50,000
Subsidy per library member per annum (₹ 50,000 ÷1,000 members)		50
Subsidy per club member per annum (₹ 50,000 ÷ 5,000 members)		10

Comment: The club is exceeding its subsidy target to members by ₹ 45 (₹ 50 – ₹5) per library member and ₹ 5 (₹ 10 – 5) per club member.

Costing for Hotels & Lodges

Question 14

A company runs a holiday home. For this purpose, it has hired a building at a rent of ₹ 10,000 per month alongwith 5% of total taking. It has three types of suites for its customers, viz., single room, double rooms and triple rooms.

Following information is given:

Type of suite	*Number*	*Occupancy percentage*
Single room	*100*	*100%*
Double rooms	*50*	*80%*
Triple rooms	*30*	*60%*

The rent of double rooms suite is to be fixed at 2.5 times of the single room suite and that of triple rooms suite as twice of the double rooms suite.

The other expenses for the year 2013 are as follows:

	(₹)
Staff salaries	*14,25,000*
Room attendants' wages	*4,50,000*
Lighting, heating and power	*2,15,000*
Repairs and renovation	*1,23,500*
Laundry charges	*80,500*
Interior decoration	*74,000*
Sundries	*1,53,000*

Provide profit @ 20% on total taking and assume 360 days in a year.

You are required to calculate the rent to be charged for each type of suite.

Solution:

(i) Total equivalent single room suites

Nature of suite	Occupancy (Room-days)	Equivalent single room suites (Room-days)
Single room suites	36,000 (100 rooms × 360 days × 100%)	36,000 (36,000 × 1)
Double rooms suites	14,400 (50 rooms × 360 days × 80%)	36,000 (14,400 × 2.5)
Triple rooms suites	6,480 (30 rooms × 360 days × 60%)	32,400 (6,480 × 5)
		1,04,400

(ii) Statement of total cost:

	(₹)
Staff salaries	14,25,000
Room attendant's wages	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,500
Laundry charges	80,500
Interior decoration	74,000

Sundries	1,53,000
	25,21,000
Building rent {(₹10,000 × 12 months) + 5% on total taking}	1,20,000+ 5% on total takings
Total cost	26,41,000 + 5% on total takings

Profit is 20% of total takings

∴ Total takings = ₹ 26,41,000 + 25% (5% +20%) of total takings

Let x be rent for single room suite

Then 1,04,400 x = 26,41,000 + 0.25 × 1,04,400 x

Or, 1,04,400 x = 26,41,000 + 26,100 x

Or, 78,300 x = 26,41,000

Or, x = 33.73

(iii) Rent to be charged for single room suite = ₹ 33.73

Rent for double rooms suites ₹ 33.73 × 2.5 = ₹ 84.325

Rent for triple rooms suites ₹ 33.73 × 5 = ₹ 168.65

9 Process & Operation Costing

Basic Concepts

Process Costing	Used in industries where the material has to pass through two or more processes for being converted into a final product.
Operation Costing	It is the refinement of process costing. It is concerned with the determination of the cost of each operation rather than the process.
Equivalent Production Units	This concept use in the industries where manufacturing is a continuous activity. Converting partly finished units into equivalent finished units.
Inter Process Profit	The output of one process is transferred to the next process not at cost but at market value or cost plus a percentage of profit. The difference between cost and the transfer price is known as inter-process profits.
	Treatment of Losses in Process Costing
Normal Process Loss	The cost of normal process loss is absorbed by good units produced under the process. The amount realised by the sale of normal process loss units should be credited to the process account
Abnormal Process Loss	The total cost of abnormal process loss is credited to the process account from which it arise. The total cost of abnormal process loss is debited to costing profit and loss account
Abnormal Gain	The process account under which abnormal gain arises is debited with the abnormal gain and credited to Abnormal gain account which will be closed by transferring to the Costing Profit and loss account.
	Valuation of Work-in-Progress
First-in-First-Out (FIFO) Method	Under this method the units completed and transferred include completed units of opening work-in-progress and subsequently introduced units. Proportionate cost to complete the opening work-in-progress and that to process the completely processed

	units during the period are derived separately. The cost of opening work-in-progress is added to the proportionate cost incurred on completing the same to get the complete cost of such units. In this method the closing stock of Work in progress is valued at current cost.
Last-in-First-Out (LIFO) Method.	According to this method units lastly entering in the process are the first to be completed. This assumption has a different impact on the costs of the completed units and the closing inventory of work-in-progress. The completed units will be shown at their current cost and the closing inventory of work-in-progress will continue to appear at the cost of the opening inventory of work-in-progress.
Weighted Average Cost Method	Under this method, the cost of opening work-in-progress and cost of the current period are aggregated and the aggregate cost is divided by output in terms of completed units. The equivalent production in this case consists of work-load already contained in opening work-in-process and work-load of current period.

SECTION-A

Question 1

Explain briefly the procedure for the valuation of Work-in-process.

Solution

Valuation of Work-in process: The valuation of work-in-process can be made in the following three ways, depending upon the assumptions made regarding the flow of costs.

- First-in-first-out (FIFO) method
- Last-in-first-out (LIFO) method
- Average cost method

A brief account of the procedure followed for the valuation of work-in-process under the above three methods is as follows;

FIFO method: According to this method the units first entering the process are completed first. Thus the units completed during a period would consist partly of the units which were incomplete at the beginning of the period and partly of the units introduced during the period.

The cost of completed units is affected by the value of the opening inventory, which is based on the cost of the previous period. The closing inventory of work-in-process is valued at its current cost.

LIFO method: According to this method units last entering the process are to be completed first. The completed units will be shown at their current cost and the closing-work in process will continue to appear at the cost of the opening inventory of work-in-progress along with current cost of work in progress if any.

Average cost method: According to this method opening inventory of work-in-process and its costs are merged with the production and cost of the current period, respectively. An average cost per unit is determined by dividing the total cost by the total equivalent units, to ascertain the value of the units completed and units in process.

Question 2

Explain equivalent units.

Solution:

When opening and closing stocks of work-in-process exist, unit costs cannot *be* computed by simply dividing the total cost by total number of units still in process. We can convert the work-in-process units into finished units called equivalent units so that the unit cost of these units can be obtained.

Equivalent Completed Units	=	Actual number of units in the process of manufacture	×	Percentage of work completed

It consists of balance of work done on opening work-in-process, current production done fully and part of work done on closing WIP with regard to different elements of costs viz., material, labour and overhead.

Question 3

"Operation costing is defined as refinement of Process costing." Explain it.

Solution:

Operation costing is concerned with the determination of the cost of each operation rather than the process:

- In the industries where process consists of distinct operations, the operation costing method is applied.
- It offers better control and facilitates the computation of unit operation cost at the end of each operation.

Question 4

What is inter-process profit? State its advantages and disadvantages.

Solution:

In some process industries the output of one process is transferred to the next process not at cost but at market value or cost plus a percentage of profit. *The difference between cost and the transfer price is known as inter-process profits.*

The advantages and disadvantages of using inter-process profit, in the case of process type industries are as follows:

Advantages:

1. Comparison between the cost of output and its market price at the stage of completion is facilitated.
2. Each process is made to stand by itself as to the profitability.

Disadvantages:

1. The use of inter-process profits involves complication.
2. The system shows profits which are not realised because of stock not sold out

SECTION- B

Question 1

Following information is available regarding process A for the month of February, 2014:

Production Record:

Units in process as on 01.02.2014	*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 28.02.2014	*6,000*
(All materials used, 33-1/3% complete for labour and overhead)	

Cost Records:

Work-in-process as on 01.02.2014	*(₹)*
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 Equivalent Production.

(ii) Statement showing Cost for each element.

(iii) Statement of Apportionment of cost.

(iv) Process Cost Account for Process A.

Solution:

(i) Statement of Equivalent Production (Average cost method)

Input (Units)	Particulars	Output Units	Equivalent Production					
			Materials		Labour		Overheads	
			(%*)	Units**	(%)*	Units**	(%)*	Units**
20,000	Completed	14,000	100	14,000	100	14,000	100	14,000
	WIP	6,000	100	6,000	33-1/3	2,000	33-1/3	2,000
20,000		20,000		20,000		16,000		16,000

*Percentage of completion ** Equivalent units

(ii) Statement showing Cost for each element

Particulars	Materials	Labour	Overhead	Total
Cost of opening work-in-progress (₹)	6,000	1,000	1,000	8,000
Cost incurred during the month (₹)	25,600	15,000	15,000	55,600
Total cost (₹) : (A)	31,600	16,000	16,000	63,600
Equivalent units : (B)	20,000	16,000	16,000	
Cost per equivalent unit (₹) : C= (A ÷ B)	1.58	1	1	3.58

(iii) Statement of Apportionment of cost

	(₹)	(₹)
Value of output transferred: (A) (14,000 units × ₹ 3.58)		50,120
Value of closing work-in-progress: (B)		
Material (6,000 units × ₹1.58)	9,480	
Labour (2,000 units × ₹ 1)	2,000	
Overhead (2,000 units × ₹ 1)	2,000	13,480
Total cost : (A + B)		63,600

(iv) Process- A Account

Particulars	Units	(₹)	Particulars	Units	(₹)
To Opening WIP	4,000	8,000	By Completed units	14,000	50,120
To Materials	16,000	25,600	By Closing WIP	6,000	13,480

To Labour		15,000			
To Overhead		15,000			
	20,000	63,600		20,000	63,600

Question 2

From the following Information for the month ending October, 2013, prepare Process Cost accounts for Process III. Use First-in-fist-out (FIFO) method to value equivalent production.

Direct materials added in Process III (Opening WIP)	*2,000 units at ₹ 25,750*
Transfer from Process II	*53,000 units at ₹ 4,11,500*
Transferred to Process IV	*48,000 units*
Closing stock of Process III	*5,000 units*
Units scrapped	*2,000 units*
Direct material added in Process III	*₹ 1,97,600*
Direct wages	*₹ 97,600*
Production Overheads	*₹ 48,800*

Degree of completion:

	Opening Stock	*Closing Stock*	*Scrap*
Materials	*80%*	*70%*	*100%*
Labour	*60%*	*50%*	*70%*
Overheads	*60%*	*50%*	*70%*

The normal loss in the process was 5% of production and scrap was sold at ₹ 3 per unit.

Solution:

Process III

Process Cost Sheet (FIFO Method)

Opening Stock: 2,000 units; Introduced: 53,000 units

Statement of Equivalent Production

Input		Output		Equivalent production					
Item	**Units**	**Item**	**Units**	**Mat- A**	**(%)**	**Mat- B**	**(%)**	**Labour & OHs.**	**(%)**
Opening stock	2,000	Work on opening WIP	2,000	-	-	400	20	800	40
Process II transfer	53,000	Introduced & completed during							

		the period (48,000 – 2000)	46,000	46,000	100	46,000	100	46,000	100
			48,000						
		Normal Loss (2,000+53,000 – 5,000) x 5%	2,500	-	-	-	-	-	-
		Closing WIP	5,000	5,000	100	3,500	70	2,500	50
			55,500	51,000		49,900		49,300	
		Abnormal Gain	500	500	100	500	100	500	100
	55,000		55,000	50,500		49,400		48,800	

Statement of Cost for each Element

Element of cost	**Cost (₹)**	**Equivalent Production**	**Cost per unit (₹)**
Material A:			
Transfer from Process-II	4,11,500		
Less: Scrap value of Normal Loss (2,500 × ₹ 3)	7,500		
	4,04,000	50,500	8
Material B	1,97,600	49,400	4
Wages	97,600	48,800	2
Overheads	48,800	48,800	1
	7,48,000		15

Process Cost Sheet

	(₹)
Opening WIP (for completion):	
Material- B (400 units × ₹ 4)	1,600
Wages (800 units × ₹ 2)	1,600
Overheads (800 units × ₹ 1)	800
	4,000
Introduced and completely processed during the period (46,000 units × ₹ 15)	6,90,000
Closing WIP:	
Material- A (5,000 units × ₹ 8)	40,000
Material- B (3,500 units × ₹ 4)	14,000

Wages (2,500 units × ₹ 2)	5,000
Overheads (2,500 units × ₹ 1)	2,500
	61,500
Abnormal Gain (500 units × ₹ 15)	7,500

Process III A/c

Particulars	Units	Amount	Particulars	Units	Amount
To Balance b/d	2,000	25,750	By Normal Loss	2,500	7,500
To Process II A/c	53,000	4,11,500	By Process IV A/c (₹ 6,90,000 + ₹ 4000 + ₹ 25,750)	48,000	7,19,750
To Direct Material		1,97,600	By Balance c/d	5,000	61,500
To Direct Wages		97,600			
To Production OH		48,800			
To Abnormal Gain	500	7,500			
	55,500	7,88,750		55,500	7,88,750

Question 3

A Company produces a component, which passes through two processes. During the month of April, 2014, materials for 40,000 components were put into Process I of which 30,000 were completed and transferred to Process II. Those not transferred to Process II were 100% complete as to materials cost and 50% complete as to labour and overheads cost. The Process I costs incurred were as follows:

Direct Materials	*₹ 15,000*
Direct Wages	*₹ 18,000*
Factory Overheads	*₹ 12,000*

Of those transferred to Process II, 28,000 units were completed and transferred to finished goods stores. There was a normal loss with no salvage value of 200 units in Process II. There were 1,800 units, remained unfinished in the process with 100% complete as to materials and 25% complete as regard to wages and overheads.

No further process material costs occur after introduction at the first process until the end of the second process, when protective packing is applied to the completed components. The process and packing costs incurred at the end of the Process II were:

Packing Materials	*₹ 4,000*

Direct Wages *₹ 3,500*

Factory Overheads *₹ 4,500*

Required:

(i) Prepare Statement of Equivalent Production, Cost per unit and Process I A/c.

(ii) Prepare statement of Equivalent Production, Cost per unit and Process II A/c.

Solution:

Process I

Statement of Equivalent Production and Cost

Input (Units)	Particulars	Output Units	Equivalent Production					
			Materials		Labour		Overheads	
			(%)	Units	(%)	Units	(%)	Units
40,000	Completed	30,000	100	30,000	100	30,000	100	30,000
	Closing WIP	10,000	100	10,000	50	5,000	50	5,000
40,000		40,000		40,000		35,000		35,000

Particulars	Materials	Labour	Overhead	Total
Cost incurred (₹)	15,000	18,000	12,000	45,000
Equivalent units	40,000	35,000	35,000	
Cost per equivalent unit (₹)	0.3750	0.5143	0.3428	1.2321

Process- I Account

Particulars	Units	(₹)	Particulars	Units	(₹)
To Materials	40,000	15,000	By Process-II A/c (30,000 units × ₹1.2321)	30,000	36,964
To Labour		18,000	By Closing WIP	10,000	8,036*
To Overhead		12,000			
	40,000	45,000		40,000	45,000

* (Material 10,000 units × ₹ 0.3750) + (Labour 5,000 units × ₹ 0.5143) + (Overheads 5,000 units × ₹0.3428) = ₹ 3,750 + ₹ 2,572 + ₹ 1,714 = ₹ 8,036

Process II

Statement of Equivalent Production and Cost

Input (Units)	Particulars	Output Units	Equivalent Production					
			Materials		Labour		Overheads	
			(%)	Units	(%)	Units	(%)	Units
30,000	Completed	28,000	100	28,000	100	28,000	100	28,000
	Normal loss	200		--		--		--
	WIP	1,800	100	1,800	25	450	25	450
30,000		30,000		29,800		28,450		28,450

Particulars	Materials	Labour	Overhead	Total
Process-I Cost	36,964	--	--	36,964
Cost incurred (₹)	--	3,500	4,500	8,000
Equivalent units	29,800	28,450	28,450	
Cost per equivalent unit (₹)	1.2404	0.1230	0.1582	1.5216

Process- II Account

Particulars	Units	(₹)	Particulars	Units	(₹)
To Process-I A/c	30,000	36,964	By Normal loss A/c	200	--
To Packing Material	--	4,000	By Finished Goods Stock A/c	28,000*	46,605
To Direct Wages	--	3,500	By Closing WIP	1,800**	2,359
To Factory Overhead	--	4,500			
	30,000	48,964		30,000	48,964

* 28,000 × ₹ 1.5216 = ₹ 42,605 + ₹ 4,000 (Packing Material Cost) = ₹46,605

** 1,800 units × ₹ 1.2404 + 450 units × (₹ 0.1230 + ₹ 0.1582) = ₹ 2,359

Question 4

A Chemical Company carries on production operation in two processes. The material first pass through Process I, where Product 'A' is produced.

Following data are given for the month just ended:

Material input quantity	*2,00,000 kg.*
Opening work-in-progress quantity	

(Material 100% and conversion 50% complete)	*40,000 kg.*
Work completed quantity	*1,60,000 kg.*
Closing work-in-progress quantity *(Material 100% and conversion two-third complete)*	*30,000 kg.*
Material input cost	*₹ 75,000*
Processing cost	*₹ 1,02,000*
Opening work-in-progress cost	
Material cost	*₹ 20,000*
Processing cost	*₹ 12,000*

Normal process loss in quantity may be assumed to be 20% of material input. It has no realisable value.

Any quantity of Product 'A' can be sold for ₹ 1.60 per kg.

Alternatively, it can be transferred to Process II for further processing and then sold as Product 'AX' for ₹ 2 per kg. Further materials are added in Process II, which yield two kg. of product 'AX' for every kg. of Product 'A' of Process I.

Of the 1,60,000 kg. per month of work completed in Process I, 40,000 kg. are sold as Product 'A' and 1,20,000 kg. are passed through Process II for sale as Product 'AX'. Process II has facilities to handle upto 1,60,000 kg. of Product 'A' per month, if required.

The monthly costs incurred in Process II (other than the cost of Product 'A') are:

	1,20,000 kg. of Product 'A' input (₹)	**1,60,000 kg. of Product 'A' input (₹)**
Materials Cost	*1,32,000*	*1,76,000*
Processing Costs	*1,20,000*	*1,40,000*

Required:

(i) Determine, using the weighted average cost method, the cost per kg. of Product 'A' in Process I and value of both work completed and closing work-in-progress for the month just ended.

(ii) Is it worthwhile processing 1,20,000 kg. of Product 'A' further?

(iii) Calculate the minimum acceptable selling price per kg., if a potential buyer could be found for additional output of Product 'AX' that could be produced with the remaining Product 'A' quantity.

Solution

(i) **Process- I**

Statement of Equivalent Production

Inputs		Output		Equivalent output			
				Material		Conversion	
Particulars	Kg.	Particulars	Kg.	(%)	kg.	(%)	kg.
Opening W.I.P.	40,000	Normal loss	40,000	--	--	--	--
New material introduced	2,00,000	Units introduced & completed	1,60,000	100	1,60,000	100	1,60,000
		Abnormal loss	10,000	100	10,000	100	10,000
		Closing WIP	30,000	100	30,000	2/3rd	20,000
	2,40,000		2,40,000		2,00,000		1,90,000

Process- I

Statement of Cost for each element

Elements of cost	Costs of opening WIP	Costs in process	Total cost	Equivalent units	Cost per Kg.
	(₹)	(₹)	(₹)	Kg.	(₹)
Material	20,000	75,000	95,000	2,00,000	0.475
Conversion cost	12,000	1,02,000	1,14,000	1,90,000	0.600
	32,000	1,77,000	2,09,000		1.075

Statement of Apportionment of Cost

Units completed	Elements	Equivalent units (Kg.)	Cost/unit (₹)	Cost (₹)	Total cost (₹)
Work completed	Material	1,60,000	0.475	76,000	
	Conversion	1,60,000	0.600	96,000	1,72,000
Closing WIP	Material	30,000	0.475	14,250	
	Conversion	20,000	0.600	12,000	26,250

(ii) Statement showing comparative data to decide whether 1,20,000 kg. of product 'A' should be processed further into 'AX'.

Alternative I – To sell product 'A' after Process – I	(₹)
Sales 1,20,000 kg. × ₹ 1.60	1,92,000
Less: Cost from Process- I 1,20,000 kg. × ₹ 1.075	1,29,000
Profit	63,000

Alternative II – Process further into 'AX'

Sales 2,40,000 kg. × ₹ 2.00		4,80,000
Less: Cost from Process- I 1,20,000 kg. × ₹ 1.075	= ₹ 1,29,000	
Material in Process- II	= ₹ 1,32,000	
Processing cost in Process- II	= ₹ 1,20,000	3,81,000
Profit		99,000

Hence company should process further

It will increase profit by ₹ 99,000 – ₹ 63,000 = ₹ 36,000

(iii) Calculation of minimum selling price per kg.:

Cost of processing remaining 40,000 kg. further	(₹)
Material ₹ 1,76,000 – ₹ 1,32,000	44,000
Processing cost ₹ 1,40,000 – ₹ 1,20,000	20,000
Cost from process- I relating to 40,000 kg. 'A' (40,000 kg. × ₹1.075)	43,000
Benefit foregone if 40,000 kg. 'A' are further processed	
40,000 kg. (₹ 1.60 – ₹ 1.075)	21,000
Total cost	1,28,000
Additional quantity of product 'AX' (40,000 kg. × ₹ 2)	80,000

$\therefore$ Minimum selling price $\left(\dfrac{₹1,28,000}{80,000\,\text{kg.}}\right)$ = ₹ 1.60

Question 5

Following details are related to the work done in Process 'A' of XYZ Company during the month of March, 2014:

	(₹)
Opening work-in-progress (2,000 units):	
Materials	*80,000*
Labour	*15,000*
Overheads	*45,000*
Materials introduced in Process 'A' (38,000 units)	*14,80,000*
Direct labour	*3,59,000*
Overheads	*10,77,000*
Units scrapped: 3,000 units,	
Degree of completion:	

Materials	*100%*
Labour and overheads	*80%*
Closing work-in-progress : 2,000 units,	
Degree of Completion:	
Materials	*100%*
Labour and overheads	*80%*
Units finished and transferred to Process 'B' : 35,000 units	
Normal Loss:	
5% of total input including opening work-in-progress	
Scrapped units fetch ₹ 20 per piece.	

You are required to prepare:

(i) Statement of equivalent production;

(ii) Statement of cost;

(iii) Statement of distribution cost; and

(iv) Process 'A' Account, Normal and Abnormal Loss Accounts.

Solution:

(i) Statement of Equivalent Production

Input	Units	Output	Units	Equivalent production			
				Material		Labour & Overheads	
				(%)	Units	(%)	Units
Opening WIP	2,000	Completed and transferred to Process 'B'	35,000	100	35,000	100	35,000
Units introduced	38,000	Normal loss (5% of 40,000 units)	2,000	--	--	--	--
		Abnormal loss	1,000	100	1,000	80	800
		Closing WIP	2,000	100	2,000	80	1,600
	40,000		40,000		38,000		37,400

(ii) **Statement of Cost**

Details	Cost at the beginning of process (₹)	Cost added (₹)	Total cost (₹)	Equivalent Units (₹)	Cost per unit (₹)
Material	80,000	14,80,000	15,60,000		
Less: Value of normal loss (2,000 units × ₹ 20)			(40,000)		
			15,20,000	38,000	40
Labour	15,000	3,59,000	3,74,000	37,400	10
Overheads	45,000	10,77,000	11,22,000	37,400	30
Total	1,40,000	29,16,000	30,16,000		80

(iii) **Statement of Distribution of Cost**

	(₹)
Completed and transferred to Process-B (35,000 units × ₹ 80)	28,00,000
Abnormal Loss:	
Materials (1,000 units × ₹ 40)	40,000
Wages (800 units × ₹ 10)	8,000
Overheads (800 units × ₹ 30)	24,000
	72,000
Closing WIP:	
Materials (2,000 units × ₹ 40)	80,000
Wages (1,600 units × ₹ 10)	16,000
Overheads (1,600 units × ₹ 30)	48,000
	1,44,000

(iv) **Process 'A' Account**

Dr. Cr.

Particulars	Units	Amount	Particulars	Units	Amount
To Opening WIP	2,000	1,40,000*	By Normal Loss	2,000	40,000
To Material introduced	38,000	14,80,000	By Abnormal loss	1,000	72,000
To Direct labour		3,59,000	By Process 'B' A/c transfer to next process	35,000	28,00,000

To Overheads		10,77,000	By Closing WIP	2,000	1,44,000
	40,000	30,56,000		40,000	30,56,000

*Materials + Labour + Overheads = ₹ (80,000 + 15,000 + 45,000) = ₹ 1,40,000.

Normal Loss Account

Particulars	Units	Amount	Particulars	Units	Amount
To Process-A A/c	2,000	40,000	By Cost Ledger Control A/c	2,000	40,000
	2,000	40,000		2,000	40,000

Abnormal Loss Account

Particulars	Units	Amount	Particulars	Units	Amount
To Process-A A/c	1,000	72,000	By Cost Ledger Control A/c.	1,000	20,000
			By Costing Profit & Loss A/c.		52,000
	1,000	72,000		1,000	72,000

Question 6

A product passes through three processes 'X', 'Y' and 'Z'. The output of process 'X' and 'Y' is transferred to next process at cost plus 20 per cent each on transfer price and the output of process 'Z' is transferred to finished stock at a profit of 25 per cent on transfer price. The following information are available in respect of the year ending 31st March, 2014:

	Process-X	*Process-Y*	*Process-Z*	*Finished Stock*
	(₹)	*(₹)*	*(₹)*	*(₹)*
Opening stock	*15,000*	*27,000*	*40,000*	*45,000*
Material	*80,000*	*65,000*	*50,000*	--
Wages	*1,25,000*	*1,08,000*	*92,000*	--
Manufacturing Overheads	*96,000*	*72,000*	*66,500*	--
Closing stock	*20,000*	*32,000*	*39,000*	*50,000*
Inter process profit included in Opening stock	*NIL*	*4,000*	*10,000*	*20,000*

Stock in processes is valued at prime cost. The finished stock is valued at the price at which it is received from process 'Z'. Sales of the finished stock during the period was ₹ 14,00,000.

You are required to prepare:

(i) Process accounts and finished stock account showing profit element at each stage.

(ii) Costing Profit and Loss account.

(iii) Show the relevant items in the Balance Sheet.

Solution:

(i) Process 'X' Account

Dr. Cr.

Particulars	Cost (₹)	Profit (₹)	Total (₹)	Particulars	Cost (₹)	Profit (₹)	Total (₹)
To Opening Stock	15,000	–	15,000	By Process 'Y' A/c (Transfer)	2,96,000	74,000	3,70,000
To Material	80,000	–	80,000				
To Wages	1,25,000	–	1,25,000				
Total	2,20,000	–	2,20,000				
Less: Closing stock	20,000	–	20,000				
Prime Cost	2,00,000		2,00,000				
To Manufacturing Overheads	96,000	–	96,000				
Total cost	2,96,000	–	2,96,000				
To Costing Profit and Loss A/c (20% on transfer Price or 25% on cost)		74,000	74,000				
	2,96,000	74,000	3,70,000		2,96,000	74,000	3,70,000

Process 'Y' Account

Dr. Cr.

Particulars	Cost (₹)	Profit (₹)	Total (₹)	Particulars	Cost (₹)	Profit (₹)	Total (₹)
To Opening Stock	23,000	4,000	27,000	By Process 'Z' A/c (Transfer)	5,36,379	2,26,121	7,62,500
To Process 'X' A/c	2,96,000	74,000	3,70,000				
To Material	65,000	--	65,000				
To Wages	1,08,000	--	1,08,000				
Total	4,92,000	78,000	5,70,000				
Less: Closing stock	27,621	4,379	32,000				
Prime Cost	4,64,379	73,621	5,38,000				
To Manufacturing Overheads	72,000	--	72,000				
Total cost	5,36,379	73,621	6,10,000				

To Costing Profit and Loss A/c (20% on transfer Price or 25% on cost)	--	1,52,500	1,52,500				
	5,36,379	2,26,121	7,62,500		5,36,379	2,26,121	7,62,500

Process 'Z' Account

Dr. Cr.

Particulars	Cost (₹)	Profit (₹)	Total (₹)	Particulars	Cost (₹)	Profit (₹)	Total (₹)
To Opening Stock	30,000	10,000	40,000	By Finished Stock A/c (Transfer)	7,45,629	5,50,371	12,96,000
To Process 'Y' A/c	5,36,379	2,26,121	7,62,500				
To Material	50,000	--	50,000				
To Wages	92,000	--	92,000				
Total	7,08,379	2,36,121	9,44,500				
Less: Closing stock	29,250	9,750	39,000				
Prime Cost	6,79,129	2,26,371	9,05,500				
To Manufacturing Overheads	66,500	--	66,500				
Total cost	7,45,629	2,26,371	9,72,000				
To Costing Profit and Loss A/c (25% on transfer Price or 33 1/3% on cost)	--	3,24,000	3,24,000				
	7,45,629	5,50,371	12,96,000		7,45,629	5,50,371	12,96,000

Finished Stock Account

Dr. Cr.

Particulars	Cost (₹)	Profit (₹)	Total (₹)	Particulars	Cost (₹)	Profit (₹)	Total (₹)
To Opening Stock	25,000	20,000	45,000	By Costing P&L A/c A/c (Transfer)	7,41,862	6,58,138	14,00,000
To Process 'Z' A/c	7,45,629	5,50,371	12,96,000				
Total	7,70,629	5,70,371	13,41,000				
Less: Closing stock	28,767	21,233	50,000				
To Costing Profit and Loss A/c	7,41,862	5,49,138	12,91,000				
		1,09,000	1,09,000				
	7,41,862	6,58,138	14,00,000		7,41,862	6,58,138	14,00,000

Costing Profit & Loss Account
for the year ending 31st March, 2014

Dr. Cr.

Particulars	Amount (₹)	Particulars	Amount (₹)
To Provision for unrealized profit on closing stock (₹ 4,379 + ₹ 9,750 + ₹ 21,233)	35,362	By Provision for unrealized profit on opening stock (₹ 4,000 + ₹ 10,000 + ₹ 20,000)	34,000
To Net Profit	6,58,138	By Process X A/c	74,000
		By Process Y A/c	1,52,500
		By Process Z A/c	3,24,000
		By Finished Stock A/c	1,09,000
	6,93,500		6,93,500

Workings:

Calculation of amount of unrealized profit on closing stock:

Process 'X' = Nil

Process 'Y' $= \dfrac{₹78,000}{₹5,70,000} \times ₹32,000 = ₹\ 4,379.$

Process 'Z' $= \dfrac{₹\ 2,36,121}{₹\ 9,44,500} \times ₹\ 39,000 = ₹\ 9,750.$

Finished Stock $= \dfrac{₹\ 5,50,371}{₹\ 12,96,000} \times ₹\ 50,000 = ₹\ 21,233.$

Balance Sheet as on 31st March, 2014 (Extract)

Liabilities	Amount (₹)	Assets	Amount (₹)
Net profit	6,58,138	Closing stock:	
		Process – X	20,000
		Process – Y	32,000
		Process – Z	39,000
		Finished stock	50,000
			1,41,000
		Less: Provision for unrealized profit	35,362
			1,05,638

Question 7

ABC Limited manufactures a product 'ZX' by using the process namely RT. For the month of May, 2014, the following data are available:

	Process RT
Material introduced (units)	*16,000*
Transfer to next process (units)	*14,400*
Work in process:	
At the beginning of the month (units)	*4,000*
(4/5 completed)	
At the end of the month (units)	*3,000*
(2/3 completed)	
Cost records:	
Work in process at the beginning of the month	
Material	*₹30,000*
Conversion cost	*₹ 29,200*
Cost during the month : materials	*₹ 1,20,000*
Conversion cost	*₹1,60,800*

Normal spoiled units are 10% of good finished output transferred to next process.

Defects in these units are identified in their finished state. Material for the product is put in the process at the beginning of the cycle of operation, whereas labour and other indirect cost flow evenly over the year. It has no realizable value for spoiled units.

Required:

(i) Statement of equivalent production (Average cost method);

(ii) Statement of cost and distribution of cost;

(iii) Process accounts.

Solution:

Statement of Equivalent production of Process RT

Input units	Details	Output units	Equivalent Production			
			Material		Conversion cost	
			units	(%)	units	(%)
4,000	Opening WIP					
16,000	Introduced completed	14,400	14,400	100	14,400	100

	and transfer to next					
	Normal spoilage	1,440	--	--	--	--
	Abnormal Spoilage	1,160	1,160	100	1,160	100
	Closing WIP	3,000	3,000	100	2,000	66.67
20,000		20,000	18,560		17,560	

Statement showing Cost of each element

	Opening (₹)	Cost in Process (₹)	Total (₹)	Equivalent Units	Cost per unit (₹)
Materials	30,000	1,20,000	1,50,000	18,560	8.0819
Conversion cost	29,200	1,60,800	1,90,000	17,560	10.8200

Statement of Apportionment of cost

Completed Units	Material	14,400	8.0819	1,16,380
	Conversion cost	14,400	10.8200	1,55,808
				2,72,188
Closing stock	Material	3,000	8.0819	24,246
	Conversion cost	2,000	10.8200	21,640
				45,886
Abnormal Loss	Material	1,160	8.0819	9,375
	Conversion cost	1,160	10.8200	12,551
				21,926

Process-RT Account

Particulars	Units	Amount	Particulars	Units	Amount
To Opening WIP	4,000	59,200	By Normal Loss	1,440	--
To Material introduced	16,000	1,20,000	By Abnormal loss	1,160	21,926
To Conversion cost		1,60,800	By Transfer to next process	14,400	2,72,188
			By Closing WIP	3,000	45,886
	20,000	3, 40,000		20,000	3, 40,000

Question 8

JK Ltd. produces a product "AZE", which passes through two processes, viz., process I and process II. The output of each process is treated as the raw material of the next process to which it is transferred and output of the second process is transferred to finished stock. The following data related to December, 2013:

	Process I	*Process II*
25,000 units introduced at a cost of	*₹2,00,000*	*–*
Material consumed	*₹1,92,000*	*₹96,020*
Direct labour	*₹2,24,000*	*₹1,28,000*
Manufacturing expenses	*₹1,40,000*	*₹60,000*
Normal wastage of input	*10%*	*10%*
Scrap value of normal wastage (per unit)	*₹9.90*	*₹8.60*
Output in Units	*22,000*	*20,000*

Required:

(i) Prepare Process I and Process II account.

(ii) Prepare Abnormal Gain/ Loss account as the case may be for each process.

Solution:

Process- I Account

Particulars	**Units**	**Amount (₹)**	**Particulars**	**Units**	**Amount (₹)**
To Input	25,000	2,00,000	By Normal wastage (2,500 units × ₹ 9.90)	2,500	24,750
To Material		1,92,000	By Abnormal loss A/c (500 units × ₹ 32.50)	500	16,250
To Direct Labour		2,24,000	By Process- II (22,000 units × ₹ 32.50)	22,000	7,15,000
To Manufacturing Exp.		1,40,000			
	25,000	7,56,000		25,000	7,56,000

Cost per unit = $\frac{₹7,56,000 - ₹24,750}{25,000\,\text{units} - 2,500\,\text{units}}$ = ₹ 32.50 per unit

Process- II Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process- I	22,000	7,15,000	By Normal wastage (2,200 units × ₹ 8.60)	2,200	18,920
To Material		96,020	By Finished stock (20,000 units × ₹ 49.50)	20,000	9,90,000
To Direct Labour		1,28,000			
To Manufacturing Exp.		60,000			
To Abnormal Gain A/c (200 units × ₹ 49.50)	200	9,900			
	22,200	10,08,920		22,200	10,08,920

Cost per unit = $\frac{₹9,99,020 - ₹18,920}{22,000\text{ units} - 2,200\text{ units}}$ = ₹ 49.50 per unit

Abnormal Loss Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process- I A/c	500	16,250	By Cash (Sales) (500 units × ₹ 9.90)	500	4,950
			By Costing Profit and Loss A/c		11,300
	500	16,250		500	16,250

Abnormal Gain Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Normal wastage (200 units × ₹ 8.60)	200	1,720	By Process II A/c	200	9,900
To Costing Profit and Loss		8,180			
	200	9,900		200	9,900

Question 9

A product passes from Process I and Process II. Materials issued to Process I amounted to ₹ 40,000, Labour ₹ 30,000 and manufacturing overheads were ₹ 27,000. Normal loss was 3% of input as estimated. But 500 more units of output of Process I were lost due to the carelessness of workers. Only 4,350 units of output were transferred to Process II. There were no opening stocks. Input raw material issued to Process I were 5,000 units.

You are required to show Process I account.

Solution:

Process- I Account

Particulars	Units	(₹)	Particulars	Units	(₹)
To Material	5,000	40,000	By Normal loss*	150	–
To Labour		30,000	By Abnormal loss** (500 units × ₹ 20)	500	10,000
To Overhead		27,000	By Process II (4,350 units × ₹ 20)	4,350	87,000
	5,000	97,000		5,000	97,000

* 3% of input = 3% $\times$ 5,000 = 150 units

** $\frac{97,000}{(5,000-150)} = \frac{97,000}{4,850}$ = ₹ 20 per unit.

Question 10

XP Ltd. furnishes you the following information relating to process II.

(i) Opening work-in-progress – NIL

(ii) Units introduced 42,000 units @ ₹ 12

(iii) Expenses debited to the process:

		(₹)
Direct material	=	*61,530*
Labour	=	*88,820*
Overhead	=	*1,76,400*

(iv) Normal loss in the process = 2 % of input.

(v) Closing work-in-progress – 1,200 units

Degree of completion - Materials	*100%*
Labour	*50%*

Overhead 40%

(vi) *Finished output – 39,500 units*

(vii) *Degree of completion of abnormal loss:*

Material 100%

Labour 80%

Overhead 60%

(viii) *Units scraped as normal loss were sold at ₹ 4.50 per unit.*

(ix) *All the units of abnormal loss were sold at ₹ 9 per unit.*

Prepare:

(a) *Statement of equivalent production;*

(b) *Statement showing the cost of finished goods, abnormal loss and closing work-in-progress;*

(c) *Process II account and abnormal loss account.*

Solution:

(a) Statement of Equivalent Production

Particulars	Output	Material		Labour		Overhead	
		Units	(%)	Units	(%)	Units	(%)
Finished Output	39,500	39,500	100	39,500	100	39,500	100
Normal Loss (2% of 42,000 units)	840	--	--	--	--	--	--
Abnormal Loss (42,000 – 39,500 – 840 – 1,200)	460	460	100	368	80	276	60
Closing W.I.P.	1,200	1,200	100	600	50	480	40
	42,000	41,160		40,468		40,256	

(b) Statement of Cost (₹)

Units Introduced 42,000 units @ ₹ 12 per unit	5,04,000
Add: Material	61,530
	5,65,530
Less: Value of Normal Loss (840 units × ₹ 4.50)	3,780
	5,61,750

		Cost per Unit (₹)
Material	$\frac{₹5,61,750}{41,160\text{ units}}$	13.648
Labour	$\frac{₹88,820}{40,468\text{ units}}$	2.195
Overhead	$\frac{₹1,76,400}{40,256\text{ units}}$	4.382
		20.225

		Amount (₹)
Abnormal Loss:		
Material	(460 units × ₹ 13.648)	6,278.08
Labour	(368 units × ₹ 2.195)	807.76
Overheads	(276 units × ₹ 4.382)	1,209.42
		8,295.26
Closing W.I.P:		
Material	(1,200 units × ₹13.648)	16,377.60
Labour	(600 units × ₹ 2.195)	1,317.00
Overheads	(480 units × ₹ 4.382)	2,103.36
		19,797.96
Finished Goods		
	(39,500 units × ₹ 20.225)	7,98,887.50

(c) **Process II Account**

Particulars		Units	Amount (₹)	Particulars		Units	Amount (₹)
To	Opening WIP	-	Nil	By	Normal Loss	840	3,780
"	Input	42,000	5,04,000	"	Abnormal Loss	460	8,295
"	Direct Material	-	61,530	"	Finished Goods	39,500	7,98,877
"	Labour	-	88,820				
"	Overhead	-	1,76,400	"	Closing WIP	1,200	19,798
		42,000	8,30,750			42,000	8,30,750

Abnormal Loss Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process II	460	8,295	By Cash (460 units × ₹ 9)	460	4,140
			" Costing P & L	--	4,155
	460	8,295		460	8,295

Question 11

Pharma Limited produces product 'Gluco-G' which passes through two processes before it is completed and transferred to finished stock. The following data relates to March, 2014:

	Process-I (₹)	*Process-II (₹)*	*Finished Stock (₹)*
Opening Stock	*1,50,000*	*1,80,000*	*4,50,000*
Direct materials	*3,00,000*	*3,15,000*	*-*
Direct Wages	*2,24,000*	*2,25,000*	*-*
Factory Overheads	*2,10,000*	*90,000*	*-*
Closing Stock	*74,000*	*90,000*	*2,25,000*
Inter process profit included in Opening stock	*NIL*	*30,000*	*1,65,000*

Output of process I is transferred to process II at 25 percent profit on the transfer price, whereas output of process II is transferred to finished stock at 20 percent on transfer price. Stock in processes are valued at prime cost. Finished stock is valued at the price at which it is received from process II. Sales for the month is ₹ 28,00,000.

You are required to prepare Process-I A/c, Process-II A/c, and Finished Stock A/c showing the profit element at each stage.

Solution:

Process- I A/c

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
To Opening Balance	1,50,000	1,50,000	-	By Transfer to Process II A/c	10,80,000	8,10,000	2,70,000
To Direct Material	3,00,000	3,00,000	-				

To Direct Wages	2,24,000	2,24,000	-				
	6,74,000	6,74,000	-				
Less: Closing Stock	74,000	74,000	-				
Prime Cost	6,00,000	6,00,000	-				
To Factory Overhead	2,10,000	2,10,000	-				
Total Cost:	8,10,000	8,10,000	-				
Profit 25% on transfer price i.e. $33\frac{1}{3}$ on total cost	2,70,000	-	2,70,000				
	10,80,000	8,10,000	2,70,000		10,80,000	8,10,000	2,70,000

Process- II A/c

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
To Opening Stock	1,80,000	1,50,000	30,000	By Transfer to Process II A/c	22,50,000	15,15,000	7,35,000
To Direct Material	3,15,000	3,15,000	-				
To Direct Wages	2,25,000	2,25,000	-				
To Transfer from Process I A/c	10,80,000	8,10,000	2,70,000				
Prime Cost	18,00,000	15,00,000	3,00,000				
Less: Closing Stock	90,000	75,000	15,000				
	17,10,000	14,25,000	2,85,000				
To Factory Overhead	90,000	90,000	-				
Total Cost:	18,00,000	15,15,000	2,85,000				
Profit 20% on transfer price i.e. 25% on cost	4,50,000	-	4,50,000				
	22,50,000	15,15,000	7,35,000		22,50,000	15,15,000	7,35,000

Profit element in closing stock = $\frac{3,00,000}{18,00,000} \times 90,000 = 15,000$

Finished Stock A/c

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
To Opening Stock	4,50,000	2,85,000	1,65,000	By Sales	28,00,000	16,48,500	11,51,500
To Transfer from Process-II	22,50,000	15,15,000	7,35,000				
	27,00,000	18,00,000	9,00,000				
Less: Closing Stock	2,25,000	1,51,500	73,500				
Total Cost	24,75,000	16,48,500	8,26,500				
Profit	3,25,000	-	3,25,000				
(Balancing Figure)							
	28,00,000	16,48,500	11,51,500		28,00,000	16,48,500	11,51,500

Profit element in closing finished Stock = $\frac{7,35,000}{22,50,000} \times 2,25,000$ = 73,500

Calculation of Profit on Sale

Process	Apparent Profit	Add: Unrealised Profit in Opening Stock	Less: Unrealised Profit in Closing Stock	Actual Profit
	(₹)	(₹)	(₹)	(₹)
Process – I	2,70,000	--	--	2,70,000
Process – II	4,50,000	30,000	15,000	4,65,000
Finished Stock	3,25,000	1,65,000	73,500	4,16,500
	10,45,000	1,95,000	88,500	11,51,500

Question 12

Following information is available regarding Process A for the month of October 2013:

Production Record:

(i)	*Opening work-in progress*	*40,000 Units*
	(Material: 100% complete, 25% complete for labour & overheads)	
(ii)	*Units Introduced*	*1,80,000 Units*
(iii)	*Units Completed*	*1,50,000 Units*

(iv) Units in-process on 31.10.2013 *70,000 Units*

(Material: 100% complete, 50% complete for labour & overheads)

Cost Record: *(₹)*

Opening Work-in-progress:	
Material	*1,00,000*
Labour	*25,000*
Overheads	*45,000*
Cost incurred during the month:	
Material	*6,60,000*
Labour	*5,55,000*
Overheads	*9,25,000*

Assure that FIFO method is used for W.I.P. inventory valuation.

Required:

(i) Statement of Equivalent Production

(ii) Statement showing Cost for each element

(iii) Statement of apportionment of Cost

(iv) Process- A Account

Solution:

Statement of Equivalent Production

(FIFO Method)

Input		Output		Equivalent Production			
Particulars	Units	Particulars	Units	Material		Labour & Overheads	
				(%)	Units	(%)	Units
Opening WIP	40,000	Transfer to Process II:					
Introduced	1,80,000	Opening WIP completed	40,000	--	--	75	30,000
		Introduced & completed	1,10,000	100	1,10,000	100	1,10,000
		Closing WIP	70,000	100	70,000	50	35,000
	2,20,000		2,20,000		1,80,000		1,75,000

Statement showing Cost for each element

Item of Cost	Equivalent Production	Cost Incurred (₹)	Cost per Unit (₹)
Material	1,80,000	6,60,000	3.66667
Labour & Overheads	1,75,000	14,80,000	8.45714
			12.12381

Statement of Apportionment of Cost

Transfer to Process II		
Opening WIP Completed		
Cost already Incurred ₹ (1,00,000 + 25,000 + 45,000)	1,70,000	
Cost Incurred during the Month		
Labour & Overheads (30,000 units × ₹8.45714)	2,53,714	4,23,714
Introduced & Completed (1,10,000 units × ₹ 12.12381)		13,33,619
		17,57,333
Closing WIP		
Material (70,000 units × ₹ 3.66667) Labour and Overheads (35,000 units × ₹ 8.45714)	2,56,667 2,96,000	5,52,667

Process- A A/c

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Opening WIP	40,000	1,70,000	By Process II A/c	1,50,000	17,57,333
To Materials	1,80,000	6,60,000	By Closing WIP	7,000	5,52,667
To Labour		5,55,000			
To Overheads		9,25,000			
	2,20,000	23,10,000		2,20,000	23,10,000

Question 13

The following details are available of Process X for August 2013:

(1)	*Opening work-in-progress*	*8,000 units*
	Degree of completion and cost:	
	Material (100%)	*₹ 63,900*
	Labour (60%)	*₹ 10,800*
	Overheads (60%)	*₹ 5,400*
(2)	*Input 1,82,000 units at*	*₹ 7,56,900*
(3)	*Labour paid*	*₹ 3,28,000*
(4)	*Over heads incurred*	*₹ 1,64,000*
(5)	*Units scrapped*	*14,000*
	Degree of completion:	
	Material	*100%*
	Labour and overhead	*80%*

(6)	*Closing work-in-process*	*18000 units*
	Degree of completion:	
	Material	*100%*
	Labour and overhead	*70%*
(7)	*1,58,000 units were completed and transferred to next process.*	
(8)	*Normal loss is 8% of total input including opening work-in-process*	
(9)	*Scrap value is ₹ 8 per unit to be adjusted in direct material cost*	

You are required to compute, assuming that average method of inventory is used:

(i) Equivalent production, and

(ii) Cost per unit

Solution:

(i) Statement of Equivalent Production

Particulars	Units	Material		Labour and Overhead	
		(%)	Units	(%)	Units
Production units completed	1,58,000	100	1,58,000	100	1,58,000
Normal Loss 8% of (1,82,000 + 8,000)	15,200	--	--	--	--
Closing WIP	18,000	100	18,000	70	12,600
	1,91,200	--	1,76,000	--	1,70,600
Less : Abnormal Gain	1,200	100	1,200	100	1,200
Total	1,90,000		1,74,800		1,69,400

(ii) Statement of cost

Particulars	Materials (₹)	Labour (₹)	Overhead (₹)
Opening WIP	63,900	10,800	5,400
Input of Materials	7,56,900	-	-
Expenses	-	3,28,000	1,64,000
Total	8,20,800	3,38,800	1,69,400
Less : Sale of Scrap (15,200 x ₹ 8)	1,21,600	-	-
Net cost	6,99,200	3,38,800	1,69,400
Equivalent Units	1,74,800	1,69,400	1,69,400
Cost Per Unit	₹ 4.00	₹ 2.00	₹ 1.00

Total cost per unit = ₹ (4+2+1) = ₹ 7.00

Question 14

A product passes through two processes A and B. During the year 2013, the input to process A of basic raw material was 8,000 units @ ₹ 9 per unit. Other information for the year is as follows:

	Process A	*Process B*
Output units	*7,500*	*4,800*
Normal loss (% to input)	*5%*	*10%*
Scrap value per unit (₹)	*2*	*10*
Direct wages (₹)	*12,000*	*24,000*
Direct expenses (₹)	*6,000*	*5,000*
Selling price per unit (₹)	*15*	*25*

Total overheads ₹ 17,400 were recovered as percentage of direct wages. Selling expenses were ₹ 5,000. These are not allocated to the processes. 2/3rd of the output of Process A was passed on to the next process and the balance was sold. The entire output of Process B was sold.

Prepare Process A and B Accounts.

Solution:

Process- A Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Input	8,000	72,000	By Normal Loss (5% of 8,000 units × ₹ 2)	400	800
To Direct Wages	--	12,000	By Abnormal loss (100 units × ₹ 12.50)	100	1,250
To Direct Exp.	--	6,000	By Process- B A/c (7,500 units× $\frac{2}{3}$ × ₹12.50)	5,000	62,500
To Overheads (₹17,400 × $\frac{1}{3}$)	--	5,800	By Profit and Loss A/c (7,500 units× $\frac{1}{3}$ × ₹12.50)	2,500	31,250
	8,000	95,800		8,000	95,800

$$\text{Cost per unit} = \frac{₹95{,}800 - ₹800}{8{,}000\,\text{units} - 400\,\text{units}} = \frac{₹95{,}000}{7{,}600\,\text{units}} = ₹12.50$$

Process- B Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process- A A/c	5,000	62,500	By Normal Loss (10% of 5,000 units × ₹10)	500	5,000

To Direct Wages	--	24,000	By Finished Stock A/c or Profit & loss A/c (4,800 units × ₹ 21.80)	4,800	1,04,640
To Direct Expenses	--	5,000			
To Overheads (₹17,400 × $\frac{2}{3}$)	--	11,600			
To Abnormal gain	300	6,540			
	5,300	1,09,640		5,300	1,09,640

$$\text{Cost per unit} = \frac{₹1,03,100 - ₹5,000}{5,000\,\text{units} - 500\,\text{units}} = \frac{₹98,100}{4,500\,\text{units}} = ₹21.80$$

Working

Profit & Loss A/c

Particulars	Amount (₹)	Amount (₹)	Particulars	Amount (₹)	Amount (₹)
To Cost of Sales:			By Sales:		
Process A (2,500 units × ₹ 12.50)	31,250		Process A (2,500 units × ₹15)	37,500	
Process B (4,800 units × ₹ 21.80)	1,04,640	1,35,890	Process B (4,800 units × ₹ 25)	1,20,000	1,57,500
To Abnormal Loss:			By Abnormal gain:		
Process A [(100 units × ₹(12.50-2)]		1,050	Process B [(300 units × ₹ (21.80-10)]		3,540
To Selling expenses		5,000			
To Net Profit		19,100			
		1,61,040			1,61,040

Note:

1. As mentioned selling expenses are not allocable to process which is debited directly to the P/L A/c.
2. It is assumed that Process A and Process B are not responsibility centres and hence, Process A and Process B have not been credited to direct sales. P/L A/c is prepared to arriving at profit/loss.

Question- 15

ABX Company Ltd. provides the following information relating to Process-B:

(i)	*Opening Work-in-progress*	-	*NIL*
(ii)	*Units Introduced*	-	*45,000 units @ ₹ 10 per unit*
(iii)	*Expenses debited to the process:*		
	Direct material		*₹ 65,500*
	Labour		*₹ 90,800*
	Overhead		*₹ 1,80,700*
(iv)	*Normal loss in the process*	-	*2% of Input*
(v)	*Work-in progress*	-	*1800 units*
	Degree of completion		
	Materials	-	*100%*
	Labour	-	*50%*
	Overhead	-	*40%*
(vi)	*Finished output*	-	*42,000 units*
(vii)	*Degree of completion of abnormal loss:*		
	Materials	-	*100%*
	Labour	-	*80%*
	Overhead	-	*60%*

(viii) Units scrapped as normal loss were sold at ₹ 5 per unit.

(ix) All the units of abnormal loss were sold at ₹ 2 per unit.

You are required to prepare:

(a) Statement of equivalent production.

(b) Statement showing the cost of finished goods, abnormal loss and closing balance of work-in-progress.

(c) Process-B Account and Abnormal Loss account.

Solution

(a) Statement of Equivalent Production

Input Details	Units	Output Particulars	Units	Equivalent Production					
				Material		Labour		Overhead	
				%	Units	%	Units	%	Units
Unit Introduced	45,000	Finished output	42,000	100	42,000	100	42,000	100	42,000

		Normal loss (2% of 45,000)	900	-	-	-	-	-	-
		Abnormal loss	300	100	300	80	240	60	180
		Closing W-I-P	1,800	100	1,800	50	900	40	720
	45,000		45,000		44,100		43,140		42,900

(b) Statement of Cost

Particulars	Units	Rate (₹)	Amount (₹)	Amount (₹)
(i) Finished goods	42,000	17.9042		7,51,976.40
(ii) Abnormal Loss				
Material	300	11.5873	3,476.19	
Labour	240	2.1048	505.15	
Overhead	180	4.2121	758.18	4,739.52
(iii) Closing W-I-P:				
Material	1,800	11.5873	20,857.14	
Labour	900	2.1048	1,894.32	
Overhead	720	4.2121	3,032.71	25,784.17

Cost per Unit

Particulars	Amount (₹)	Units	Per Unit (₹)
(i) Direct Material :			
Unit Introduced	4,50,000		
Add: Material	65,500		
	5,15,500		
Less: Value of normal loss (900 units × ₹5)	(4,500)		
	5,11,000	44,100	11.5873
(ii) Labour	90,800	43,140	2.1048
(iii) Overhead	1,80,700	42,900	4.2121
			17.9042

(c) Process – B A/c

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Input	45,000	4,50,000	By Normal loss	900	4,500
To Direct Material	-	65,500	By Abnormal loss	300	4,740
To Labour	-	90,800	By Finished goods	42,000	7,51,976
To Overhead		1,80,700	By Closing W-I-P	1,800	25,784
	45,000	7,87,000		45,000	7,87,000

Abnormal Loss A/c

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process-B A/c	300	4,740	By Cost ledger control A/c or Bank A/c	300	600
			By Costing Profit & loss A/c	-	4,140
	300	4,740		300	4,740

Question- 16

M J Pvt. Ltd. produces a product "SKY" which passes through two processes, viz. Process-A and Process-B. The details for the year ending 31st March, 2014 are as follows:

	Process A	*Process - B*
40,000 Units introduced at a cost of	*₹ 3,60,000*	-
Material Consumed	*₹ 2,42,000*	*2,25,000*
Direct Wages	*₹ 2,58,000*	*1,90,000*
Manufacturing Expenses	*₹ 1,96,000*	*1,23,720*
Output in Units	*37,000*	*27,000*
Normal Wastage of Input	*5%*	*10%*
Scrap Value (per unit)	*₹ 15*	*20*
Selling Price (per unit)	*₹ 37*	*61*

Additional Information:

(a) *80% of the output of Process-A, was passed on to the next process and the balance was sold. The entire output of Process- B was sold.*

(b) *Indirect expenses for the year was ₹ 4,48,080.*

(c) *It is assumed that Process-A and Process-B are not responsibility centre.*

Required:

(i) Prepare Process-A and Process-B Account.

(ii) Prepare Profit & Loss Account showing the net profit I net loss for the year.

Solution:

(i) **Process- A Account**

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Input	40,000	3,60,000	By Normal wastage (2,000 units × ₹ 15)	2,000	30,000
To Material	---	2,42,000	By Abnormal loss A/c (1,000 units × ₹ 27)	1,000	27,000
To Direct wages	---	2,58,000	By Process- B (29,600 units × ₹ 27)	29,600	7,99,200
To Manufacturing Exp.	---	1,96,000	By Profit & Loss A/c (7,400 units × ₹ 27)	7,400	1,99,800
	40,000	10,56,000		40,000	10,56,000

Cost per unit $= \frac{₹10,56,000 - ₹30,000}{40,000\text{units} - 2,000\text{units}}$ = ₹ 27 per unit

Normal wastage = 40,000 units × 5% = 2,000 units

Abnormal loss = 40,000 units – (37,000 units + 2,000 units) = 1,000 units

Transfer to Process- B = 37,000 units × 80% = 29,600 units

Sale = 37,000 units × 20% = 7,400 units

Process- B Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process- A A/c	29,600	7,99,200	By Normal wastage (2,960 units × ₹ 20)	2,960	59,200
To Material	---	2,25,000	By Profit & Loss A/c (27,000 units × ₹ 48)	27,000	12,96,000
To Direct Wages	---	1,90,000			
To Manufacturing Exp.	---	1,23,720			

To Abnormal Gain A/c (360 units × ₹ 48)	360	17,280			
	29,960	13,55,200		29,960	13,55,200

Cost per unit $= \frac{₹13,37,920 - ₹59,200}{29,600\,\text{units} - 2,960\,\text{units}}$ = ₹ 48 per unit

Normal wastage = 29,600 units × 10% = 2,960 units

Abnormal gain = (27,000 units + 2,960 units) – 29,600 units = 360 units

(ii) **Profit & Loss Account**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Process- A A/c	1,99,800	By Sales:	
To Process- B A/c	12,96,000	- Process-A (7,400 units × ₹ 37)	2,73,800
To Abnormal loss A/c	12,000	- Process- B (27,000 units × ₹ 61)	16,47,000
To Indirect Expenses	4,48,080	By Abnormal gain	10,080
		By Net loss	25,000
	19,55,880		19,55,880

Working Notes:

Normal wastage (Loss) Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process- A A/c	2,000	30,000	By Abnormal Gain A/c (360 units × ₹ 20)	360	7,200
To Process- B A/c	2,960	59,200	By Bank (Sales)	4,600	82,000
	4,960	89,200		4,960	89,200

Abnormal Loss Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process- A A/c	1,000	27,000	By Bank A/c (1,000 units × ₹ 15)	1,000	15,000
			By Profit & Loss A/c	---	12,000
	1,000	27,000		1,000	27,000

Abnormal Gain Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Normal loss A/c (360 units × ₹ 20)	360	7,200	By Process- B A/c	360	17,280
To Profit & Loss A/c		10,080			
	360	17,280		360	17,280

Question- 17

The following information relate to Process A:

(i)	*Opening Work-in-Progress*	*8,000 units at ₹ 75,000*
	Degree of Completion: Material	*100%*
	Labour and Overhead	*60%*
(ii)	*Input 1,82,000 units at*	*₹ 7,37,500*
(iii)	*Wages paid*	*3,40,600*
(iv)	*Overheads paid*	*1,70,300*
(v)	*Units scrapped*	*14,000*
	Degree of Completion: Material	*100 %*
	Wages and Overheads	*80%*
(vi)	*Closing Work - in- Progress*	*18,000 units*
	Degree of Completion: Material	*100%*
	Wages and Overheads	*70%*
(vii)	*Units completed and 1,58,000 to next process*	
(viii)	*Normal loss 5% of total input including opening WIP*	
(ix)	*Scrap value is ₹ 5 per unit to be adjusted out of direct material cost*	

You are required to compute on the basis of FIFO

(i) Equivalent Production

(ii) Cost Per Unit

(iii) Value of Units transferred to next process.

Solution:

(i) Statement of Equivalent Production

(FIFO Method)

Input		Output		Equivalent Production			
Particulars	Units	Particulars	Units	Material		Labour & Overheads	
				(%)	Units	(%)	Units
Opening WIP	8,000	Transfer to next Process :					
Introduced	1,82,000	Opening WIP completed	8,000	--	--	40	3,200
		Introduced & completed	1,50,000	100	1,50,000	100	1,50,000
		Normal loss 5% (8,000 + 182,000)	9,500	--	--	--	--
		Abnormal loss	4,500	100	4,500	80	3,600
		Closing WIP	18,000	100	18,000	70	12,600
	1,90,000		1,90,000		1,72,500		1,69,400

(ii) Computation of Cost per unit

Particulars	Materials (₹)	Labour (₹)	Overhead (₹)
Input of Materials	7,37,500	--	--
Expenses	--	3,40,600	1,70,300
Total	7,37,500	3,40,600	1,70,300
Less : Sale of Scrap (9,500 units x ₹ 5)	(47,500)	--	--
Net cost	6,90,000	3,40,600	1,70,300
Equivalent Units	1,72,500	1,69,400	1,69,400
Cost Per Unit	4.0000	2.0106	1.0053

Total cost per unit = ₹ (4.0000 + 2.0106 + 1.0053) = ₹ 7.0159

(iii) Value of units transferred to next process:

	Amount (₹)	Amount (₹)
Opening W-I-P	75,000	
Add: Labour (3,200 units × ₹ 2.0106)	6,434	
Overhead (3,200 units × ₹ 1.0053)	3,217	84,651
New introduced (1,50,000 units × ₹ 7.0159)		10,52,385
		11,37,036

Question- 18

The following information is furnished by ABC Company for Process - II of its manufacturing activity for the month of April 2015:

(i) Opening Work-in-Progress - Nil

(ii) Units transferred from Process I – 55,000 units at ₹ 3,27,800

(iii) Expenditure debited to Process – II:

Consumables	*₹ 1,57,200*
Labour	*₹ 1,04,000*
Overhead	*₹ 52,000*

(iv) Units transferred to Process III – 51,000 units

(v) Closing WIP – 2,000 units (Degree of completion):

Consumables	*80%*
Labour	*60%*
Overhead	*60%*

(vi) Units scrapped - 2,000 units, scrapped units were sold at ` 5 per unit

(vii) Normal loss – 4% of units introduced

You are required to:

(i) Prepare a Statement of Equivalent Production.

(ii) Determine the cost per unit

(iii) Determine the value of Work-in-Process and units transferred to Process – III

Solution:

(i) Statement of Equivalent Production

Input Details	**Units**	**Output Particulars**	**Units**	**Equivalent Production**					
				Material- A*		**Consumables**		**Labour & Overheads**	
				%	**Units**	**%**	**Units**	**%**	**Units**
Units transferred from Process-I	55,000	Units transferred to Process-III	51,000	100	51,000	100	51,000	100	51,000
		Normal loss (4% of 55,000)	2,200	-	-	-	-	-	-
		Closing W-I-P	2,000	100	2,000	80	1,600	60	1,200
		Abnormal Gain	(200)	100	(200)	100	(200)	100	(200)
	55,000		55,000		52,800		52,400		52,000

*Material A represent transferred-in units from process-I

(ii) Determination of Cost per Unit

Particulars	Amount (₹)	Units	Per Unit (₹)
(i) Direct Material (Consumables) :			
Value of units transferred from Process-I	3,27,800		
Less: Value of normal loss (2,200 units × ₹ 5)	(11,000)		
	3,16,800	52,800	6.00
(ii) Consumables added in Process-II	1,57,200	52,400	3.00
(iii) Labour	1,04,000	52,000	2.00
(iii) Overhead	52,000	52,000	1.00
Total Cost per equivalent unit			12.00

(iii) Determination of value of Work-in-Process and units transferred to Process-III

Particulars	Units	Rate (₹)	Amount (₹)
Value of Closing W-I-P:			
Material from Process-I	2,000	6.00	12,000
Consumables	1,600	3.00	4,800
Labour	1,200	2.00	2,400
Overhead	1,200	1.00	1,200
			20,400
Value of units transferred to Process-III	51,000	12.00	6,12,000

Question- 19

Star Ltd. manufactures chemical solutions for the food processing industry. The manufacturing takes place in a number of processes and the company uses a FIFO process costing system to value work-in-process and finished goods. At the end of the last month, a fire occurred in the factory and destroyed some of the paper files containing records of the process operations for the month.

Star Ltd. needs your help to prepare the process accounts for the month during which the fire occurred. You have been able to gather some information about the month's operating activities but some of the information could not be retrieved due to the damage. The following information was salvaged:

- *Opening work-in-process at the beginning of the month was 800 litres, 70% complete for labour and 60% complete for overheads. Opening work-in-process was valued at ₹ 26,640.*
- *Closing work-in-process at the end of the month was 160 litres, 30% complete for labour and 20% complete for overheads.*

- *Normal loss is 10% of input and total losses during the month were 1,800 litres partly due to the fire damage.*
- *Output sent to finished goods warehouse was 4,200 litres.*
- *Losses have a scrap value of ₹15 per litre.*
- *All raw materials are added at the commencement of the process.*
- *The cost per equivalent unit (litre) is ₹39 for the month made up as follows:*

	(₹)
Raw Material	*23*
Labour	*7*
Overheads	*9*
	39

Required:

(a) Calculate the quantity (in litres) of raw material inputs during the month.

(b) Calculate the quantity (in litres) of normal loss expected from the process and the quantity (in litres) of abnormal loss / gain experienced in the month.

(c) Calculate the values of raw material, labour and overheads added to the process during the month.

(d) Prepare the process account for the month.

Solution:

(a) Calculation of Raw Material inputs during the month:

Quantities Entering Process	Litres	Quantities Leaving Process	Litres
Opening WIP	800	Transfer to Finished Goods	4,200
Raw material input (balancing figure)	5,360	Process Losses	1,800
		Closing WIP	160
	6,160		6,160

(b) Calculation of Normal Loss and Abnormal Loss/Gain

	Litres
Total process losses for month	1,800
Normal Loss (10% input)	536
Abnormal Loss (balancing figure)	1,264

(c) Calculation of values of Raw Material, Labour and Overheads added to the process:

	Material	Labour	Overheads
Cost per equivalent unit	₹ 23.00	₹7.00	₹9.00
Equivalent units (litre) (refer the working note)	4,824	4,952	5,016
Cost of equivalent units	₹1,10,952	₹34,664	₹45,144
Add: Scrap value of normal loss (536 units × ₹ 15)	₹8,040	--	--
Total value added	₹1,18,992	₹34,664	₹45,144

Workings:

Statement of Equivalent Units (litre):

Input Details	Units	Output details	Units	Equivalent Production					
				Material		Labour		Overheads	
				Units	(%)	Units	(%)	Units	(%)
Opening WIP	800	Units completed:							
Units introduced	5,360	- Opening WIP	800	--	--	240	30	320	40
		- Fresh inputs	3,400	3,400	100	3,400	100	3,400	100
		Normal loss	536	--	--	--	--	--	--
		Abnormal loss	1,264	1,264	100	1,264	100	1,264	100
		Closing WIP	160	160	100	48	30	32	20
	6,160		6,160	4,824		4,952		5,016	

(d) Process Account for Month

	Litres	Amount (₹)		Litres	Amount (₹)
To Opening WIP	800	26,640	By Finished goods	4,200	1,63,800
To Raw Materials	5,360	1,18,992	By Normal loss	536	8,040
To Wages	--	34,664	By Abnormal loss	1,264	49,296
To Overheads	--	45,144	By Closing WIP	160	4,304
	6,160	2,25,440		6,160	2,25,440

10 Joint Products & By-Products

Basic Concepts

Joint Products	Two or more products of equal importance, produced, simultaneously from the same process, with each having a significant relative sale value are known as joint products.
By- Products	Products recovered from material discarded in a main process, or from the production of some major products.
Co- Products	Two or more products which are contemporary but do not emerge necessarily from the same material in the same process.
	Methods of Apportioning joint costs over Joint Products
Physical Unit Method	Joint Costs are apportioned on the basis of some physical base, such as weight or measure expressed in gallon, tonnes, etc.
Average unit cost method	Under this method process cost (upto the point of separation) is divided by total units of joint products produced.
Survey Method	It is based on the technical survey of all factors involved in the production and distribution of products. Under this method joint costs are apportioned over the joint products on the basis of percentage/ point value assigned to the products according to their relative importance.
Contribution Margin Method	According to this method, joint costs are segregated into two parts-variable and fixed. The variable costs are apportioned over the joint products on the basis of units produced (average method) or physical quantities. In case the products are further processed after the point of separation, then all variable cost incurred be added to the variable costs determined earlier. In this way total variable cost is arrived which is deducted from their respective sales values to ascertain their contribution. The fixed costs are then apportioned over the joint products on the basis of the contribution ratios.
Market Value Method	Under this method joint costs upto the point of separation is apportioned on the basis of market value of the joint products at

	the point of separation.
	Methods of Apportioning joint costs over By- Products
Market value or realization value method	The realisation on the disposal of the by-product may be deducted from the total cost of production so as to arrive at the cost of the main product.
Standard Cost in technical estimates	The standard may be determined by averaging costs recorded in the past and making technical estimates of the number of units of original raw material going into the main product and the number forming the by-product or by adopting some other consistent basis. This method may be adopted where the by-product is not saleable in the condition in which it emerges or comparative prices of similar products are not available.
Comparative price Method	Value of the by-product is ascertained with reference to the price of a similar or an alternative material.
Re-use basis	The value put on the by-product should be same as that of the materials introduced into the process.

SECTION-A

Question 1

Distinguish between Joint products and By-products.

Solution:

Joint products and By-products: Joint Products are defined as the products which are produced simultaneously from same basic raw materials by a common process or processes but none of the products is relatively of more importance or value as compared with the other. For example spirit, kerosene oil, fuel oil, lubricating oil, wax, tar and asphalt are the examples of joint products.

By products, on the other hand, are the products of minor importance jointly produced with other products of relatively more importance or value by the common process and using the same basic materials. These products remain inseparable upto the point of split off. For example in Dairy industries, batter or cheese is the main product, but butter milk is the by-product.

Points of Distinction:

(1) Joint products are the products of equal economic importance, while the by-products are of lesser importance.

(2) Joint products are produced in the same process, whereas by-products are produced from the scrap or the discarded materials of the main product.

(3) Joint products are not produced incidentally, but by-products emerge incidentally also.

Question 2

Discuss the treatment of by-product cost in Cost Accounting.

Solution:

Treatment of by-product cost in Cost Accounting:

(i) When they are of small total value, the amount realized from their sale may be dealt as follows:

- Sales value of the by-product may be credited to Costing Profit & Loss Account and no credit be given in Cost Accounting. The credit to Costing Profit & Loss Account here is treated either as a miscellaneous income or as additional sales revenue.
- The sale proceeds of the by-product may be treated as deduction from the total costs. The sales proceeds should be deducted either from production cost or cost of sales.

(ii) When they require further processing:

In this case, the net realizable value of the by-product at the split-off point may be arrived at by subtracting the further processing cost from realizable value of by-products. If the value is small, it may be treated as discussed in (i) above.

Question 3

How apportionment of joint costs upto the point of separation amongst the joint products using market value at the point of separation and net realizable value method is done? Discuss.

Solution:

Apportionment of Joint Cost amongst Joint Products using:

Market value at the point of separation: This method is used for apportionment of joint costs to joint products upto the split off point. It is difficult to apply if the market value of the product at the point of separation is not available. It is useful method where further processing costs are incurred disproportionately.

Net realizable value Method: From the sales value of joint products (at finished stage) the followings are deducted:

– Estimated profit margins

– Selling & distribution expenses, if any

– Post split off costs.

- The resultant figure so obtained is known as net realizable value of joint products. Joint costs are apportioned in the ratio of net realizable value.

Question 4

Describe briefly, how joint costs upto the point of separation may be apportioned amongst the joint products under the following methods:

(i) Average unit cost method

(ii) Contribution margin method

(iii) Market value at the point of separation

(iv) Market value after further processing

(v) Net realizable value method.

Solution:

Methods of apportioning joint cost among the joint products:

(i) Average Unit Cost Method: Under this method, total process cost (upto the point of separation) is divided by total units of joint products produced. On division average cost per unit of production is obtained. The effect of application of this method is that all joint products will have uniform cost per unit.

(ii) Contribution Margin Method: Under this method joint costs are segregated into two parts – variable and fixed. The variable costs are apportioned over the joint products on the basis of units produced (average method) or physical quantities. If the products are further processed, then all variable cost incurred be added to the variable cost determined earlier. Then contribution is calculated by deducting variable cost from their respective sales values. The fixed costs are then apportioned over the joint products on the basis of contribution ratios.

(iii) Market Value at the Time of Separation: This method is used for apportioning joint costs to joint products upto the split off point. It is difficult to apply if the market values of the products at the point of separation are not available. The joint cost may be apportioned in the ratio of sales values of different joint products.

(iv) Market Value after further Processing: Here the basis of apportionment of joint costs is the total sales value of finished products at the further processing. The use of this method is unfair where further processing costs after the point of separation are disproportionate or when all the joint products are not subjected to further processing.

(v) Net Realisable Value Method: Here joint costs is apportioned on the basis of net realisable value of the joint products,

Net Realisable Value	=	Sale value of joint products (at finished stage)
	(-)	estimated profit margin
	(-)	selling & distribution expenses, if any
	(-)	post split off cost

SECTION- B

Question 1

Pokemon Chocolates manufactures and distributes chocolate products. It purchases Cocoa beans and processes them into two intermediate products:

Chocolate powder liquor base

Milk-chocolate liquor base

These two intermediate products become separately identifiable at a single split off point. Every 500 pounds of cocoa beans yields 20 gallons of chocolate – powder liquor base and 30 gallons of milk-chocolate liquor base.

The chocolate powder liquor base is further processed into chocolate powder. Every 20 gallons of chocolate-powder liquor base yields 200 pounds of chocolate powder. The milk-chocolate liquor base is further processed into milk-chocolate. Every 30 gallons of milk-chocolate liquor base yields 340 pounds of milk chocolate.

Production and sales data for October, 2013 are:

Cocoa beans processed	*7,500 pounds*
Costs of processing Cocoa beans to split off point (including purchase of beans)	*₹ 7,12,500*

	Production	***Sales***	***Selling price***
Chocolate powder	*3,000 pounds*	*3,000 pounds*	*₹ 190 per pound*
Milk chocolate	*5,100 Pounds*	*5,100 Pounds*	*₹ 237.50 per pound*

The October, 2013 separable costs of processing chocolate-powder liquor into chocolate powder are ₹ 3,02,812.50. The October 2013 separable costs of processing milk-chocolate liquor base into milk-chocolate are ₹ 6,23,437.50.

Pokemon full processes both of its intermediate products into chocolate powder or milk-chocolate. There is an active market for these intermediate products. In October, 2013, Pokemon could have sold the chocolate powder liquor base for ₹ 997.50 a gallon and the milk-chocolate liquor base for ₹ 1,235 a gallon.

Required:

(i) Calculate how the joint cost of ₹ 7,12,500 would be allocated between the chocolate powder and milk-chocolate liquor bases under the following methods:

(a) Sales value at split off point

(b) Physical measure (gallons)

(c) Estimated net realisable value, (NRV) and

(d) Constant gross-margin percentage NRV.

(ii) What is the gross-margin percentage of the chocolate powder and milk-chocolate liquor bases under each of the methods in requirements (i) above?

(iii) Could Pokemon have increased its operating income by a change in its decision to fully process both of its intermediate products? Show your computations.

Solution

(i) Comparison of alternative Joint-Cost Allocation Methods:

(a) Sales Value at Split-off Point Method

	Chocolate powder liquor base	Milk chocolate liquor base	Total
Sales value of products at split off	₹ 2,99,250*	₹ 5,55,750**	₹ 8,55,000
Weights	0.35	0.65	1.00
Joint cost allocated	₹ 2,49,375 (₹7,12,500 × 0.35)	₹ 4,63,125 (₹7,12,500 × 0.65)	₹ 7,12,500

*(3,000 lbs ÷ 200 lbs) × 20 gallon × ₹ 997.50 = ₹ 2,99,250

** (5,100 lbs ÷ 340 lbs) × 30 gallon × ₹1,235 = ₹ 5,55,750

(b) Physical Measure Method

	Chocolate powder liquor base	Milk chocolate liquor base	Total
Output	300 gallon*	450 gallon**	750 gallons
Weight	300/750 = 0.40	450/750 = 0.60	1.00
Joint cost allocated	₹ 2,85,000 (₹ 7,12,500 x 0.40)	₹ 4,27,500 (₹ 7,12,500 x 0.60)	₹ 7,12,500

*(3,000 lbs ÷ 200 lbs) × 20 gallon = 300 gallon

** (5,100 lbs ÷ 340 lbs) × 30 gallon = 450 gallon

(c) Net Realisable Value (NRV) Method

	Chocolate powder liquor base	Milk chocolate liquor base	Total
Final sales value of production	₹ 5,70,000 (3,000 lbs × ₹190)	₹ 12,11,250 (5,100 lbs × ₹ 237.50)	₹ 17,81,250
Less: Separable costs	₹ 3,02,812.50	₹ 6,23,437.50	₹ 9,26,250
Net realisable value at split off point	₹ 2,67,187.50	₹ 5,87,812.50	₹ 8,55,000
Weight	0.3125 (2,67,187.50 ÷ 8,55,000)	0.6875 (5,87,812.5 ÷ 8,55,000)	1.00
Joint cost allocated	₹ 2,22,656.25 (₹ 7,12,500 x 0.3125)	₹ 4,89,843.75 (₹ 7,12,500 x 0.6875)	₹ 7,12,500

(d) Constant Gross Margin(%) NRV method

	Chocolate powder Liquor base	Milk chocolate liquor Base	Total
Final sales value of production	₹ 5,70,000	₹ 12,11,250	₹ 17,81,250
Less: Gross margin* 8%	₹ 45,600	₹ 96,900	₹ 1,42,500
Cost of goods available for sale	₹ 5,24,400	₹ 11,14,350	₹16,38,750
Less: Separable costs	₹ 3,02,812.50	₹ 6,23,437.50	₹ 9,26,250
Joint cost allocated	₹ 2,21,587.50	₹ 4,90,912.50	₹ 7,12,500

*Final sales value of total production = ₹17,81,250

Less: Joint and separable cost = ₹ 16,38,750 (₹ 7,12,500 + ₹ 9,26,250)

Gross Margin = ₹ 1,42,500

Gross margin (%) $= \frac{₹\ 1,42,500}{₹\ 17,81,250} \times 100 = 8\%$

(ii) Chocolate powder liquor base **(Amount in ₹)**

	Sales value at Split off	Physical Measure	Estimated net Realisable Value	Constant Gross Margin NRV
Final sale value of	5,70,000	5,70,000	5,70,000	5,70,000

Chocolate powder				
Less: Separable costs	3,02,812.50	3,02,812.50	3,02,812.50	3,02,812.50
Less: Joint costs	2,49,375	2,85,000	2,22,656.25	2,21,587.50
Gross Margin	17,812.50	(17,812.50)	44,531.25	45,600
Gross Margin %	3.125%	(3.125%)	7.8125%	8.00%

Milk chocolate liquor base **(Amount in ₹)**

	Sales value at split off	**Physical measure**	**Estimated net realisable**	**Constant Gross margin NRV**
Final sale value of milk chocolate	12,11,250	12,11,250	12,11,250	12,11,250
Less: Separable costs	6,23,437.50	6,23,437.50	6,23,437.50	6,23,437.50
Less: Joint costs	4,63,125	4,27,500	4,89,843.75	4,90,912
Gross Margin	1,24,687.50	1,60,312.50	97,968.75	96,900.50
Gross Margin %	10.29%	13.24%	8.09%	8.00%

(iii) Further processing of Chocolate powder liquor base into Chocolate powder

	(Amount in ₹)
Incremental revenue {₹ 5,70,000 – (₹ 997.50 x 300 gallon)}	2,70,750
Less: Incremental costs	3,02,812.50
Incremental operating income	(32,062.50)

Further processing of Milk Chocolate liquor base into Milk Chocolate.

	(Amount in ₹)
Incremental revenue {₹12,11,250 – (₹ 1,235 x 450 gallon)}	6,55,500
Less: Incremental cost	6,23,437.50
Incremental operating income	32,062.50

The above computations show that Pokemon Chocolates could increase operating income by ₹ 32,062.50 if chocolate liquor base is sold at split off point and milk chocolate liquor base is processed further.

Question 2

The Sunshine Oil Company purchases crude vegetables 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 (March, 2014), the output at split off point was:

Product M	*3,00,000 gallons*
Product N	*1,00,000 gallons*
Product O	*50,000 gallons*
Product P	*50,000 gallons*

The joint cost of purchasing the crude vegetables oil and processing it were ₹ 40,00,000.

Sunshine had no beginning or ending inventories. Sales of Product O in March, 2014 were ₹ 20,00,000. Total output of products M, N and P was further refined and then sold. Data related to March, 2014 are as follows:

	Further Processing Costs to Make Super Products	***Sales***
Super M'	*₹ 80,00,000*	*₹ 1,20,00,000*
Super N'	*₹ 32,00,000*	*₹ 40,00,000*
Super P'	*₹ 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 March, 2014 production:

Product M	*₹ 20,00,000*
Product N	*₹ 12,00,000*
Product P	*₹ 28,00,000*

You are required to answer:

(i) How the joint cost of ₹ 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 March, 2014 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.

Solution:

(i) Allocation of Joint Cost by the following methods:

(a) Sales Value at split – off Method

Products	Sales value of the point of split off (₹)	Joint cost allocated (₹)
M	20,00,000	10,00,000

		$\left(\frac{₹\ 20,00,000}{₹\ 80,00,000}\right) x ₹\ 40,00,000$
N	12,00,000	6,00,000 $\left(\frac{₹\ 12,00,000}{₹\ 80,00,000}\right) x ₹\ 40,00,000$
O	20,00,000	10,00,000 $\left(\frac{₹\ 20,00,000}{₹\ 80,00,000}\right) x ₹\ 40,00,000$
P	28,00,000	14,00,000 $\left(\frac{₹\ 28,00,000}{₹\ 80,00,000}\right) x ₹\ 40,00,000$
Total	80,00,000	40,00,000

(b) Physical output (gallon) Method

Products	Physical output (in gallon)	Joint cost allocated (₹)
M	3,00,000	24,00,000 $\left(\frac{3,00,000\ \text{gallon}}{5,00,000\ \text{gallon}}\right) x ₹40,00,000$
N	1,00,000	8,00,000 $\left(\frac{1,00,000\ \text{gallon}}{5,00,000\ \text{gallon}}\right) x ₹40,00,000$
O	50,000	4,00,000 $\left(\frac{50,000\ \text{gallon}}{5,00,000\ \text{gallon}}\right) x ₹40,00,000$
P	50,000	4,00,000 $\left(\frac{50,000\ \text{gallon}}{5,00,000\ \text{gallon}}\right) x ₹40,00,000$
Total	5,00,000	40,00,000

(c) Estimated Net Realizable Value Method

Products	Sales revenue after further processing	Sales revenue at the point of split off	Further processing costs	Net realizable value	Joint cost allocated
	(₹)	(₹)	(₹)	(₹)	(₹)
(a)	(b)	(c)	(d)	(e)=[(b) – (d)] or (c)	
'Super M'	1,20,00,000	--	80,00,000	40,00,000	20,00,000 $\left(\frac{₹\ 40,00,000}{₹\ 80,00,000}\right) x ₹40,00,000$
'Super N'	40,00,000	--	32,00,000	8,00,000	4,00,000 $\left(\frac{₹\ 8,00,000}{₹\ 80,00,000}\right) x ₹40,00,000$
'O'	--	20,00,000	--	20,00,000	10,00,000 $\left(\frac{₹\ 20,00,000}{₹\ 80,00,000}\right) x ₹40,00,000$
'Super P'	48,00,000	--	36,00,000	12,00,000	6,00,000 $\left(\frac{₹\ 12,00,000}{₹\ 80,00,000}\right) x ₹40,00,000$
		Total	1,48,00,000	80,00,000	40,00,000

(ii) Decision about the further refining of Product M, N or P.

Products	M (₹)	N (₹)	P (₹)
Sales revenue after further processing: (A)	1,20,00,000	40,00,000	48,00,000
Sales revenue at the point of split off: (B)	20,00,000	12,00,000	28,00,000
Incremental sales revenue: (C)={(A)-(B)}	1,00,00,000	28,00,000	20,00,000
Further processing cost: (D)	80,00,000	32,00,000	36,00,000
Profit (Loss) arising due to further processing: {(C) – (D)}	20,00,000	(4,00,000)	(16,00,000)

It is apparent from above that further processing of products N and P results in the decrease of the operating profit by ₹ 20,00,000. Hence M/s. Sunshine Oil Company should not resort to further processing of its N and P products. This decision on adoption would increase the operating profits of the company for the month of March, 2014 by ₹ 20,00,000.

Question 3

ABC Ltd. operates a simple chemical process to convert a single material into three separate items, referred to here as X, Y and Z. All three end products are separated simultaneously at a single split-off point.

Product X and Y are ready for sale immediately upon split off without further processing or any other additional costs. Product Z, however, is processed further before being sold. There is no available market price for Z at the split-off point.

The selling prices quoted here are expected to remain the same in the coming year. During 2013-14, the selling prices of the items and the total amounts sold were:

X – 186 tons sold for ₹ 1,500 per ton

Y – 527 tons sold for ₹ 1,125 per ton

Z – 736 tons sold for ₹ 750 per ton

The total joint manufacturing costs for the year were ₹ 6,25,000. An additional ₹ 3,10,000 was spent to finish product Z.

There were no opening inventories of X, Y or Z at the end of the year. The following inventories of complete units were on hand:

X 180 tons

Y 60 Tons

Z 25 tons

There was no opening or closing work-in-progress.

Required:

(i) Compute the cost of inventories of X, Y and Z for Balance Sheet purposes and cost of goods sold for income statement purpose as of March 31, 2014, using:

(a) Net realizable value (NRV) method of joint cost allocation

(b) Constant gross-margin percentage NRV method of joint-cost allocation.

(ii) Compare the gross-margin percentages for X, Y and Z using two methods given in requirement (i)

Solution:

(i) (a) Statement of Joint Cost allocation of inventories of X, Y and Z for Balance Sheet purposes

(By using Net Realisable Value Method)

	Products			Total
	X	Y	Z	
	(₹)	(₹)	(₹)	(₹)
Final sales value of total production (Working Note 1)	5,49,000 (366 x ₹ 1,500)	6,60,375 (587 x ₹ 1,125)	5,70,750 (761 x ₹ 750)	17,80,125
Less: Additional cost	--	--	3,10,000	3,10,000
Net realisable value (at split-off point)	5,49,000	6,60,375	2,60,750	14,70,125
Joint cost allocated (Working Note 2)	2,33,398	2,80,748	1,10,854	6,25,000

Cost of goods sold for income statement purpose as of March 31, 2014

(By using Net Realisable Value Method)

	Products			Total
	X	Y	Z	
	(₹)	(₹)	(₹)	(₹)
Allocated joint cost	2,33,398	2,80,748	1,10,854	6,25,000
Additional costs	--	--	3,10,000	3,10,000
Cost of goods available for sale (CGAS)	2,33,398	2,80,748	4,20,854	9,35,000
Less: Cost of ending inventory (Working Note 1)	1,14,785 (CGAS× 49.18%)	28,692 (CGAS × 10.22%)	13,846 (CGAS × 3.29%)	1,57,323
Cost of goods sold	1,18,613	2,52,056	4,07008	7,77,677

Income Statement (Showing gross margin and gross margin percentage)

(By using net realisable value method)

	Products			Total
	X	Y	Z	
Sales revenue (₹)	2,79,000 (186 x ₹ 1,500)	5,92,875 (527 x ₹ 1,125)	5,52,000 (736 x ₹ 750)	14,23,875

Less: Cost of goods sold (₹)	1,18,613	2,52,056	4,07,008	7,77,677
Gross margin (₹)	1,60,387	3,40,819	1,44,992	6,46,198
Gross margin (%)	57.49%	57.49%	26.27%	45.38%

(b) Statement of joint cost allocation of inventories of X, Y and Z for Balance sheet purposes

(By using Constant Gross Margin Percentage Net Realisable Value Method)

	Product			Total
	X	Y	Z	
	(₹)	(₹)	(₹)	(₹)
Final sales value of total production	5,49,000	6,60,375	5,70,750	17,80,125
Less: Gross margin (Working Note 3)	2,60,641	3,13,517	2,70,967	8,45,125
	2,88,359	3,46,858	2,99,783	9,35,000
Less: Additional Cost	--	--	3,10,000	3,10,000
Joint cost allocated	2,88,359	3,46,858	(10,217)	6,25,000

Note: The negative joint cost allocation to product Z illustrates one 'unusual' feature of the constant gross margin NRV method.

Cost of Goods Sold for Income Statement purpose
(By using Constant Gross Margin Percentage Net Realisable Value Method)

	Products			Total
	X	Y	Z	
	(₹)	(₹)	(₹)	(₹)
Allocated joint cost	2,88,359	3,46,858	(10,217)	6,25,000
Additional costs	--	--	3,10,000	3,10,000
Cost of goods available for sale (CGAS)	2,88,359	3,46,858	2,99,783	9,35,000
Less: Cost of ending inventory (Working Note 1)	1,41,815 (CGAS×49.18%)	35,449 (CGAS×10.22%)	9,863 (CGAS × 3.29%)	1,87,127
Cost of Goods sold	1,46,544	3,11,409	2,89,920	7,47,873

Income Statement (Showing gross margin and gross margin percentage)
(By using Constant Gross Margin Percentage NRV Method)

	Products			Total
	X	Y	Z	
Sales revenue (₹)	2,79,000 (186 x ₹1,500)	5,92,875 (527 x ₹ 1,125)	5,52,000 (736 x ₹ 750)	14,23,875
Less: Cost of Goods sold (₹)	1,46,544	3,11,409	2,89,920	7,47,873
Gross margin (₹)	1,32,456	2,81,466	2,62,080	6,76,002
Gross margin (%)	47.48%	47.48%	47.48%	47.48%

(ii) Comparative statement of gross percentage for X, Y and Z
(Using Net Realisable Value and Constant Gross Margin Percentage NRV Methods)

Method	Product gross margin percentage		
	X	Y	Z
Net Realisable Method	57.49	57.49	26.26
Constant gross margin percentage NRV	47.48	47.48	47.48

Working Notes

1. **Total production of three products for the year 2013-2014**

Products	Quantity sold in tones	Quantity of ending inventory in tons	Total production	Ending inventory percentage (%)
(1)	(2)	(3)	(4) = [(2) + (3)}	(5) = (3)/ (4)
X	186	180	366	49.18
Y	527	60	587	10.22
Z	736	25	761	3.29

2. **Joint cost apportioned to each product:**

$$\frac{\text{Total Joint cost}}{\text{Total Net Realisable Value}} \text{ x Net Realisable Value of each product}$$

$$= \text{Total cost of Product X} = \frac{₹\ 6,25,000}{₹\ 14,70,125} \text{ x } ₹\,5,49,000 = ₹\,2,33,398$$

Similarly, the joint cost of inventories of products Y and Z comes to ₹ 2,80,748 and ₹ 1,10,854 respectively.

3. **Gross margin percentage**

	(₹)
Final sales value production	17,80,125
Less: Joint cost and additional costs (₹ 6,25,000 + ₹ 3,10,000)	9,35,000
Gross margin	8,45,125
Gross margin percentage (₹ 8,45,125 ÷ ₹ 17,80,125) × 100	47.4756%

Question 4

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	*₹ 12,68,800*
Direct Wages Department	*(₹)*
P	*3,84,000*
Q	*96,000*
R	*64,000*
S	*36,000*

Factory overheads of ₹ 4,64,000 are to be apportioned to the departments on direct wage 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. (₹)	*32*	*24*	*16*

There is 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 ₹ 20, ₹ 22 and ₹ 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) above.*

Solution:

(i) Statement showing the apportionment of joint costs to joint products

	Products			
	A	B	C	Total
Output sold Kg.: (I)	44,000	40,000	20,000	
Selling price per kg. at split off (₹): (II)	20	22	10	
Sales value at split off (₹): (I) x (II)	8,80,000	8,80,000	2,00,000	19,60,000
Joint costs (costs incurred in department P (₹) (apportioned on the basis of sales value at the point of split off) i.e. (22:22:5) (Working Note 1)	8,80,000	8,80,000	2,00,000	19,60,000

(ii) Statement showing product-wise and total profit for the month under reference

(as per the company's current processing policy)

	Products			
	A	B	C	Total
Output (kg.) : (a)	44,000	40,000	20,000	
Selling price per kg. after further processing (₹): (b)	32	24	16	
Sales value after further processing (₹).:(c) = {(a) x (b)}	14,08,000	9,60,000	3,20,000	26,88,000
Joint costs (₹): (d)	8,80,000	8,80,000	2,00,000	19,60,000
Further processing costs (₹): (e) (Working Note 2)	1,72,800	1,15,200	64,800	3,52,800
Total costs (₹): (f) = [(d) + (e)}	10,52,800	9,95,200	2,64,800	23,12,800
Profit/ (Loss) (₹): [(c))– (f)}	3,55,200	(35,200)	55,200	3,75,200

Alternatively:

Incremental sales revenue (₹)	5,28,000 (44,000 units x ₹ 12)	80,000 (40,000 units x ₹ 2)	1,20,000 (20,000 units x ₹ 6)
Less: Further processing costs (₹) [Refer to Working Note 2 (ii)]	1,72,800	1,15,200	64,800
Incremental net profit / (loss)	3,55,200	(35,200)	55,200

(iii) Processing decision to improve the profitability of the company.

44,000 units of product A and 20,000 units of product C should be further processed because the incremental sales revenue generated after further processing is more than the further processing costs incurred. 40,000 units of product B should be sold at the point of-split off because the incremental revenue generated after further processing is less than the further processing costs.

(iv) The product wise and total profit arising from the recommendation in (iii) above is as follows:

Product	A	B	C	Total
Profit (₹)	3,55,200	-	55,200	4,10,400

Working Notes:

1. **Statement of department-wise costs**

	P (₹)	Q (₹)	R (₹)	S (₹)
Raw materials	12,68,800			
Wages	3,84,000	96,000	64,000	36,000
Overheads (Apportioned on the basis of departmental direct wages i.e. 96:24:16:9)	3,07,200	76,800	51,200	28,800
Total Cost	19,60,000	1,72,800	1,15,200	64,800

2. **Joint costs and further processing costs**

(i) Costs incurred in the department P are joint costs of products A, B and C and are equal to ₹ 19,60,000.

(ii) Costs incurred in the departments Q, R and S are further processing costs of products A, B and C respectively. Further processing costs of products A, B and C thus are ₹ 1,72,800; ₹ 1,15,200 and ₹ 64,800 respectively.

Question 5

A company's plant processes 1,50,000 kg. of raw material in a month to produce two products, viz, 'P' and 'Q'. The cost of raw material is ₹ 12 per kg. The processing costs per month are:

	(₹)
Direct Materials	*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 prices of the two products at the point of split off are: P ₹ 12 per kg. and Q ₹ 20 per kg. A proposal is available to process P further by mixing it with other purchased materials. 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 ₹ 15 and each kg of output of S will require one kilogram of input P. The cost of processing of P into S (including other materials) is ₹ 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.

Will you recommend further processing?

Solution:

Working Notes:

1.

	(Kg.)
Material input	1,50,000
Less: Loss of Material in process (5% of 1,50,000 kg.)	7,500
Total output	1,42,500

2. Output of P and Q are in the ratio of 1 : 2 of the total output:

$$P = \frac{1,42,500\,\text{Kg.} \times 1}{3} = 47,500\text{ kg.}$$

$$Q = \frac{1,42,500\,\text{Kg.} \times 2}{3} = 95,000\text{ kg.}$$

3. Joint Costs:

	(₹)
Material (input) (1,50,000 kg. × ₹ 12)	18,00,000

Direct materials	90,000
Direct Wages	1,20,000
Variable overheads	1,00,000
Fixed overheads	1,00,000
	22,10,000

4. Sales Revenue of P, Q and S
   P = 47,500 Kg. × ₹ 12 = ₹ 5,70,000

   Q = 95,000 Kg. × ₹ 20 = ₹ 19,00,000

   S = 47,500 Kg. × ₹ 15 = ₹ 7,12,500.

5. Apportionment of joint costs viz. ₹ 22,10,000 over P and Q in proportion of their sales value i.e. ₹ 5,70,000 and ₹ 19,00,000, i.e., 3 : 10 is:

	Total	P	Q
	(₹)	(₹)	(₹)
Joint cost apportionment In the ratio of 3 : 10	22,10,000	5,10,000 $\left(\frac{₹\ 22,10,000 \times 3}{13}\right)$	17,00,000 $\left(\frac{₹\ 22,10,000 \times 10}{13}\right)$

6. Total Cost of 47,500 kg. of S = Joint Cost of P + Cost of Processing P into S.

   = ₹ 5,10,000 + ₹ 1,85,000 = ₹ 6,95,000.

Statement showing the Monthly Profitability

	Based on existing manufacturing operations			Based on further processing of P into S		
	Products			Products		
	P	Q	Total	S	Q	Total
Sales quantity (kg.)	47,500	95,000	1,42,500	47,500	95,000	1,42,500
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
Sales Revenue (Working Note 4)	5,70,000	19,00,000	24,70,000	7,12,500	19,00,000	26,12,500
Less: Joint Costs (Working Note 5)	5,10,000	17,00,000	22,10,000	6,95,000*	17,00,000	23,95,000
Profit	60,000	2,00,000	2,60,000	17,500	2,00,000	2,17,500

*Working Note 6

Recommendation: Further processing of P is not recommended as it results in a lower profit of P.

Question 6

Three joint products are produced by passing chemicals through two consecutive processes. Output from process 1 is transferred to process 2 from which the three joint products are produced and immediately sold. The data regarding the processes for April, 2014 is given below:

	Process 1	***Process 2***
Direct material 2,500 kg. @ ₹ 4 per kg.	*₹ 10,000*	*–*
Direct labour	*₹ 6,250*	*₹ 6,900*
Overheads	*₹ 4,500*	*₹ 6,900*
Normal Loss	*10% of input*	*–*
Scrap value of loss	*₹ 2 per kg.*	*–*
Output	*2,300 kg.*	*Joint products*
		A – 900 kg.
		B – 800 kg.
		C – 600 kg.

There were no opening or closing stocks in either process and the selling prices of the output from process 2 were:

Joint product A	*₹ 24 per kg.*
Joint product B	*₹ 18 per kg.*
Joint product C	*₹ 12 per kg.*

Required:

(a) Prepare an account for process 1 together with any Loss or Gain Accounts you consider necessary to record the month's activities.

(b) Calculate the profit attributable to each of the joint products by apportioning the total costs from process 2

(i) According to weight of output;

(ii) By the market value of production.

Solution

(a) Process- 1 Account

	Qty. (kg.)	**Rate per kg. (₹)**	**Amount (₹)**		**Qty. (kg.)**	**Rate per kg. (₹)**	**Amount (₹)**
To Direct material	2,500	4	10,000	By Process 2 (Working Note 1)	2,300	9*	20,700
To Direct labour	-	-	6,250	By Normal Loss	250	2	500

				(10% of input)			
To Overhead	-	-	4,500				
To Abnormal gain	50	9*	450				
	2,550		21,200		2,550		21,200

Normal Loss Account

	Qty. (kg.)	Rate per kg. (₹)	Amount (₹)		Qty. (kg.)	Rate per kg. (₹)	Amount (₹)
To Process- 1	250	2	500	By Sales	200	2	400
				By Abnormal gain	50	2	100
	250		500		250		500

Abnormal Gain Account

	Qty. (kg.)	Rate per kg. (₹)	Amount (₹)		Qty. (kg.)	Rate per kg. (₹)	Amount (₹)
To Normal Loss A/c	50	2	100	By Process 1	50	9	450
To Costing Profit and Loss Account			350				
	50		450		50		450

(b) Statement of Profit

(attributable to each of the Joint Products according to weight of output and market value of production)

Joint products	Output	S.P. (p.u.)	Sales value	Joint cost apportionment according to			
				Weight of output	Profit/(loss)	Market value of production	Profit/ (loss)
	(kg.)	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
A	900	24	21,600	13,500*	8,100	17,250**	4,350
B	800	18	14,400	12,000	2,400	11,500	2,900
C	600	12	7,200	9,000	(1,800)	5,750	1,450
	2,300		43,200	34,500	8,700	34,500	8,700

* Working Note 3

** Working Note 4

Working Notes:

1. Normal output = 2,500 kg. – 250 kg. (2,500 kg. × 10%) = 2,250 kg.

   Total Cost = Direct material cost + Direct labour cost + Overheads – Recovery from scrap sales

   = ₹ 10,000 + ₹ 6,250 + ₹ 4,500 – ₹ 500 (2,500 × 10% × ₹ 2)

   = ₹ 20,250

   Normal cost (p.u.) = $\frac{₹\ 20,250}{2,250\,\text{kg}} = ₹\ 9$

2. Joint Cost of three products under Process- 2

	(₹)
Transfer of output from process-1	20,700
Direct Labour	6,900
Overhead	6,900
Total	34,500

3. Apportionment of joint cost on the basis of weight of output

Joint Products	Output (in kg.)	Apportionment of joint cost on the basis of weight of output
A	900	$\frac{₹34,500 \times 9}{23}$ = ₹ 13,500
B	800	$\frac{₹34,500 \times 8}{23}$ = ₹ 12,000
C	600	$\frac{₹34,500 \times 6}{23}$ = ₹ 9,000

4. Apportionment of Joint Cost on the basis of market value of production

Joint Products	Output	Selling Price (p.u.)	Sales Revenue	Apportionment of Joint Cost on the basis of market value of production	
	(In Kg.)	(₹)	(₹)		
A	900	24	21,600	$\frac{₹\ 34,500 \times 3}{6}$	₹ 17,250
B	800	18	14,400	$\frac{₹34,500 \times 2}{6}$	₹ 11,500

C	600	12	7,200	$\frac{₹\ 34,500\times1}{6}$	₹ 5,750
			43,200		34,500

Question 7

A company produces two joint product X and Y, from the same basic materials. The processing is completed in three departments.

Materials are mixed in Department I. At the end of this process X and Y get separated. After separation X is completed in the Department II and Y is finished in Department III. During a period 2,00,000 kg. of raw material were processed in Department I, at a total cost of ₹ 8,75,000, and the resultant 60% becomes X and 30% becomes Y and 10% normally lost in processing.

In Department II 1/6th of the quantity received from Department I is lost in processing. X is further processed in Department II at a cost of ₹ 1,80,000.

In Department III further new material added to the material received from Department I and weight mixture is doubled, there is no quantity loss in the department. Further processing cost (with material cost) in Department III is ₹ 1,50,000.

The details of sales during the year are:

	Product X	***Product Y***
Quantity sold (kg.)	*90,000*	*1,15,000*
Sales price per kg (₹)	*10*	*4*

There were no opening stocks. If these products sold at split-off-point, the selling price of X and Y would be ₹ 8 and ₹ 4 per kg respectively.

Required:

(i) Prepare a statement showing the apportionment of joint cost to X and Y in proportion of sales value at split off point.

(ii) Prepare a statement showing the cost per kg of each product indicating joint cost, processing cost and total cost separately.

(iii) Prepare a statement showing the product wise profit for the year.

(iv) On the basis of profits before and after further processing of product X and Y, give your comment that products should be further processed or not.

Solution:

Calculation of quantity produced

	Dept I (kg)	Dept II (kg)	Dept III (kg)
Input	2,00,000	1,20,000 (60% of 2,00,000 kg.)	60,000 (30% of 2,00,000 kg.)
Weight lost or added	(20,000) (10% of 2,00,000 kg.)	(20,000) (1/6 th of 2,00,000 kg.)	60,000
	1,80,000	1,00,000	1,20,000
Production of X	1,20,000	1,00,000	--
Production of Y	60,000	--	1,20,000

(i) Statement of apportionment of joint cost

	Product X	Product Y
Output (kg)	1,20,000	60,000
Selling price per kg (₹)	8	4
Sales value (₹)	9,60,000	2,40,000
Share in Joint cost (4:1)	7,00,000 (₹ 8,75,000 × 4 ÷ 5)	1,75,000 (₹ 8,75,000 × 1 ÷ 5)

(ii) Statement of cost per kg

	Product X	Product Y
Output (kg)	1,00,000	1,20,000
Share in joint cost (₹)	7,00,000	1,75,000
Cost per kg (₹) (Joint cost)	7.00	1.458
Further processing cost (₹)	1,80,000	1,50,000
Further processing cost per kg (₹)	1.80	1.250
Total cost per kg (₹)	8.80	2.708

(iii) Statement of profit

	Product X	Product Y
Output (kg)	1,00,000	1,20,000
Sales (kg)	90,000	1,15,000
Closing stock	10,000	5,000

	(₹)	(₹)
Sales @ ₹10 and ₹4 for product X and Y respectively	9,00,000	4,60,000
Add: closing stock (kg) (at full cost)	88,000	13,540
Value of production	9,88,000	4,73,540
Less: Share in joint cost	7,00,000	1,75,000
Further processing	1,80,000	1,50,000
Profit	1,08,000	1,48,540

(iv) Profitability statement, before and after processing

	Product X Before (₹)	Product X After (₹)	Product Y Before (₹)	Product Y After (₹)
Sales Value	9,60,000	1,08,000 (as per iii above)	2,40,000	1,48,540 (as per iii above)
Share in joint costs	7,00,000		1,75,000	
Profit	2,60,000		65,000	

Product X should be sold at split off point and product Y after processing because of higher profitability.

Question 8

A company manufactures one main product (M_1) and two by-products B_1 and B_2. For the month of January 2013, following details are available:

Total Cost upto separation Point ₹ 2,12,400

	M_1	B_1	B_2
Cost after separation	-	*₹ 35,000*	*₹ 24,000*
No. of units produced	*4,000*	*1,800*	*3,000*
Selling price per unit	*₹ 100*	*₹ 40*	*₹ 30*
Estimated net profit as percentage to sales value	-	*20%*	*30%*
Estimated selling expenses as percentage to sales value	*20%*	*15%*	*15%*

There are no beginning or closing inventories.

Prepare statement showing:

(i) Allocation of joint cost; and

(ii) Product-wise and overall profitability of the company for January 2013.

Solution:

(i) **Statement showing allocation of Joint Cost**

Particulars	B_1	B_2
No. of units Produced	1,800	3,000
Selling Price Per unit (₹)	40	30
Sales Value (₹)	72,000	90,000
*Less:*Estimated Profit (B_1 -20% & B_2 -30%)	(14,400)	(27,000)
Cost of Sales	57,600	63,000
Less: Estimated Selling Expenses (B_1 -15% & B_2 -15%)	(10,800)	(13,500)
Cost of Production	46,800	49,500
*Less:*Cost after separation	(35,000)	(24,000)
Joint Cost allocated	11,800	25,500

(ii) **Statement of Profitability**

Particulars		M_1 (₹)	B_1 (₹)	B_2 (₹)
Sales Value	(A)	4,00,000 (4,000 × ₹100)	72,000	90,000
Less:- Joint Cost		1,75,100 (2,12,400 -11,800 - 25,500)	11,800	25,500
- Cost after separation		-	35,000	24,000
- Selling Expenses (M_1- 20%, B_1-15% & B_2-15%)		80,000	10,800	13,500
	(B)	2,55,100	57,600	63,000
Profit	(A –B)	1,44,900	14,400	27,000
Overall Profit = ₹1,44,900 + ₹14,400 + ₹ 27,000 = ₹ 1,86,300				

Question 9

SV chemicals Limited processes 9,00,000 kgs. of raw material in a month purchased at ₹ 95 per kg in department X. The input output ratio of department X is 100 : 90. Processing of the material results in two joint products being produced 'P_1' and 'P_2' in the ratio of 60 : 40. Product 'P_1' can be sold at split off stage or can be further processed in department Y and sold as a new product 'YP_1'. The input output ratio of department Y is 100 : 95. Department Y is utilized only for further processing of product 'P_1' to product 'YP_1'. Individual departmental expenses are as follows:

	Dept. X (₹ lakhs)	Dept. Y (₹ lakhs)
Direct Materials	*95.00*	*14.00*
Direct Wages	*80.00*	*27.00*
Variable Overheads	*100.00*	*35.00*
Fixed Overheads	*75.00*	*52.00*
Total	*350.00*	*128.00*

Further, selling expenses to be incurred on three products are:

Particulars	Amount (₹ in lakhs)
Product 'P_1'	*28.38*
Product 'P_2'	*25.00*
Product 'YP_1'	*19.00*

Selling price of the products 'P_1' and 'P_2' at split off point is ₹110 per kg and ₹325 per kg respectively. Selling price of new product 'YP_1' is ₹ 150 per kg.

You are required to:

(i) Prepare a statement showing apportionment of joint costs, in the ratio of value of sales, net of selling expenses.

(ii) Statement showing profitability at split off point.

(iii) Statement of profitability of 'YP_1'.

(iv) Would you recommend further processing of P_1?

Solution:

Working Notes:

Input output ratio of material processed in Department X = 100 : 90

Particulars	Quantity (Kg)
Material input	9,00,000
Less: Loss of material in process @ 10% of 9,00,000 kgs	90,000
Output	8,10,000

Output of department X is product 'P_1' and 'P_2' in the ratio of 60 : 40.

Output 'P_1' = $\frac{60 \times 8,10,000}{100}$ = 4,86,000 kgs.

Output 'P_2' = $\frac{40 \times 8,10,000}{100}$ = 3,24,000 kgs.

Statement showing ratio of net sales

Product	P_1	P_2	Total
Quantity (kgs)	4,86,000	3,24,000	8,10,000
Selling price per kg (₹)	110.00	325.00	
Sales Value (₹ Lakhs)	534.60	1,053.00	1,587.60
Less: Selling Expenses	28.38	25.00	53.38
Net Sales	506.22	1,028.00	1,534.22
Ratio	33%	67%	100.00

Computation of Joint Costs

Particulars	Amount (₹Lakhs)
Raw Material input 9,00,000 kgs @ ₹ 95 per kg	855.00
Direct Materials	95.00
Direct Wages	80.00
Variable Overheads	100.00
Fixed Overheads	75.00
Total	1,205.00

(i) Statement showing apportionment of joint costs in the ratio of net sales

Particulars	Amount (₹ In lakhs)
Joint cost of P1 – 33% of ₹1,205 lakhs	397.65
Joint cost of P2 – 67% of ₹1,205 lakhs	807.35
Total	1,205.00

(ii) Statement showing profitability at split off point

Product	P_1	P_2	Total
Net Sales Value (₹ in lakhs) – [A]	506.22	1028.00	1534.22
Less: Joint costs (₹ in lakhs)	397.65	807.35	1205.00
Profit (₹ in lakhs) [A] – [B]	108.57	220.65	329.22

(iii) Statement of profitability of product 'YP1'

Particulars		YP_1
Sales Value (₹ in lakhs) [A]		629.55
Less: Cost of P1	397.65	807.35
Cost of Department Y	128.00	

Selling Expenses of Product 'YP1'	19.00	
Total Costs [B]		544.65
Profit (₹ in lakhs) [A] – [B]		147.90

Working Note: Computation of product 'YP1'

Quantity of product P_1 input used =- 4,86,000 kgs

Input output ratio of material processed in Department Y = 100 : 95

Particulars	**Quantity (Kg)**
Material input	4,86,000
Less: Loss of material in process @ 5% of 4,86,000	24,300
Output	4,61,700

Sales Value of YP_1 = 4,61,700 kgs @ ₹ 150 per kg = ₹692.55 lakhs

(iv) Further processing of product P_1 and converting to product YP_1 is beneficial as the profit of the company increases by ₹39.33 lakhs.

Working Note:

Profit of Product 'YP_1'	₹147.90L
Profit of Product 'P_1	₹108.57L
Increase in profit after further processing	₹ 39.33 L

11 Standard Costing

Basic Concepts

Standard Costing	Standard costing is a method of costing which measure the performance or an activity by comparing actual cost with standard cost, analyses the variances and reporting of variances for investigation.
Standard Cost	It is a planned unit cost of the product, component or service produced in a period.
Standard Price	A predetermined price fixed on the basis of a specification of a product or service and of all factors affecting that price.
Standard Time	The total time in which task should be completed at standard performance.
Variance	A divergence from the predetermined rates, expressed ultimately in money value, generally used in standard costing and budgetary control systems.
Variance Analysis	The analysis of variances arising in standard costing system into their constituent parts.
Ideal Standards	These represent the level of performance attainable when prices for material and labour are most favourable, when the highest output is achieved with the best equipment and layout and when the maximum efficiency in utilization of resources results in maximum output with minimum cost.
Normal Standards	These are standards that may be achieved under normal operating conditions.
Basic or Bogey Standards	These standards are used only when they are likely to remain constant or unaltered over a long period.

Current Standard	These standards reflect the management anticipation of what actual cost will be for the current period.
Controllable Variances	Controllable variances are those which can be controlled by the department heads. Responsibility centres are answerable for the all adverse variances.
Un-controllable Variances	These variances are arising from the conditions which are beyond the control of the concerned department.
Favourable Variance	Variances which are profitable for the organisation are known as favourable variance.
Adverse Variance	Variances which increase the cost for the organisation are known as adverse variance.
Material Cost Variance	This is the difference between standard material cost for the actual output and actual cost incurred.
Material Price Variance	It measures variance arises in the material cost due to difference in actual material purchase price from standard material price.
Material Usage Variance	It measures the variance in material cost due to usage/ consumption of materials.
Material Mix Variance	Variance in material consumption which arise due to difference in proportion actually used from the set standard proportion. It arises only when two or more inputs are used to produce a product.
Material Yield Variance	Variance in material consumption which arises due to yield or productivity of the inputs. It may arise due to use of sub standard quality of materials or inefficiency or workers or due to wrong processing.
Labour Cost Variance	This is difference between the standard labour costs for actual hours worked and actual wages paid.
Labour Rate Variance	This arises due to the difference in actual rate paid from the standard rate.

Labour Efficiency Variance	Labour efficiency variance is the difference between the actual hours worked by the worker and the standard hours required to produce the actual quantity.
Labour Mix/ Gang Variance	Labour efficiency variance which arises due to change in the proportion or combination or different skills set.
Labour Yield Variance	Labour efficiency variance which arises due to the productivity of workers from the set standard productivity.
Idle Time Variance	It is calculated for the unproductive labour hours.
Variable Overhead Cost Variance	This is the difference between the actual variable overhead paid and the standard variable overhead.
Variable Overhead Expenditure Variance	This is difference between the actual rate of variable overhead and standard variable overhead rate.
Variable Overhead Efficiency Variance	This is the difference between the actual hours worked and standard hours required for the actual volume of work.
Fixed Overhead Cost Variance	This is the difference between the actual fixed overhead incurred and absorbed fixed overhead.
Fixed Overhead Expenditure Variance	This the difference between the actual fixed overhead incurred and budgeted fixed overhead.
Fixed Overhead Volume Variance	Variance in fixed overhead which arises due to the volume of production.
Fixed Overhead Efficiency Variance	This is the difference between the actual hours worked and the standard hours required.
Fixed Overhead Capacity Variance	This is the difference between the budgeted capacity and the actual hours worked.
Fixed Overhead Calendar Variance	This is the difference between the actual number of days and budgeted number of working days.

Basic Formulae

Material Variances

Material Cost Variance
[Standard Cost – Actual Cost]
(The difference between the Standard Material Cost *of the actual production volume* and the Actual Cost of Material)
[(SQ × SP) – (AQ × AP)]

Material Price Variance	**Material Usage Variance**
[Standard Cost of Actual Quantity – Actual Cost]	[Standard Cost of Standard Quantity for Actual Production – Standard Cost of Actual Quantity]
(The difference between the Standard Price and Actual Price for the Actual Quantity Purchased)	(The difference between the Standard Quantity *specified for actual production* and the Actual Quantity *used*, at Standard Price)
[(SP – AP) × AQ] *Or* [(SP × AQ) – (AP × AQ)]	[(SQ – AQ) × SP] *Or* [(SQ × SP) – (AQ × SP)]

Material Mix Variance	**Material Yield Variance**
[Standard Cost of Actual Quantity in Standard Proportion – Standard Cost of Actual Quantity]	[Standard Cost of Standard Quantity for Actual Production – Standard Cost of Actual Quantity in Standard Proportion]
(The difference between the Actual Quantity *in standard proportion* and Actual Quantity *in actual proportion*, at Standard Price)	(The difference between the Standard Quantity *specified for actual production* and Actual Quantity *in standard proportion*, at Standard Purchase Price)
[(RSQ – AQ) × SP] *Or* [(RSQ × SP) – (AQ × SP)]	[(SQ – RSQ) × SP] *Or* [(SQ × SP) – (RSQ × SP)]

Note:

SQ	=	Standard Quantity = Expected Consumption for Actual Output
AQ	=	Actual Quantity *of Material Consumed*
RSQ	=	Revised Standard Quantity = Actual Quantity Rewritten in Standard Proportion
SP	=	Standard Price per Unit
AP	=	Actual Price per Unit

Labour Variances

Labour Cost Variance

[Standard Cost – Actual Cost]

(The difference between the <u>Standard Labour Cost</u> and the <u>Actual Labour Cost</u> *incurred for the production achieved*)

$[(SH \times SR) - (AH^* \times AR)]$

Labour Rate Variance

[Standard Cost of Actual Time – Actual Cost]

(The difference between the <u>Standard Rate</u> *per hour* and <u>Actual Rate</u> *per hour* for the <u>Actual Hours</u> *paid*)

$[(SR - AR) \times AH^*]$

Or

$[(SR \times AH^*) - (AR \times AH^*)]$

Labour Idle Time Variance

[Standard Rate per Hour x Actual Idle Hours]

(The difference between the <u>Actual Hours</u> *paid* and <u>Actual Hours</u> *worked* at <u>Standard Rate</u>)

$[(AH^* - AH^{\#}) \times SR]$

Or

$[(AH^* \times SR) - (AH^{\#} \times SR)]$

Labour Efficiency Variance

[Standard Cost of Standard Time for Actual Production – Standard Cost of Actual Time]

(The difference between the <u>Standard Hours</u> *specified for actual production* and <u>Actual Hours</u> *worked* at <u>Standard Rate</u>)

$[(SH - AH^{\#}) \times SR]$

Or

$[(SH \times SR) - (AH^{\#} \times SR)]$

Labour Mix Variance Or Gang Variance

[Standard Cost of Actual Time *Worked* in Standard Proportion – Standard Cost of Actual Time *Worked*]

(The difference between the <u>Actual Hours</u> *worked in standard proportion* and <u>Actual Hours</u> *worked in actual proportion*, at <u>Standard Rate</u>)

$[(RSH - AH^{\#}) \times SR]$

Or

$[(RSH \times SR) - (AH^{\#} \times SR)]$

Labour Yield Variance Or Sub-Efficiency Variance

[Standard Cost of Standard Time for Actual Production – Standard Cost of Actual Time *Worked* in Standard Proportion]

(The difference between the <u>Standard Hours</u> *specified for actual production* and <u>Actual Hours</u> *worked in standard proportion*, at <u>Standard Rate</u>)

$(SH - RSH) \times SR$

Or

$(SH \times SR) - (RSH \times SR)$

Alternate Formula	***Alternate Formula***
[Total Actual Time *Worked* (hours) × {*Average* Standard Rate *per hour* of Standard Gang <u>Less</u> *Average* Standard Rate *per hour* of Actual Gang@}] *@ on the basis of hours worked*	[*Average* Standard Rate *per hour* of Standard Gang × {Total Standard Time (hours) <u>Less</u> Total Actual Time *Worked* (hours)}]

Note:

SH = Standard Hours = Expected time (Time allowed) for Actual Output

AH* = Actual Hours *paid for*

AH# = Actual Hours *worked*

RSH = Revised Standard Hours = Actual Hours (worked) rewritten in Standard Proportion

SR = Standard Rate per Labour Hour

AR = Actual Rate per Labour Hour Paid

In the absence of idle time: Actual Hours Worked = Actual Hours Paid

☞

Idle Time is a period for which a workstation is available for production but is not used due to e.g. shortage of tooling, material or operators. During Idle Time, Direct Labour Wages are being paid but no output is produced. The cost of this can be identified separately in an Idle Time Variance, so that it is not 'hidden' in an adverse Labour Efficiency Variance.

Some organizations face Idle Time on regular basis. In this situation the Standard Labour Rate may include an allowance for the cost of the expected idle time. Only the impact of any unexpected or abnormal Idle Time would be included in the Idle Time Variance.

Variable Overhead Variances

Variable Overhead Cost Variance

(Standard Variable Overheads for Production – Actual Variable Overheads)

Variable Overhead Expenditure (Spending) Variance	**Variable Overhead Efficiency Variance**
(Standard Variable Overheads for Actual Hours#) *Less* (Actual Variable Overheads) [(SR – AR) × AH#] *Or* [(SR × AH#) – (AR × AH#)]	(Standard Variable Overheads for Production) *Less* (Standard Variable Overheads for Actual Hours#) [(SH – AH#) × SR] *Or* [(SH × SR) – (AH# × SR)]

Actual Hours (Worked)

Fixed Overhead Variances

Fixed Overhead Cost Variance

(Absorbed Fixed Overheads) *Less* (Actual Fixed Overheads)

Fixed Overhead Expenditure Variance	**Fixed Overhead Volume Variance**
(Budgeted Fixed Overheads) *Less* (Actual Fixed Overheads) Or (BH × SR) – (AH × AR)	(Absorbed Fixed Overheads) *Less* (Budgeted Fixed Overheads) Or (SH × SR) – (BH × SR)

Fixed Overhead Capacity Variance	**Fixed Overhead Calendar Variance**	**Fixed Overhead Efficiency Variance**
SR (AH – BH) Or (AH × SR) – (BH × SR)	Std. Fixed Overhead rate per day (Actual no. of Working days – Budgeted Working days)	SR(AH – SH) Or (AH × SR) – (SH × SR)

Fixed Overhead Efficiency Variance

(Absorbed Fixed Overheads) – (Budgeted Fixed Overheads for Actual Hours)

Or

(Standard Fixed Overhead Rate per Hour × Standard Hours for Actual Output) – (Standard Fixed Overhead Rate per Hour × Actual Hours)

Or

Standard Fixed Overhead Rate per Hour × (Standard Hours for Actual Output – Actual Hours)

Fixed Overhead Capacity Variance

(Budgeted Fixed Overheads for Actual Hours) – (Budgeted Fixed Overheads)

Or

(Standard Fixed Overhead Rate per Hour × Actual Hours) – (Standard Fixed Overhead Rate per Hour × Budgeted Hours)

Or
Standard Fixed Overhead Rate per Hour × (Actual Hours – Budgeted Hours)

Fixed Overhead Volume Variance (when rate per unit is given)
(Absorbed Fixed Overheads) – (Budgeted Fixed Overheads)
Or
(Standard Fixed Overhead Rate per Unit × Actual Output) – (Standard Fixed Overhead Rate per Unit × Budgeted Output)
Or
Standard Fixed Overhead Rate per Unit × (Actual Output – Budgeted Output)

Fixed Overhead Volume Variance (when rate per hour is given)
(Absorbed Fixed Overheads) – (Budgeted Fixed Overheads)
Or
(Standard Fixed Overhead Rate per Hour × Standard Hours for Actual Output) – (Standard Fixed Overhead Rate per Hour × Budgeted Hours)
Or
Standard Fixed Overhead Rate per Hour × (Standard Hours for Actual Output – Budgeted Hours)
Or
Standard Fixed Overhead Rate per Hour × (Standard Hours per Unit × Actual Output – Standard Hours per Unit × Budgeted Output)
Or
(Standard Fixed Overhead Rate per Hour × Standard Hours per Unit) × (Actual Output – Budgeted Output)
Or
Standard Fixed Overhead Rate per Unit × (Actual Output – Budgeted Output)

Sales Variances (Turnover or Value)

Sales Variance
(Actual Sales) *Less* (Budgeted Sales)
[(AP × AQ) – (BP × BQ)]

Sales Price Variance	Sales Volume Variance
(Actual Sales) *Less* (Standard Sales)	(Standard Sales) *Less* (Budgeted Sales)
[(AP × AQ) – (BP × AQ)] *Or* [AQ × (AP – BP)]	[(BP × AQ) – (BP × BQ)] *Or* [BP × (AQ – BQ)]

Sales Mix Variance	Sales Quantity Variance
(Standard Sales) *Less* (Revised Standard Sales)	(Revised Standard Sales) *Less* (Budgeted Sales)
[(BP × AQ) – (BP × RSQ)] *Or* [BP × (AQ – RSQ)]	[(BP × RSQ) – (BP × BQ)] Or [BP × (RSQ – BQ)]
Alternative Formula [Total Actual Quantity (units) × {*Average* Budgeted Price *per unit* of Actual Mix Less *Average* Budgeted Price *per unit* of Budgeted Mix}]	***Alternative Formula*** [*Average* Budgeted Price *per unit* of Budgeted Mix × {Total Actual Quantity (units) Less Total Budgeted Qty (units)}]

SECTION-A

Question-1

Describe three distinct groups of variances that arise in standard costing.

Solution:

The three distinct groups of variances that arise in standard costing are:

(i) Variances of efficiency. These are the variance, which arise due to efficiency or inefficiency in use of material, labour etc.

(ii) Variances of prices and rates: These are the variances, which arise due to changes in procurement price and standard price.

(iii) Variances due to volume: These represent the effect of difference between actual activity and standard level of activity.

Question-2

"Calculation of variances in standard costing is not an end in itself, but a means to an end." Discuss.

Solution:

The crux of standard costing lies in variance analysis. Standard costing is the technique whereby standard costs are predetermined and subsequently compared with the recorded actual costs. It is a technique of cost ascertainment and cost control. It establishes predetermined estimates of the cost of products and services based on management's standards of efficient operation. It thus lays emphasis on "what the cost should be". These should be costs are when compared with the actual costs. The difference between standard cost and actual cost of actual output is defined as the variance.

The variance in other words in the difference between the actual performance and the standard performance. The calculations of variances are simple. A variance may be favourable or unfavourable. If the actual cost is less than the standard cost, the variance is favourarable but if the actual cost is more than the standard cost, the variance will be unfavourable. They are easily expressible and do not provide detailed analysis to enable management of exercise control over them. It is not enough to know the figures of these variances from month to month. We in fact are required to trace their origin and causes of occurrence for taking necessary remedial steps to reduce / eliminate them.

A detailed probe into the variance particularly the controllable variances helps the management to ascertain:

(i) the amount of variance

(ii) the factors or causes of their occurrence

(iii) the responsibility to be laid on executives and departments and

(iv) corrective actions which should be taken to obviate or reduce the variances.

Mere calculation and analysis of variances is of no use. The success of variance analysis depends upon how quickly and effectively the corrective actions can be taken on the analysed variances. In fact variance gives information. The manager needs to act on the information provided for taking corrective action. Information is the means and action taken on it is the end. In other words, the calculation of variances in standard costing is not an end in itself, but a means to an end.

Question-3

Describe the various steps involved in adopting standard costing system in an organization.

Solution:

The Steps of standard costing is as below:

(i) **Setting of Standards:** The first step is to set standards which are to be achieved.

(ii) **Ascertainment of actual costs:** Actual cost for each component of cost is ascertained. Actual costs are ascertained from books of account, material invoices, wage sheet, charge slip etc.

(iii) **Comparison of actual cost and standard cost:** Actual costs are compared with the standards costs and variances are determined.

(iv) **Investigation of variances:** Variances arises are investigated for further action. Based on this performance is evaluated and appropriate actions are taken.

(v) **Disposition of variances:** Variances arise are disposed off by transferring it the relevant accounts (costing profit and loss account) as per the accounting method (plan) adopted.

SECTION- B

Question 1

Calculate Efficiency and Capacity ratio from the following figures:

Budgeted production	*80 units*
Actual production	*60 units*
Standard time per unit	*8 hours*
Actual hours worked	*500 hours.*

Solution:

Efficiency Ratio = $\dfrac{\text{Actual output in terms of standard hours}}{\text{Actual hour worked}} \times 100$

Or, $\dfrac{60\text{ units} \times 8\text{ hours}}{500\text{ hours}} \times 100$ Or, $\dfrac{480\text{ hours}}{500\text{ hours}} \times 100 = 96\%$

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

Or, $\dfrac{500\text{ hours}}{80\text{ units} \times 8\text{ hours}} \times 100$ Or, $\dfrac{500\text{ hours}}{640\text{ hours}} \times 100 = 78.12\%$

Question 2

KPR Limited 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 (₹)***
Direct material	*5 kg. @ ₹ 4.20*	*21.00*
Direct labour	*3 hours @ ₹ 3.00*	*9.00*
Factory overhead	*₹ 1.20 per labour hour*	*3.60*
	Total manufacturing cost	*33.60*

The production schedule for the month of June, 2013 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, 2013, 2,25,000 kg. of material at the rate of ₹ 4.50 per kg. Production and Sales records for the month showed the following actual results.

Material used	*2,05,600 kg.*
Direct labour 1,21,200 hours; cost incurred	*₹ 3,87,840*
Total factory overhead cost incurred	*₹ 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 factory overhead.

(iii) Prepare Income statement for June, 2013 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.

Solution

(i) Material variances:

(a) Direct Material Cost Variance = Standard Cost – Actual Cost

= (40,960 units × 5 kg.× ₹ 4.20) – (2,05,600 kg.× ₹4.50)

= ₹ 8,60,160 – ₹ 9,25,200 = ₹ 65,040 (A)

(b) Material Price Variance = Actual Qty. (Std. Price – Actual Price)

= 2,05,600* kg. (₹ 4.20 – ₹4.50) = ₹ 61,680 (A)

(*Material variances are calculated on the basis of consumption)

(c) Material Usages Variance = Std. Price (Std. Qty. – Actual Qty.)

= ₹ 4.20 (40,960 units × 5 kg. – 2,05,600 kg.)

= ₹ 3,360 (A)

(ii) Labour Variances and Overhead Variances:

(a) Labour Cost Variance = Standard cost – Actual cost

= (40,960 units × 3 hours × ₹ 3) – ₹ 3,87,840

= ₹19,200 (A)

(b) Labour Rate Variance = Actual Hours (Std. Rate – Actual Rate)

= 1,21,200 hours (₹ 3 – ₹ 3.20)

= ₹ 24,240 (A)

(c) Labour Efficiency Variance = Std. Rate (Std. Hour – Actual Hour)

= ₹ 3 (40,960 units × 3 hour – 1,21,200 hour)

= ₹ 5,040 (F)

(d) Total Factory Overhead Variance

= Factory Overhead Absorbed – Actual Factory Overhead

= (Actual Hours × Std. Rate) – Actual Factory Overhead

= (40,960 units × 3 hours × ₹1.20) – ₹1,00,000

= ₹ 47,456 (F)

(iii) Preparation of Income Statement

Calculation of unit selling price	(₹)
Direct material	21.00
Direct labour	9.00
Factory overhead	3.60
Factory cost	33.60
Margin 25% on factory cost	8.40
Selling price	42.00

Income Statement

	(₹)	(₹)
Sales (40,000 units × ₹ 42)		16,80,000

Less: Standard cost of goods sold (40,000 units × ₹33.60)		13,44,000
		3,36,000
Less: Adverse Variances:		
Material Price variance	61,680	
Material Usage variance	3,360	
Labour Rate variance	24,240	89,280
		2,46,720
Add: Favourable variances:		
Labour efficiency variance	5,040	
Factory overhead	47,456	52,496
Actual gross margin		2,99,216

(iv)

Labour hour saved	(₹)
Standard labour hours (40,960 units × 3 hours)	1,22,880
Actual labour hour worked	1,21,200
Labour hour saved	1,680

Bonus for saved labour = 50% (1,680 hours × ₹ 3) = ₹ 2,520.

Question 3

UV Ltd. presents the following information for November, 2013:

Budgeted production of product P = 200 units.

Standard consumption of Raw materials = 2 kg. per unit of P.

Standard price of material A = ₹ 6 per kg.

Actually, 250 units of P were produced and material A was purchased at ₹ 8 per kg and consumed at 1.8 kg per unit of P. Calculate the Material Cost Variances.

Solution:

Actual production of P = 250 units

Standard quantity of material A for actual production = 2 kg. × 250 units = 500 kg. (SQ)

Actual quantity of material A for actual production = 1.8 kg. × 250 units = 450 kg. (AQ)

Standard price per kg. of material A = ₹ 6 (SP)

Actual price per kg. of material A = ₹ 8 (AP)

(1)	Total Material Cost Variance	= (Standard Price × Standard Quantity)
		– (Actual Price × Actual Quantity)
		= (₹ 6 × 500 kg.) – (₹ 8 × 450 kg.)
		= ₹ 3,000 – ₹ 3,600 = ₹ 600 (A)
(2)	Material Price Variance	= (Standard Price – Actual Price) × Actual Quantity
		= (₹ 6 – ₹ 8) × 450 kg. = 900 (A)
(3)	Material Usage Variance	= (Standard Quantity – Actual Quantity) × Standard Price
		= (500 kg. – 450 kg.) × ₹ 6 = 300 (F)

Question 4

The following information is available from the cost records of Vatika & Co. For the month of August, 2013:

Material purchased 24,000 kg ₹ 1,05,600

Material consumed 22,800 kg

Actual wages paid for 5,940 hours ₹ 29,700

Unit produced 2,160 units.

Standard rates and prices are:

Direct material rate is ₹ 4.00 per unit

Direct labour rate is ₹ 4.00 per hour

Standard input is 10 kg. for one unit

Standard labour requirement is 2.5 hours per unit.

Calculate all material and labour variances for the month of August, 2013.

Solution:

Material Variances:

(i) Material Cost Variance

= (Std. Qty. × Std. Price) – (Actual Qty. × Actual Price)

= (2,160 units × 10 kg. × ₹ 4) – (22,800 kg. × ₹4.40)

= ₹ 86,400 – ₹1,00,320 = ₹ 13,920 (A)

(ii) Material Price Variance

= Actual Q (SP – AP)

= 24,000 kg. (₹ 4 – ₹ 4.40) = ₹ 9,600 (A)

(Here AQ means actual quantity of material purchased)

(iii) Material Usage Variance

= SP (SQ – AQ)

= ₹ 4 (21,600 kg. – 22,800 kg.) = ₹ 4,800 (A)

Labour Variances:

(i) Labour Cost Variance

= (SH × SR) – (AH × AR)

= (2,160 units × 2.50 hours × ₹4) – ₹29,700

= ₹ 21,600 – ₹ 29,700 = ₹ 8,100 (A)

(ii) Labour Rate Variance

= AH (SR – AR) = 5,940 hours (₹ 4 – ₹ 5) = ₹ 5,940 (A)

(iii) Labour Efficiency Variance

= SR (SH – AH)

= ₹ 4 (5,400 hours – 5,940 hours) = ₹ 2,160 (A)

Question 5

SB Constructions Limited has entered into a big contract at an agreed price of ₹ 1,50,00,000 subject to an escalation clause for material and labour as spent out on the contract and corresponding details are as follows:

Material:	Standard		Actual	
	Quantity (Tons)	Rate per Ton (₹)	Quantity (Tons)	Rate per Ton (₹)
A	3,000	1,000	3,400	1,100
B	2,400	800	2,300	700
C	500	4,000	600	3,900
D	100	30,000	90	31,500
Labour:	Hours	Hourly Rate (₹)	Hours	Hourly Rate (₹)
L_1	60,000	15	56,000	18
L_2	40,000	30	38,000	35

You are required to:

Calculate the following variances and verify them :

(a) Material Cost Variance

(b) Material Price Variance

(c) Material Usage Variance

(d) Labour Cost Variance

(e) Labour Rate Variance

(f) Labour Efficiency Variance.

Solution:

Material Variances

(SQ × SP)		(₹)	(AQ × AP)		(₹)	(AQ × SP)		(₹)
A-3,000 ×1,000	=	30,00,000	3,400 ×1,100	=	37,40,000	3,400 ×1,000	=	34,00,000
B-2,400 × 800	=	19,20,000	2,300 × 700	=	16,10,000	2,300 × 800	=	18,40,000
C- 500 ×4,000	=	20,00,000	600 × 3,900	=	23,40,000	600 × 4,000	=	24,00,000
D-100×30,000	=	30,00,000	90 × 31,500	=	28,35,000	90 × 30,000	=	27,00,000
Total		99,20,000			1,05,25,000			1,03,40,000

(a) Material Cost Variance (MCV) = (SQ × SP) – (AQ × AP)

= ₹ 99, 20,000 – ₹ 1, 05, 25,000 = ₹ 6, 05,000 (A)

(b) Material Price Variance (MPV) = AQ (SP – AP) or (AQ × SP) – (AQ × AP)

= ₹ 1, 03, 40,000 – ₹ 1, 05, 25,000 = ₹ 1, 85,000 (A)

(c) Material Usage Variance (MUV) = (SQ × SP) – (AQ × SP)

= ₹ 99, 20,000 – ₹ 1, 03, 40,000 = ₹ 4, 20,000(A)

Verification, MCV = MPV + MUV

Or, ₹ 6, 05,000 (A) = ₹ 1, 85,000 (A) + ₹ 4, 20,000 (A)

Or, ₹ 6, 05,000 (A) = ₹ 6, 05,000 (A)

Labour Variances

(SH × SR)		(₹)	(AH× AR)		(₹)	(AH× SR)		(₹)
L_1 –60,000 × 15	=	9,00,000	56,000 × 18	=	10,08,000	56,000 ×15	=	8,40,000
L_2 – 40,000 × 30	=	12,00,000	38,000 × 35	=	13,30,000	38,000 × 30	=	11,40,000
Total		21,00,000			23,38,000			19,80,000

(a) Labour Cost Variance (LCV) = (SH × SR) – (AH × AR)

= ₹ 21,00,000 – ₹ 23,38,000 = ₹ 2,38,000 (A)

(b) Labour Rate Variance (LRV) = (AH × SR) – (AH × AR)

= ₹ 19,80,000 – ₹ 23,38,000 = ₹ 3,58,000 (A)

(c) Labour Efficiency Variance (LEV) = (SH × SR) – (AH × SR)

= ₹ 21,00,000 – ₹ 19,80,000 = ₹ 1,20,000 (F)

Verification, LCV = LRV + LEV

Or, ₹ 2,38,000 (A) = ₹ 3,58,000 (A) + ₹ 1,20,000 (F)

Or, ₹ 2,38,000 (A) = ₹ 2,38,000 (A)

Question 6

Compute the sales variances (total, price and volume) from the following figures:

Product	*Budgeted quantity*	*Budgeted Price per Unit (₹)*	*Actual quantity*	*Actual Price per unit (₹)*
P	*4000*	*25*	*4800*	*30*
Q	*3000*	*50*	*2800*	*45*
R	*2000*	*75*	*2400*	*70*
S	*1000*	*100*	*800*	*105*

Solution:

Working:

Product	**Budgeted Price (₹)**	**Actual Price (₹)**	**Budgeted Qty.**	**Actual Qty.**	**Budgeted Sales (₹)**	**Standard Sales (Actual Sales at Budgeted price) (₹)**	**Actual sales (₹)**
	(a)	**(b)**	**(c)**	**(d)**	**(e) = (a × c)**	**(f) = (a × d)**	**(g) =(b x d)**
P	25	30	4,000	4,800	1,00,000	1,20,000	1,44,000
Q	50	45	3,000	2,800	1,50,000	1,40,000	1,26,000
R	75	70	2,000	2,400	1,50,000	1,80,000	1,68,000
S	100	105	1,000	800	1,00,000	80,000	84,000
					5,00,000	5,20,000	5,22,000

Calculation of Variances:

Sale Price Variance = Actual Quantity (Actual Price – Budgeted Price)

= Actual Sales – Standard. Sales

= ₹ 5,22,000 – ₹ 5,20,000 = ₹ 2,000 (F)

Sales Volume Variance = Budgeted Price (Actual Quantity – Budgeted Quantity)
= Standard Sales – Budgeted Sales
= ₹ 5,20,000 – ₹ 5,00,000 = ₹ 20,000 (F)

Total Sales Variance = Actual Sales – Budgeted Sales
= ₹ 5,22,000 – ₹ 5,00,000 = ₹ 22,000 (F)

Verification, Total Sales Variance = Sales Price Variance + Sales Volume Variance

₹ 22,000 (F) = ₹ 2,000 (F) + ₹ 20,000 (F)

Question 7

Gama Ltd. has furnished the following standard cost data per' unit of production:

Material 10 kg @ ₹ 10 per kg.

Labour 6 hours @ ₹ 5.50 per hour

Variable overhead 6 hours @ ₹ 10 per hour.

Fixed overhead ₹ 4,50,000 per month (Based on a normal volume of 30,000 labour hours.)

The actual cost data for the month of August 2013 are as follows:

Material used 50,000 kg at a cost of ₹ 5,25,000.

Labour paid ₹ 1,55,000 for 31,000 hours worked

Variable overheads ₹ 2,93,000

Fixed overheads ₹ 4,70,000

Actual production 4,800 units.

Calculate:

(i) Material Cost Variance.

(ii) Labour Cost Variance.

(iii) Fixed Overhead Cost Variance.

(iv) Variable Overhead Cost Variance.

Solution:

Budgeted Production 30,000 hours ÷ 6 hours per unit = 5,000 units

Budgeted Fixed Overhead Rate = ₹ 4,50,000 ÷ 5,000 units = ₹ 90 per unit Or
= ₹ 4,50,000 ÷ 30,000 hours = ₹ 15 per hour.

(i) Material Cost Variance = (Std. Qty. × Std. Price) – (Actual Qty. × Actual Price)
= (4,800 units × 10 kg. × ₹10) - ₹ 5,25,000

= ₹ 4.80,000 – ₹ 5,25,000

= ₹ 45,000 (A)

(ii) Labour Cost Variance = (Std. Hours × Std. Rate) – (Actual Hours × Actual rate)

= (4,800 units × 6 hours × ₹ 5.50) – ₹1,55,000

= ₹ 1,58,400 – ₹ 1,55,000

= ₹ 3,400 (F)

(iii) Fixed Overhead Cost Variance = (Budgeted Rate × Actual Qty) – Actual Overhead

= (₹ 90 x 4,800 units) – ₹ 4,70,000

= ₹ 38,000 (A)

OR = (Budgeted Rate × Std. Hours) – Actual Overhead

= (₹ 15 x 4,800 units × 6 hours) – ₹ 4,70,000

= ₹ 38,000 (A)

(iv) Variable Overhead Cost Variance= (Std. Rate × Std. Hours) – Actual Overhead

= (4,800 units × 6 hours × ₹ 10) - ₹ 2,93,000

= ₹ 2,88,00 - ₹ 2,93,000

= ₹ 5,000 (A)

Question 8

SJ Ltd. has furnished the following information:

Standard overhead absorption rate per unit	*₹ 20*
Standard rate per hour	*₹ 4*
Budgeted production	*12,000 units*
Actual production	*15,560 units*

Actual overheads were ₹ 2,95,000 out of which ₹ 62,500 fixed .

Actual hours 74,000

Overheads are based on the following flexible budget

Production (units)	*8,000*	*10,000*	*14,000*
Total Overheads (₹)	*1,80,000*	*2,10,000*	*2,70,000*

You are required to calculate the following overhead variances (on hour's basis) with appropriate workings:

(i) Variable overhead efficiency and expenditure variance

(ii) Fixed overhead efficiency and capacity variance.

Solution:

Workings:

(a) Variable Overhead rate per unit

$$= \frac{\text{Difference of Overhead at two level}}{\text{Difference in Production units}}$$

$$= \frac{₹2,10,000 - ₹1,80,000}{10,000 \text{ units} - 8,000 \text{ units}} = ₹15$$

(b) Fixed Overhead = ₹ 1,80,000 – (8,000 units × ₹ 15) = ₹ 60,000

(c) Standard hours per unit of production $= \frac{\text{Std. Overhead Absorption Rate}}{\text{Std. Rate per hour}}$

$$= \frac{₹20}{₹4} = 5 \text{ hours}$$

(d) Standard Variable Overhead Rate per hour $= \frac{\text{Variable Overhead per unit}}{\text{Std. hour per unit}}$

$$= \frac{₹15}{5 \text{ hours}} = ₹3$$

(e) Standard Fixed Overhead Rate per hour = ₹ 4- ₹ 3 = ₹ 1

(f) Actual Variable Overhead = ₹ 2,95,000 – ₹ 62,500= ₹ 2,32,500

(g) Actual Variable Overhead Rate per Hour $= \frac{₹2,32,500}{74,000 \text{ hours}} = ₹3.1419$

(h) Budgeted hours = 12,000 units × 5 hours = 60,000 hours

(i) Standard Hours for Actual Production = 15,560 units × 5 hours = 77,800 hours

(i) Variable Overhead Efficiency and Expenditure Variance:

Variable Overhead Efficiency Variance = Std. Rate per hour (Std. Hours – Actual Hours)

= ₹ 3 (77,800 hours – 74,000 hours)

= ₹ 11,400 (F)

Variable Overhead Expenditure Variance = Actual Hours (Std. Rate - Actual Rate)

= 74,000 hours (₹ 3 - ₹ 3.1419)

= ₹ 10,500 (A)

(ii) Fixed Overhead Efficiency and Capacity Variance:

Fixed Overhead Efficiency Variance = Std. Rate per Hour (Std. Hours-Actual Hours)

= ₹ 1(77,800 hours -74,000 hours) = ₹ 3,800 (F)

Fixed Overheads Capacity Variance = Std. Rate per Hour (Actual Hours -Budgeted Hours)

= ₹ 1(74,000 hours – 60,000 hours)

= ₹ 74,000 – ₹ 60,000= ₹ 14,000 (F)

Question 9

The standard labour employment and the actual labour engaged in a 40 hours week for a job are as under:

Category of Workers	*Standard*		*Actual*	
	No. of workers	*Wage Rate per hour (₹)*	*No. of workers*	*Wage Rate per hour (₹)*
Skilled	*65*	*45*	*50*	*50*
Semi-skilled	*20*	*30*	*30*	*35*
Unskilled	*15*	*15*	*20*	*10*

Standard output: 2,000 units; Actual output: 1,800 units

Abnormal Idle time 2 hours in the week

Calculate:

(i) Labour Cost Variance

(ii) Labour Efficiency Variance

(iii) Labour Idle Time Variance.

Solution:

Working Note:

Table Showing Standard & Actual Cost

Worker	Standard Hours (a)	Standard Rate per Hour (b)	Standard Cost for Actual Output (c) = (a x b)	Actual Hours Paid (d)	Actual Rate per hour (e)	Actual Cost (f) = (d) x (e)	Idle time (g)	Actual hours worked (h)=(d)-(g)
Skilled	2,340 hrs. [(65 Workers x 40 hrs.)/ 2,000 units)] x1,800 units	₹ 45	₹1,05,300	2,000 hrs. (50 Workers x 40 hrs.)	₹ 50	₹1,00,000	100 hrs. (50 Workers x 2 hrs.)	1,900 hrs. (2,000 hrs.-100 hrs.)
Semi-skilled	720 hrs. [(20 Workers x	₹30	₹21,600	1,200 hrs. (30 Workers	₹35	₹42,000	60 hrs. (30	1,140 hrs. (1,200 hrs.-60

	40 hrs.)/ 2,000 units)] x1,800 units			x 40 hrs.)			Workers x 2 hrs.)	hrs.)
Unskilled	540 hrs. [(15 Workers x 40 hrs.)/ 2,000 units)] x1,800 units	₹15	₹8,100	800 hrs. (20 Workers x 40 hrs.)	₹10	₹8,000	40 hrs. (20 Workers x 2 hrs.)	760 hrs. (800 hrs.-40 hrs.)
Total	3,600 hrs.		₹1,35,000	4,000 hrs.		₹1,50,000	200 hrs.	3,800 hrs.

Calculation of Variances

(i) Labour Cost Variance = Standard Cost for actual output – Actual cost

Skilled worker = ₹1,05,300 - ₹1,00,000

= ₹ 5,300 (F)

Semi-skilled worker = ₹ 21,600 - ₹ 42,000

= ₹ 20,400 (A)

Unskilled Worker = ₹ 8,100 - ₹ 8,000

= ₹100 (F)

Total = ₹5,300 (F) + ₹20,400 (A) + ₹100 (F)

= ₹15,000 (A)

(ii) Labour Efficiency Variance = Std. Rate x (Standard hours – Actual hours worked)

Skilled worker = ₹ 45 x (2,340 hrs. - 1,900 hrs.)

= ₹19,800 (F)

Semi-skilled worker = ₹ 30 x (720 hrs. - 1,140 hrs.)

= ₹ 12,600 (A)

Unskilled Worker = ₹ 15 x (540 hrs. - 760 hrs.)

= ₹ 3,300 (A)

Total = ₹19,800 (F) + ₹12,600 (A) + ₹3,300 (A)

= ₹3,900 (F)

(iii) Labour Idle Time Variance = Std. Rate x Idle Time (Hrs.)

Skilled worker = ₹ 45 x 100 hrs.

= ₹ 4,500 (A)

Semi-skilled worker = ₹ 30 x 60 hrs.

= ₹ 1,800 (A)

Unskilled worker	= ₹ 15 x 40 hrs.= ₹ 600 (A)
Total	= ₹ 4,500 (A) + ₹ 1,800 (A) + ₹ 600 (A)
	= ₹ 6,900 (A)

Question 10

Following are the details of the product Phomex for the month of April 2013:

Standard quantity of material required per unit	*5 kg*
Actual output	*1000 units*
Actual cost of materials used	*₹ 7,14,000*
Material price variance	*₹ 51,000 (Fav)*

Actual price per kg of material is found to be less than standard price per kg of material by ₹ 10.

You are required to calculate:

(i) Actual quantity and Actual price of materials used.

(ii) Material Usage Variance

(iii) Material Cost Variance.

Solution:

(i) Actual Quantity and Actual Price of material used

Material Price Variance = Actual Quantity (Std. Price – Actual Price) = ₹51,000

Or, AQ (SP – AP) = ₹ 51,000

Or, 10 AQ = ₹ 51,000

Or, AQ = 5,100 kgs

Actual cost of material used is given i.e.

AQ x AP = ₹ 7,14,000

Or, 5,100 AP = ₹ 7,14,000

AP = ₹ 140

∵ Actual price is less by ₹ 10

So, Standard Price = ₹ 140 + ₹ 10 = ₹ 150 per kg

Actual Quantity = 5,100 kgs

Actual Price = ₹ 140/kg

(ii) Material Usage Variance

Std. Price (Std. Quantity – Actual Quantity)

Or, SP (SQ – AQ) = ₹ 150 (1,000 units x 5 kg – 5,100 kg)

= ₹ 15,000 (A)

(iii) Material Cost Variance = Std. Cost – Actual Cost

= (SP x SQ) – (AP x AQ)

= ₹ 150 x 5,000 – ₹ 140 x 5,100

= ₹ 7,50,000 – ₹ 7,14,000

= ₹ 36,000 (F)

OR

Material Price Variance + Material Usage Variance

₹ 51,000 (F) + ₹15,000 (A)= ₹ 36,000 (F)

Question 11

SP Limited produces a product 'Tempex' which is sold in a 10 Kg. packet. The standard cost card per packet of 'Tempex' are as follows:

	(₹)
Direct materials 10 kg @ ₹ 45 per kg	*450*
Direct labour 8 hours @ ₹ 50 per hour	*400*
Variable Overhead 8 hours @ ₹ 10 per hour	*80*
Fixed Overhead	*200*
	1,130

Budgeted output for the third quarter of a year was 10,000 Kg. Actual output is 9,000 Kg.

Actual cost for this quarter are as follows :

	(₹)
Direct Materials 8,900 Kg @ ₹ 46 per Kg.	*4,09,400*
Direct Labour 7,000 hours @ ₹ 52 per hour	*3,64,000*
Variable Overhead incurred	*72,500*
Fixed Overhead incurred	*1,92,000*

You are required to calculate :

(i) Material Usage Variance

(ii) Material Price Variance

(iii) Material Cost Variance

(iv) Labour Efficiency Variance

(v) Labour Rate Variance

(vi) Labour Cost Variance

(vii) Variable Overhead Cost Variance

(viii) Fixed Overhead Cost Variance.

Solution:

(i) Material Usage Variance = Std. Price (Std. Quantity – Actual Quantity)
= ₹ 45 (9,000 kg. – 8,900 kg.)
= ₹ 4,500 (Favourable)

(ii) Material Price Variance = Actual Quantity (Std. Price – Actual Price)
= 8,900 kg. (₹ 45 – ₹ 46) = ₹ 8,900 (Adverse)

(iii) Material Cost Variance = Std. Material Cost – Actual Material Cost
= (SQ × SP) – (AQ × AP)
= (9,000 kg. × ₹ 45) – (8,900 kg. × ₹ 46)
= ₹ 4,05,000 – ₹ 4,09,400
= ₹4,400 (Adverse)

(iv) Labour Efficiency Variance = Std. Rate (Std. Hours – Actual Hours)

$$= ₹\ 50\ \left(\frac{9{,}000}{10} \times 8\,\text{hours}\ - 7{,}000\ \text{hrs.}\right)$$

= ₹ 50 (7,200 hrs. – 7,000 hrs.)
= ₹ 10,000 (Favourable)

(v) Labour Rate Variance = Actual Hours (Std. Rate – Actual Rate)
= 7,000 hrs. (₹ 50 – ₹52)
= ₹ 14,000 (Adverse)

(vi) Labour Cost Variance = Std. Labour Cost – Actual Labour Cost
= (SH × SR) – (AH × AR)
= (7,200 hrs. × ₹ 50) – (7,000 hrs. × ₹ 52)
= ₹ 3,60,000 – ₹ 3,64,000
= ₹4,000 (Adverse)

(vii) Variable Cost Variance = Std. Variable Cost – Actual Variable Cost
= (7,200 hrs. × ₹ 10) – ₹ 72,500
= ₹ 500 (Adverse)

(viii) Fixed Overhead Cost Variance = Absorbed Fixed Overhead – Actual Fixed Overhead

$$= \frac{₹\ 200}{10\ \text{kgs.}} \times 9{,}000\,\text{kgs.} - ₹\,1{,}92{,}000$$

= ₹ 1,80,000 – ₹ 1,92,000 = ₹ 12,000 (Adverse)

Question 12

XYZ Co. Ltd. provides the following information:

	Standard	***Actual***
Production	*4,000 Units*	*3,800 Units*
Working Days	*20*	*21*
Fixed Overhead	*₹ 40,000*	*₹ 39,000*
Variable Overhead	*₹ 12,000*	*₹ 12,000*

You are required to calculate following overhead variances:

(a) Variable Overhead Variance

(b) Fixed Overhead Variances

(i) Expenditure Variance

(ii) Volume Variance

Solution:

Workings:

Standard Variable Overhead rate per unit = $\frac{₹\ 12,000}{4,000\ \text{units}}$ = ₹ 3

Standard Fixed Overhead rate per unit = $\frac{₹\ 40,000}{4,000\ \text{units}}$ = ₹ 10

(a) Variable Overhead Variance = Recovered Variable Overhead - Actual Variable overhead

= 3,800 units × ₹ 3 – ₹ 12,000

= ₹ 11,400 – ₹12,000 = ₹ 600 (Adverse)

(b) (i) Fixed Overhead Expenditure Variance = Budgeted Overhead – Actual Overhead

= ₹ 40,000 – ₹ 39,000

= ₹ 1,000 (Favourable)

(ii) Fixed Overhead Volume Variance = Recovered Overhead – Budgeted Overhead

= 3,800 units × ₹ 10 – ₹ 40,000

= ₹ 38,000 – ₹ 40,000

= ₹ 2,000 (Adverse)

Question 13

Jigyasa Pharmaceuticals Ltd. is engaged in producing dietary supplement 'Funkids' for growing children. It produces 'Funkids' in a batch of 10 kgs. Standard material inputs required for 10 kgs. of 'Funkids' are as below:

Material	Quantity (in kgs.)	Rate per kg. (in ₹)
Vita-X	5	110
Proto-D	3	320
Mine-L	3	460

During the month of March, 2014, actual production was 5,000 kgs. of 'Funkids' for which the actual quantities of material used for a batch and the prices paid thereof are as under:

Material	Quantity (in kgs.)	Rate per kg. (in ₹)
Vita-X	6	115
Proto-D	2.5	330
Mine-L	2	405

You are required to calculate the following variances based on the above given information for the month of March, 2014 for Jigyasa Pharmaceuticals Ltd.:

(i) Material Cost Variance;

(ii) Material Price Variance;

(iii) Material Usage Variance;

(iv) Material Mix Variance;

(v) Material Yield Variance.

Solution:

Material	SQ* × SP	AQ** × SP	AQ** × AP	RSQ*** × SP
Vita-X	₹ 2,75,000 (2,500 kg. × ₹ 110)	₹ 3,30,000 (3,000 kg. × ₹ 110)	₹ 3,45,000 (3,000 kg. × ₹ 115)	₹ 2,62,460 (2,386 kg. × ₹ 110)
Proto-D	₹ 4,80,000 (1,500 kg. × ₹ 320)	₹ 4,00,000 (1,250 kg. × ₹ 320)	₹ 4,12,500 (1,250 kg. × ₹ 330)	₹ 4,58,240 (1,432 kg. × ₹ 320)
Mine-L	₹ 6,90,000 (1,500 kg. × ₹ 460)	₹ 4,60,000 (1,000 kg. × ₹ 460)	₹ 4,05,000 (1,000 kg. × ₹ 405)	₹ 6,58,720 (1,432 kg. × ₹ 460)
Total	₹ 14,45,000	₹ 11,90,000	₹ 11,62,500	₹ 13,79,420

* *Standard Quantity of materials for actual output :*

Vita-X	$= \frac{5\text{kgs.}}{10\text{kgs}} \times 5{,}000\text{kgs.} = 2{,}500\text{kgs.}$
Proto-D	$= \frac{3\text{kgs.}}{10\text{kgs}} \times 5{,}000\text{kgs.} = 1{,}500\text{kgs.}$
Mine-L	$= \frac{3\text{kgs.}}{10\text{kgs}} \times 5{,}000\text{kgs.} = 1{,}500\text{kgs.}$

** *Actual Quantity of Material used for actual output:*

Vita-X	$= \frac{6\text{kgs.}}{10\text{kgs}} \times 5{,}000\text{kgs.} = 3{,}000\text{kgs.}$
Proto-D	$= \frac{2.5\text{kgs.}}{10\text{kgs}} \times 5{,}000\text{kgs.} = 1{,}250\text{kgs.}$
Mine-L	$= \frac{2\text{kgs.}}{10\text{kgs}} \times 5{,}000\text{kgs.} = 1{,}000\text{kgs.}$

****Revised Standard Quantity (RSQ):*

Vita-X	$= \frac{5\text{kgs.}}{11\text{ kgs}} \times 5{,}250\text{kgs.} = 2{,}386\text{kgs.}$
Proto-D	$= \frac{3\text{kgs.}}{11\text{kgs}} \times 5{,}250\text{kgs.} = 1{,}432\text{kgs.}$
Mine-L	$= \frac{3\text{kgs.}}{11\text{kgs}} \times 5{,}250\text{kgs.} = 1{,}432\text{kgs.}$

(i) Material Cost Variance = (Std. Qty. × Std. Price) – (Actual Qty. × Actual Price)

Or = (SQ × SP) – (AQ × AP)

Vita-X	= ₹ 2,75,000 - ₹ 3,45,000	= ₹ 70,000	(**A**)
Proto-D	= ₹ 4,80,000 - ₹ 4,12,500	= ₹ 67,500	(**F**)
Mine-L	= ₹ 6,90,000 - ₹ 4,05,000	= ₹ 2,85,000	(**F**)
		₹ 2,82,500	(**F**)

(ii) Material Price Variance = Actual Quantity (Std. Price – Actual Price)

= (AQ × SP) – (AQ × AP)

Vita-X	= ₹ 3,30,000 - ₹ 3,45,000	= ₹ 15,000	(**A**)

Proto-D	= ₹ 4,00,000 - ₹ 4,12,500	= ₹ 12,500	(**A**)
Mine-L	= ₹ 4,60,000 - ₹ 4,05,000	= ₹ 55,000	(**F**)
		₹ 27,500	(**F**)

(iii) Material Usage Variance = Std. Price (Std. Qty. – Actual Qty.)

Or = (SQ × SP) – (AQ × SP)

Vita-X	= ₹ 2,75,000 - ₹ 3,30,000	= ₹ 55,000	(**A**)
Proto-D	= ₹ 4,80,000 - ₹ 4,00,000	= ₹ 80,000	(**F**)
Mine-L	= ₹ 6,90,000 - ₹ 4,60,000	= ₹ 2,30,000	(**F**)
		₹ 2,55,000	(**F**)

(iv) Material Mix Variance = Std. Price (Revised Std. Qty. – Actual Qty.)

Or = (RSQ × SP) – (AQ × SP)

Vita-X	= ₹ 2,62,460 - ₹ 3,30,000	= ₹ 67,540	(**A**)
Proto-D	= ₹ 4,58,240 - ₹ 4,00,000	= ₹ 58,240	(**F**)
Mine-L	= ₹ 6,58,720 - ₹ 4,60,000	= ₹ 1,98,720	(**F**)
		= ₹ 1,89,420	(**F**)

(v) Material Yield Variance = Std. Price (Std. Qty. – Revised Std. Qty.)

Or = (SQ × SP) – (RSQ × SP)

Vita-X	= ₹ 2,75,000 - ₹ 2,62,460	= ₹ 12,540	(**F**)
Proto-D	= ₹ 4,80,000 - ₹ 4,58,240	= ₹ 21,760	(**F**)
Mine-L	= ₹ 6,90,000 - ₹ 6,58,720	= ₹ 31,280	(**F**)
		= ₹ 65,580	(**F**)

Question 14

ABC Ltd. had prepared the following estimation for the month of April:

	Quantity	***Rate (₹)***	***Amount (₹)***
Material-A	*800 kg.*	*45.00*	*36,000*
Material-B	*600 kg.*	*30.00*	*18,000*
Skilled labour	*1,000 hours*	*37.50*	*37,500*
Unskilled labour	*800 hours*	*22.00*	*17,600*

Normal loss was expected to be 10% of total input materials and an idle labour time of 5% of expected labour hours was also estimated.

At the end of the month the following information has been collected from the cost accounting department:

The company has produced 1,480 kg. finished product by using the followings:

	Quantity	*Rate (₹)*	*Amount (₹)*
Material-A	*900 kg.*	*43.00*	*38,700*
Material-B	*650 kg.*	*32.50*	*21,125*
Skilled labour	*1,200 hours*	*35.50*	*42,600*
Unskilled labour	*860 hours*	*23.00*	*19,780*

You are required to calculate:

(a) Material Cost Variance;

(b) Material Price Variance;

(c) Material Mix Variance;

(d) Material Yield Variance;

(e) Labour Cost Variance;

(f) Labour Efficiency Variance and

(g) Labour Yield Variance.

Solution:

Material Variances:

Material	SQ (WN-1)	SP (₹)	SQ × SP (₹)	RSQ (WN-2)	RSQ × SP (₹)	AQ	AQ × SP (₹)	AP (₹)	AQ × AP (₹)
A	940 kg.	45.00	42,300	886 kg.	39,870	900 kg.	40,500	43.00	38,700
B	705 kg.	30.00	21,150	664 kg.	19,920	650 kg.	19,500	32.50	21,125
	1645 kg		63,450	1550 kg	59,790	1550 kg	60,000		59,825

WN-1: Standard Quantity (SQ):

Material A- $\left(\frac{800\text{kg.}}{0.9\times1,400\text{kg.}}\times1,480\text{kg.}\right)$ = 939.68 or 940 kg.

Material B- $\left(\frac{600\text{kg.}}{0.9\times1,400\text{kg.}}\times1,480\text{kg.}\right)$ = 704.76 or 705 kg.

WN- 2: Revised Standard Quantity (RSQ):

Material A- $\left(\frac{800\,kg.}{1,400\,kg.}\times 1,550\,kg.\right)$ = 885.71 or 886 kg.

Material B- $\left(\frac{600\,kg.}{1,400\,kg.}\times 1,550\,kg.\right)$ = 664.28 or 664 kg.

(a) Material Cost Variance (A + B) = {(SQ × SP) – (AQ × AP)}
= {63,450 – 59,825} = 3,625 (F)

(b) Material Price Variance (A + B) = {(AQ × SP) – (AQ × AP)
= {60,000 – 59,825} = 175 (F)

(c) Material Mix Variance (A + B) = {(RSQ × SP) – (AQ × SP)}
= {59,790 – 60,000} = 210 (A)

(d) Material Yield Variance (A + B) = {(SQ × SP) – (RSQ × SP)}
= {63,450 – 59,790} = 3,660 (F)

Labour Variances:

Labour	SH (WN-3)	SR (₹)	SH × SR (₹)	RSH (WN-4)	RSH × SR (₹)	AH	AH × SR (₹)	AR (₹)	AH × AR (₹)
Skilled	1,116 hrs	37.50	41,850	1144	42,900	1,200	45,000	35.50	42,600
Unskilled	893 hrs	22.00	19,646	916	20,152	860	18,920	23.00	19,780
	2,009 hrs		61,496	2,060	63,052	2,060	63,920		62,380

WN- 3: Standard Hours (SH):

Skilled labour- $\left(\frac{0.95\times 1,000\,hr.}{0.90\times 1,400\,kg.}\times 1,480\,kg.\right)$ =1,115.87 or 1,116 hrs.

Unskilled labour- $\left(\frac{0.95\times 800\,hr.}{0.90\times 1,400\,kg.}\times 1,480\,kg.\right)$ = 892.69 or 893 hrs.

WN- 4: Revised Standard Hours (RSH):

Skilled labour- $\left(\frac{1,000\,hr.}{1,800\,hr.}\times 2,060\,hr.\right)$ = 1,144.44 or 1,144 hrs.

Unskilled labour- $\left(\frac{800\,\text{hr.}}{1{,}800\,\text{hr.}} \times 2{,}060\,\text{hr.}\right)$	= 915.56 or 916 hrs.
(e) Labour Cost Variance (Skilled + Unskilled)	= {(SH × SR) – (AH × AR)}
	= {61,496 – 62,380} = 884 (A)
(f) Labour Efficiency Variance (Skilled + Unskilled)	= {(SH × SR) – (AH × SR)}
	= {61,496 – 63,920} = 2,424 (A)
(g) Labour Yield Variance (Skilled + Unskilled)	= {(SH × SR) – (RSH × SR)}
	= {61,496 – 63,052} = 1,556 (A)

Question 15

The following information has been provided by a company:

Number of units produced and sold	*6,000*
Standard labour rate per hour	*₹ 8*
Standard hours required for 6,000 units	*-*
Actual hours required	*17,094 hours*
Labour efficiency	*105.3%*
Labour rate variance	*₹ 68,376 (A)*

You are required to calculate:

(i) Actual labour rate per hour

(ii) Standard hours required for 6,000 units

(iii) Labour Efficiency variance

(iv) Standard labour cost per unit

(v) Actual labour cost per unit.

Solution:

SR – Standard labour Rate per Hour

AR – Actual labour rate per hour

SH – Standard Hours

AH – Actual hours

(i) Labour rate Variance = AH(SR – AR)

= 17,094 (8 – AR) = 68,376 (A) = - 68,476

= 8 – AR = -4

= AR = ₹ 12

(ii) Labour Efficiency = $\frac{SH}{AH} \times 100 = 105.3$

= SH = $\frac{AH \times 105.3}{100} = \frac{17{,}094 \times 105.3}{100}$

= 17,999.982

= SH = 18,000 hours

(iii) Labour Efficiency Variance = SR (SH – AH)

= 8(18,000 – 17,094)

= 8 × 906

= ₹ 7,248 (F)

(iv) Standard Labour Cost per Unit = $\frac{18{,}000 \times 8}{6{,}000}$ = ₹24

(v) Actual Labour Cost Per Unit = $\frac{17{,}094 \times 12}{6{,}000}$ = ₹ 34.19

12 Marginal Costing

Basic Concepts

Marginal Cost	This is the variable cost of one unit of product or a service.
Marginal Costing	It is a principle whereby variable cost are charged to cost units and fixed cost attributable to the relevant period is written off in full against contribution for that period.
Absorption Costing	A method of costing by which all direct cost and applicable overheads are charged to products or cost centres for finding out the total cost of production. Absorbed cost includes production cost as well as administrative and other cost.
Direct Costing	This is a principle under which all costs which are directed related are charged to products, processes, operations or services, of which they form an integral part.
Differential Costing	It is a technique used in the preparation of ad-hoc information in which only cost and income differences in between alternative courses of action are taken into consideration.
Marginal Contribution	This is the difference between selling price and variable cost of production.
Break-even Chart	A mathematical or graphical representation, showing approximate profit or loss of an enterprise at different levels of activity within a limited range.
Break-even Point	This is the level of activity there is neither a profit nor a loss.
Cash Break-even Point	It is the level of activity where there is neither a cash profit nor a cash loss.
Cost Break-even Point	It is the level of activity where the total cost under two alternatives are the same. It is also known as Cost indifference point.
Profit Volume Chart	It is a diagram showing the expected relationship between costs, revenue at various volumes with profit being the residual.
Profit Volume Ratio or P/V Ratio	It is the ratio establishing the relationship between the contribution and the sales value.
Margin of Safety	This is the difference between the expected level of sales and the break even sales

Basic Formulae

1. **Sales – Variable Cost = Contribution**

   Or, **Contribution** = Fixed Cost ± Profit/ loss

   Or, Sales – (Fixed Cost + Variable Cost) = Profit

   By multiplying and dividing L.H.S. by S

2. $\frac{S*(S-V)}{S*} = F + P$

3. Sales × P/V Ratio = Fixed Cost + Profit or Contribution

   $P/V\ Ratio = \frac{Sales - Variable\ Cost}{Sales}$

4. Break-even Sales × P/V Ratio = Fixed Cost (∵ at BEP profit is zero)

5. **Contribution** = Sales × P/V Ratio

6. **P/V Ratio** = $\frac{Contribution}{Sales}$

7. **P/V Ratio** = $\frac{Change\ in\ profit}{Change\ in\ sales}$

8. **P/V Ratio** = $\frac{Change\ in\ contribution}{Change\ in\ sales}$

9. **P/V Ratio** = $\frac{Fixed\ Cost}{BES}$

10. **Break-even Sales (BES)** = $\frac{Fixed\ Cost}{P/V\ Ratio}$ Or,

    B.E.P (in units) = $\frac{Fixed\ Cost}{Contribution\ per\ unit}$

11. **(Break-even Sales + Margin of Safety) × P/V Ratio** = Contribution

12. **Total Sales** = Break-even Sales + Margin of Safety)

13. (Break-even Sales × P/V Ratio) + (Margin of Safety × P/V Ratio) = Fixed Cost + Profit

14. **Margin of Safety × P/V Ratio** = Profit

15. **Margin of Safety** = Total Sales – Break-even Sales or $\frac{\text{Profit}}{\text{P / V Ratio}}$

16. **Break-even Sales** = Total Sales – Margin of Safety

17. **P/V Ratio** = $\frac{\text{Profit}}{\text{Margin of Safety Ratio}}$

18. **Margin of Safety Ratio** = $\frac{\text{Total Sales - Break-even Sales}}{\text{Total Sales}}$

19. **Profit** = (Sales × P/V Ratio) – Fixed Cost Or, P/V Ratio × Margin of Safety

(P/V Ratio to be multiplied by 100 to express it in percentage)

SECTION-A

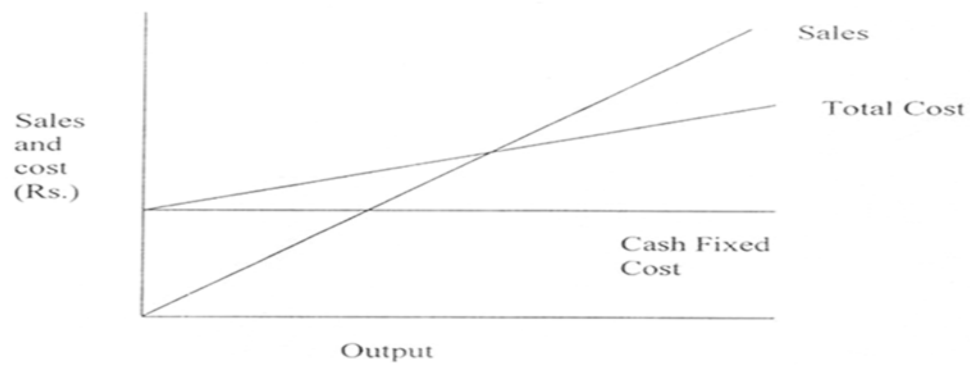
Question-1

Explain and illustrate cash break-even chart.

Solution:

In cash break-even chart, only cash fixed costs are considered. Non-cash items like depreciation etc. are excluded from the fixed cost for computation of break-even point. It depicts the level of output or sales at which the sales revenue will equal to total cash outflow. It is computed as under:

$$\text{Cash BEP (Units)} = \frac{\text{Cash Fixed Cost}}{\text{Contribution per Units}}$$



Question-2

Write short notes on Angle of Incidence.

Solution:

This angle is formed by the intersection of sales line and total cost line at the break- even point. This angle shows the rate at which profits are being earned once the break-even point has been reached. The wider the angle the greater is the rate of earning profits. A large angle of incidence with a high margin of safety indicates extremely favourable position.

Question-3

Discuss basic assumptions of Cost Volume Profit analysis.

Solution:

CVP Analysis:-Assumptions

(i) Changes in the levels of revenues and costs arise only because of changes in the number of products (or service) units produced and sold.

(ii) Total cost can be separated into two components: Fixed and variable

(iii) Graphically, the behaviour of total revenues and total cost are linear in relation to output level within a relevant range.

(iv) Selling price, variable cost per unit and total fixed costs are known and constant.

(v) All revenues and costs can be added, sub traded and compared without taking into account the time value of money.

Question-4

Elaborate the practical application of Marginal Costing.

Solution:

Practical applications of Marginal costing:

(i) Pricing Policy: Since marginal cost per unit is constant from period to period, firm decisions on pricing policy can be taken particularly in short term.

(ii) Decision Making: Marginal costing helps the management in taking a number of business decisions like make or buy, discontinuance of a particular product, replacement of machines, etc.

(iii) Ascertaining Realistic Profit: Under the marginal costing technique, the stock of finished goods and work-in-progress are carried on marginal cost basis and the fixed expenses are written off to profit and loss account as period cost. This shows the true profit of the period.

(iv) Determination of production level: Marginal costing helps in the preparation of break-even analysis which shows the effect of increasing or decreasing production activity on the profitability of the company.

SECTION- B

Computation of Break-even Point, Margin of Safety, Sales Volume, Profit, Contribution, P/V Ratio etc.

Question 1

A company produces single product which sells for ₹ 20 per unit. Variable cost is ₹ 15 per unit and Fixed overhead for the year is ₹ 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 ₹ 60,000.

Solution:

(a) Suppose Sales units are x then

S = V + F + P

(S = Sales ; V = Variable Cost; F = Fixed Cost; P = Profit)

₹ 20x = ₹ 15x + ₹ 6,30,000 + ₹ 2x

₹ 20x – ₹17x = ₹ 6,30,000

$$\therefore\ x = \frac{6{,}30{,}000}{3} = 2{,}10{,}000 \text{ units}$$

Sales value = 2,10,000 units × ₹ 20 = ₹ 42,00,000 to earn a profit of 10% on sales.

(b) Sales price to bring down BEP to 1,20,000 units

$$\text{B.E.P (Units)} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

$$\text{Or, Contribution per unit} = \frac{₹6{,}30{,}000}{1{,}20{,}000 \text{ units}} = ₹\ 5.25$$

So, Sales Price = ₹ 15 + ₹ 5.25 = ₹ 20.25

(c) $$\text{Margin of Safety Sales} = \frac{\text{Profit}}{\text{P / V Ratio}} \text{ Or, } \frac{₹60{,}000}{\text{P / V Ratio}}$$

where, P/V Ratio = $\frac{\text{Contribution per unit}}{\text{Sales Price}} \times 100$ Or, $\frac{₹\,5}{₹\,20} \times 100$ = 25%

Margin of Safety Sales = $\frac{₹\,60,000}{25\%}$ = ₹ 2,40,000

So if profit is ₹ 60,000, margin of safety sale will be ₹ 2,40,000.

Question 2

A company has fixed cost of ₹ 90,000, Sales ₹ 3,00,000 and Profit of ₹ 60,000.

Required:

(i) Sales volume if in the next period, the company suffered a loss of ₹ 30,000.

(ii) What is the margin of safety for a profit of ₹ 90,000?

Solution:

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \left(\frac{₹\,1,50,000}{₹\,3,00,000} \times 100\right) = 50\%$$

(i) If in the next period company suffered a loss of ₹ 30,000, then

Contribution = Fixed Cost $\pm$ Profit

= ₹ 90,000 – ₹ 30,000 (as it is a loss) = ₹ 60,000.

Then Sales = $\frac{\text{Contribution}}{\text{P / V ratio}}$ or $\frac{60,000}{50\%} = ₹\ 1,20,000$

So, there will be loss of ₹ 30,000 at sales of ₹ 1,20,000.

(ii) Margin of Safety = $\frac{\text{Profit}}{\text{P / V Ratio}}$ Or, $\frac{₹\,90,000}{50\%} = ₹\,1,80,000$

Alternative solution of this part:

Break-even Sales = $\frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{₹90,000}{50\%}$ = ₹ 1,80,000

Sales at profit of ₹ 90,000 = $\frac{\text{Fixed Cost} + \text{Profit}}{\text{PV Ratio}}$

$$= \frac{₹90,000 + ₹90,000}{50\%} = \frac{₹1,80,000}{50\%} = ₹\ 3,60,000.$$

Margin of Safety = Sales – Break-even Sales

= 3,60,000 – 1,80,000 = ₹ 1,80,000

Question 3

PQ Ltd. reports the following cost structure at two capacity levels:

	(100% capacity)	*(75% capacity)*
	2,000 units	*1,500 units*
Production overhead I	*₹ 3 per unit*	*₹ 4 per unit*
Production overhead II	*₹ 2 per unit*	*₹ 2 per unit*

If the selling price, reduced by direct material and labour is ₹ 8 per unit, what would be its break-even point?

Solution:

Computation of Break-even point in units:

	2,000 units	**1,500 units**
Production Overhead I: Fixed Cost (₹)	6,000 (2,000 unit × ₹ 3)	6,000 (1,500 unit × ₹ 4)
Selling price – Material and labour (₹) (A)	8	8
Production Overhead II (Variable Overhead) (B)	2	2
Contribution per unit (A) – (B)	6	6

$$\text{Break-even point} = \frac{\text{Fixed cost}}{\text{Contribution per unit}} = \frac{₹6{,}000}{₹6} = 1{,}000 \text{ units}.$$

Question 4

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 2013-14 will be ₹ 2,80,000.

Calculate the sales revenue required to achieve a quarterly profit of ₹ 70,000.

Solution:

P/V ratio = 28%

Quarterly fixed Cost = ₹ 2,80,000

Desired Profit = ₹ 70,000

Sales revenue required to achieve desired profit

$$= \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P / V Ratio}} = \frac{₹2{,}80{,}000 + ₹70{,}000}{28\%} = ₹\ 12{,}50{,}000$$

Question 5

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 ₹ 40 for J and ₹ 20 for K. Fixed costs are ₹ 6,16,000 per month. Compute the break-even point.

Solution:

Let $4x$ = No. of units of J

Then $3x$ = no. of units of K

BEP in x units = $\left(\frac{\text{Fixed Cost}}{\text{Contribution}}\right) = \frac{₹\ 6,16,000}{(4x \times ₹40) + 3x \times ₹20)}$

Or $x = \frac{₹\ 6,16,000}{₹220}$ = 2,800 units

Break- even point of Product J = 4 × 2,800 = 11,200 units

Break even point of Product K = 3 × 2,800 = 8,400 units

Question 6

Following informations are available for the year 2013 and 2014 of PIX Limited:

Year	*2013*	*2014*
Sales	*₹ 32, 00,000*	*₹ 57, 00,000*
Profit/ (Loss)	*(₹ 3,00,000)*	*₹ 7, 00,000*

Calculate – (a) P/V ratio, (b) Total fixed cost, and (c) Sales required to earn a Profit of ₹ 12,00,000.

Solution:

(a) P/V Ratio = $\frac{\text{Change in profit}}{\text{Change in sales}} \times 100$

$= \frac{₹7,00,000 - (-₹3,00,000)}{(₹57,00,000 - ₹32,00,000)} \times \frac{₹10,00,000}{₹25,00,000} \times 100 = 40\%$

(b) Total Fixed cost = Total Contribution - Profit

= (Sales × P/V Ratio) – Profit

= (₹57, 00,000 × $\frac{40}{100}$) = ₹ 7, 00,000

= ₹ 22, 80,000 – ₹ 7, 00,000 = ₹15, 80,000

(c) Contribution required to earn a profit of ₹12, 00,000

= Total fixed cost + Profit required

= ₹15, 80,000 + ₹12, 00,000 = ₹27, 80,000

Required Sales = $\frac{27,80,000}{P/V\,Ratio} = \frac{27,80,000}{40\%}$ = ₹ 69, 50,000

Question 7

MNP Ltd sold 2,75,000 units of its product at ₹ 37.50 per unit. Variable costs are ₹ 17.50 per unit (manufacturing costs of ₹ 14 and selling cost ₹ 3.50 per unit). Fixed costs are incurred uniformly throughout the year and amount to ₹ 35,00,000 (including depreciation of ₹15,00,000). there are no beginning or ending inventories.

Required:

(i) Estimate breakeven sales level quantity and cash breakeven sales level quantity.

(ii) Estimate the P/V ratio.

(iii) Estimate the number of units that must be sold to earn an income (EBIT) of ₹ 2,50,000.

(iv) Estimate the sales level achieve an after-tax income (PAT) of ₹ 2,50,000. Assume 40% corporate Income Tax rate.

Solution:

(i) Contribution = ₹ 37.50 - ₹ 17.50 = ₹ 20 per unit.

Break even Sales Quantity = $\frac{\text{Fixed cost}}{\text{Contribution margin per unit}} = \frac{₹\ 35,00,000}{₹\ 20}$ =1,75,000 units

Cash Break even Sales Qty= $\frac{\text{Cash Fixed Cost}}{\text{Contribution margin per unit}} = \frac{₹\ 20,00,000}{₹\ 20}$ =1, 00,000 units.

(ii) P/V ratio = $\frac{\text{Contribution/unit}}{\text{Selling Price/unit}} \times 100 = \frac{₹20}{₹37.50} \times 100$ = 53.33 %

(iii) No. of units that must be sold to earn an Income (EBIT) of ₹ 2, 50,000

$\frac{\text{Fixed cost + Desired EBIT level}}{\text{Contribution margin per unit}} = \frac{35,00,000+2,50,000}{20}$ = 1,87,500 units

(iv) After Tax Income (PAT) = ₹2, 50,000

Tax rate = 40%

Desired level of Profit before tax $= \frac{₹2,50,000}{60} \times 100$ = ₹4,16,667

Estimate Sales Level = $\frac{\text{Fixed Cost + Desired Profit}}{P/V\,ratio}$

Or, $\left(\frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{Contribution per unit}} \times \text{Selling Price per unit}\right)$

$= \frac{₹35,00,000 + ₹\ 4,16,667}{53.33\%} = ₹73,43,750$

Question 8

The P/V Ratio of Delta Ltd. is 50% and margin of safety is 40%. The company sold 500 units for ₹ 5,00,000. You are required to calculate:

(i) Break- even point, and

(ii) Sales in units to earn a profit of 10% on sales

Solution:

(i) P/V Ratio - 50%

Margin of Safety - 40%

Sales 500 Units for ₹ 5,00,000

Selling price per Unit - ₹ 1,000

Calculation of Break Even Point (BEP)

Margin of Safety Ratio $= \frac{\text{Sales} - \text{BEP}}{\text{Sales}} \times 100$

$40 = \frac{5,00,000 - \text{BEP}}{5,00,000} \times 100$

BEP (in sales) = ₹ 3,00,000

BEP (in Unit) = ₹ 3,00,000 ÷ ₹ 1,000 = 300 Units

(ii) Sales in units to earn a profit of 10 % on sales

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

Let the Sales be x

Profit = 10% of x i.e. 0.1 x

Thus -

$x = \left(\frac{1,50,000 + 0.1X}{50\%}\right)$

Or, x = ₹ 3,75,000

To find out sales in units amount of sales ₹ 3,75,000 is to be divided by Selling Price per unit

Thus -

Sales (in units) = $\frac{₹3,75,000}{₹1,000}$ = 375 Units

Working Notes

1. Selling price = ₹ 5,00,000 ÷ ₹ 500 = ₹ 1,000 per unit
2. Variable cost per unit = Selling Price - (Selling Price × P/V Ratio)

   = ₹1,000 – (₹ 1,000 x 50%) = ₹ 500
3. Profit at present level of sales

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

   Margin of Safety = 40% of ₹ 5,00,000 = ₹ 2,00,000

   ₹ 2,00,000 = $\frac{\text{Profit}}{50\%}$

   Profit = ₹ 1,00,000
4. Fixed Cost = (Sales x P/V Ratio) – Profit

   = (₹5,00,000 x 50%) – ₹ 1,00,000 = ₹1,50,000

(Note: Alternative ways of calculation of 'Break Even Point' and required sales to earn a profit of 10% of sales' can be adopted to solve the problem.)

Question 9

The following figures are related to LM Limited for the year ending 31st March, 2014 :

Sales - 24,000 units @ ₹ 200 per unit;

P/V Ratio 25% and Break-even Point 50% of sales.

You are required to calculate:

(i) Fixed cost for the year

(ii) Profit earned for the year

(iii) Units to be sold to earn a target net profit of ₹ 11,00,000 for a year.

(iv) Number of units to be sold to earn a net income of 25% on cost.

(v) Selling price per unit if Break-even Point is to be brought down by 4,000 units.

Solution:

Break- even point (in units) is 50% of sales i.e. 12,000 units.

Hence, Break- even point (in sales value) is 12,000 units x ₹ 200 = ₹ 24,00,000

(i) We know that Break even sales = $\frac{\text{Fixed Cost}}{\text{P / V ratio}}$

Or, ₹ 24,00,000 = $\frac{\text{Fixed Cost}}{25\%}$

Or, Fixed Cost = ₹ 24,00,000 x 25%

= ₹ 6,00,000

So Fixed Cost for the year is ₹ 6,00,000

(ii) Contribution for the year = (24,000 units × ₹ 200) × 25%

= ₹ 12,00,000

Profit for the year = Contribution – Fixed Cost

= ₹ 12,00,000 - ₹ 6,00,000

= ₹ 6,00,000

(iii) Target net profit is ₹11,00,000

Hence, Target contribution = Target Profit + Fixed Cost

= ₹11,00,000 + ₹ 6,00,000

= ₹ 17,00,000

Contribution per unit = 25% of ₹ 200 = ₹ 50 per unit

No. of units = $\frac{₹17,00,000}{₹50 \text{ per unit}}$ = 34,000 unit

So, 34,000 units to be sold to earn a target net profit of ₹ 11,00,000 for a year.

(iv) Net desired total Sales (Number of unit × Selling price) be x then desired profit is 25% on Cost or 20% on Sales i.e. 0.2 x

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

x = $\frac{6,00,000 + 0.2x}{25\%}$

or, 0.25 x = 6,00,000 + 0.2 x

or, 0.05 x = 6,00,000

or, x = ₹ 1,20,00,000

No. of units to be sold - $\frac{₹1,20,00,000}{₹200}$ = 60,000 units

(v) If Break- even point is to be brought down by 4,000 units then Break-even point will be

12,000 units – 4,000 units = 8,000 units

Let Selling price be ₹ x and fixed cost and variable cost per unit remain unchanged i.e. ₹ 6,00,000 and ₹ 150 respectively.

Break even point: Sales revenue = Total cost

8,000 x = 8,000 × ₹ 150 + ₹ 6,00,000

Or, 8,000 x = ₹ 12,00,000 + ₹ 6,00,000

Or, x = $\frac{₹ 18,00,000}{8,000}$ = ₹ 225

∴ Selling Price should be ₹ 225

Hence, selling price per unit shall be ₹ 225 if Break-even point is to be brought down by 4,000 units.

Question 10

MFN Limited started its operation in 2012 with the total production capacity of 2,00,000 units. The following data for two years is made available to you:

	2012	*2013*
Sales units	*80,000*	*1,20,000*
Total cost (₹)	*34,40,000*	*45,60,000*

There has been no change in the cost structure and selling price and it is expected to continue in 2014 as well. Selling price is ₹ 40 per unit.

You are required to calculate:

(i) Break-Even Point (in units)

(ii) Profit at 75% of the total capacity in 2014

Solution:

	2012	2013	Difference
Sales Units	80,000	1,20,000	40,000
Sale Value @ ₹ 40	32,00,000	48,00,000	16,00,000
Total Cost (₹)	34,40,000	45,60,000	11,20,000

Variable Cost per unit $= \dfrac{\text{Change in Total Cost}}{\text{Change in sales volume}}$

$= \dfrac{₹11,20,000}{40,000\text{ units}} = ₹28 \text{ per unit}$

Total Fixed Cost (₹) = ₹ 45,60,000 – (1,20,000 units × ₹28) = ₹12,00,000

(i) Break- even point (in units) = $\dfrac{\text{Fixed Cost}}{\text{Contribution per unit}}$

$= \dfrac{₹12,00,000}{(₹40 - ₹28)}$ = 1,00,000 units

(ii) Profit at 75% Capacity in 2014.

= (2,00,000 units × 75%) × Contribution per unit – Fixed Cost

= 1,50,000 units × ₹ 12 - ₹ 12,00,000 = ₹ 6,00,000.

Question 11

Arnav Ltd. manufacture and sales its product R-9. The following figures have been collected from cost records of last year for the product R-9:

Elements of Cost	*Variable Cost portion*	*Fixed Cost*
Direct Material	*30% of Cost of Goods Sold*	--
Direct Labour	*15% of Cost of Goods Sold*	--
Factory Overhead	*10% of Cost of Goods Sold*	*₹ 2,30,000*
General & Administration Overhead	*2% of Cost of Goods Sold*	*₹ 71,000*
Selling & Distribution Overhead	*4% of Cost of Sales*	*₹ 68,000*

Last Year 5,000 units were sold at ₹185 per unit. From the given data find the followings:

(a) Break-even Sales (in rupees)

(b) Profit earned during last year

(c) Margin of safety (in %)

(d) Profit if the sales were 10% less than the actual sales.

Solution:

Working Notes:

(i) Calculation of Cost of Goods Sold (COGS):

COGS = {(DM- 0.3 COGS) + (DL- 0.15 COGS) + (FOH- 0.10 COGS + ₹ 2,30,000) + (G&AOH- 0.02 COGS + ₹ 71,000)}

Or COGS = 0.57 COGS + ₹ 3,01,000

Or COGS $= \frac{₹ 3,01,000}{0.43} =$ ₹ 7,00,000

(ii) Calculation of Cost of Sales (COS):

COS = COGS + (S&DOH- 0.04 COS + ₹ 68,000)

Or COS = ₹ 7,00,000 + (0.04 COS + ₹ 68,000)

Or COS $= \frac{₹ 7,68,000}{0.96} =$ ₹ 8,00,000

(iii) Calculation of Variable Costs:

Direct Material-	(0.3 × ₹ 7,00,000)	₹ 2,10,000
Direct Labour-	(0.15 × ₹ 7,00,000)	₹ 1,05,000
Factory Overhead-	(0.10 × ₹ 7,00,000)	₹ 70,000
General & Administration OH-	(0.02 × ₹ 7,00,000)	₹ 14,000
Selling & Distribution OH	(0.04 × ₹ 8,00,000)	₹ 32,000
		₹ 4,31,000

(iv) Calculation of total Fixed Costs:

Factory Overhead-	₹ 2,30,000
General & Administration OH-	₹ 71,000
Selling & Distribution OH	₹ 68,000
	₹ 3,69,000

(v) Calculation of P/V Ratio:

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Sales} - \text{Variable Costs}}{\text{Sales}} \times 100$$

$$= \frac{(₹185 \times 5{,}000\text{ units}) - ₹4{,}31{,}000}{₹185 \times 5{,}000\text{ units}} \times 100 = 53.41\%$$

(a) Break-Even Sales $= \frac{\text{Fixed Costs}}{\text{P / V Ratio}} = \frac{₹ 3{,}69{,}000}{53.41\%} =$ ₹ 6,90,882

(b) Profit earned during the last year

= (Sales – Total Variable Costs) – Total Fixed Costs

= (₹ 9,25,000 - ₹ 4,31,000) - ₹ 3,69,000

= ₹ 1,25,000

(c) Margin of Safety (%) = $\frac{\text{Sales} - \text{Breakeven sales}}{\text{Sales}} \times 100$

$= \frac{₹9,25,000 - ₹6,90,882}{₹9,25,000} \times 100 = 25.31\%$

(d) Profit if the sales were 10% less than the actual sales:

Profit = 90% (₹ 9,25,000 - ₹ 4,31,000) - ₹ 3,69,000

= ₹ 4,44,600 - ₹ 3,69,000 = ₹ 75,600

Question 12

Maxim Ltd. manufactures a product "N-joy". In the month of August 2014, 14,000 units of the product "N-joy" were sold, the details are as under:

	(₹)
Sale Revenue	*2,52,000*
Direct Material	*1,12,000*
Direct Labour	*49,000*
Variable Overheads	*35,000*
Fixed Overheads	*28,000*

A forecast for the month of September 2014 has been carried out by the General manger of Maxim Ltd. As per the forecast, price of direct material and variable overhead will be increased by 10% and 5% respectively.

Required to calculate:

(i) Number of units to be sold to maintain the same quantum of profit that made in August 2014.

(ii) Margin of safety in the month of August 2014 and September 2014.

Solution:

Calculation of Profit made in the month of August 2014 by selling 14,000 units.

	Amount per unit (₹)	Amount (₹)
Sales Revenue	18.00	2,52,000
Less: Variable Costs:		

- Direct Material	8.00	1,12,000
- Direct Labour	3.50	49,000
- Variable Overhead	2.50	35,000
Contribution	4.00	56,000
Less: Fixed Overhead	2.00	28,000
Profit	2.00	28,000

(i) To maintain the same amount of profit i.e. ₹ 28,000 in September 2014 also, the company needs to maintain a contribution of ₹ 56,000.

Let, number of units to be sold in September 2014 is 'x', then the contribution will be

₹ 18 x – [(₹8 × 1.10) + ₹ 3.5 + (₹ 2.5 × 1.05)] x = ₹ 56,000

₹ 18 x – (₹ 8.8 + ₹ 3.5 + ₹ 2.625) x = ₹ 56,000

Or, $x = \frac{₹56,000}{₹3.075}$ =18,211.38 units or 18,212 units.

(ii) Margin of Safety

	August 2014	September 2014
Profit	₹ 28,000	₹ 28,000
P/V Ratio	$\frac{₹4}{₹18}\times100$	$\frac{₹3.075}{₹18}\times100$
	₹1,26,000	₹1,63,902.44
Margin of Safety $\left(\frac{\text{Profit}}{\text{P / VRatio}}\times100\right)$	$\left(\frac{28,000}{400}\times18\times100\right)$	$\left(\frac{28,000}{307.5}\times18\times100\right)$

Question 13

Maryanne Petrochemicals Ltd. is operating at 80 % capacity and presents the following information:

Break-even Sales ₹ *400 crores*

P/V Ratio *30 %*

Margin of Safety ₹ *120 crores*

Maryanne's management has decided to increase production to 95 % capacity level with the following modifications:

(a) The selling price will be reduced by 10%.

(b) The variable cost will be increased by 2% on sales

(c) The fixed costs will increase by ₹ 50 crores, including depreciation on additions, but excluding interest on additional capital.

Additional capital of ₹ 100 crores will be needed for capital expenditure and working capital.

Required:

(i) Indicate the sales figure, with the working, that will be needed to earn ₹ 20 crores over and above the present profit and also meet 15% interest on the additional capital.

(ii) What will be the revised

(a) Break-even Sales

(b) P/V Ratio

(c) Margin of Safety

Solution:

Working Notes:

1. Total Sales = Break -even Sales + Margin of Safety
   = ₹ 400 crores + ₹ 120 crores
   = ₹ 520 crores
2. Variable Cost = Total Sales × (1- P/V Ratio)
   = ₹ 520 crores × (1 – 0.3)
   = ₹ 364 crores
3. Fixed Cost = Break-even Sales × P/V Ratio
   = ₹ 400 crores × 30%
   = ₹ 120 crores
4. Profit = Total Sales – (Variable Cost + Fixed Cost)
   = ₹ 520 crores – (₹ 364 crores + ₹ 120 crores)
   = ₹ 36 crores

(i) Revised Sales figure to earn profit of ₹ 56 crores (i.e. ₹ 36 crores + ₹ 20 crores)

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

$$= \frac{₹\,185\,\text{crores} + ₹\,56\,\text{crores}}{28\%}$$

= ₹ 860.71 Crores

*Revised Fixed Cost = Present Fixed Cost + Increment in fixed cost + Interest on additional Capital

= ₹ 120 crores + ₹ 50 crores + 15% of ₹ 100 crores

= ₹ 185 crores

**Revised P/V Ratio : Let current selling price per unit be ₹ 100.

Therefore, Reduced selling price per unit = ₹ 100 × 90% = ₹ 90

Revised Variable Cost on Sales = 70%+ 2% = 72%

Variable Cost per unit = ₹ 90 × 72% = ₹ 64.80

Contribution per unit = ₹ 90 - ₹ 64.80 = ₹ 25.20

$$\text{Revised P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{₹ 25.2}{₹ 90} \times 100 = 28\%$$

(ii) **(a)** Revised Break-even Sales $= \frac{\text{Fixed Cost}}{\text{P/V Ratio}} \times 100 = \frac{₹ 185 \text{ crores}}{28\%} = ₹ 660.71 \text{ crores}$

(b) Revised P/V Ratio = 28 % (as calculated above)

(c) Revised Margin of safety = Total Sales – Break-even Sales

= ₹ 860.71 crores - ₹ 660.71 crores

= ₹ 200 crores.

Question 14

SHA Limited provides the following trading results:

Year	*Sale*	*Profit*
2012-13	*₹ 25,00,000*	*10% of Sale*
2013-14	*₹ 20,00,000*	*8% of Sale*

You are required to calculate:

(i) Fixed Cost

(ii) Break Even Point

(iii) Amount of profit, if sale is ₹ 30,00,000

(iv) Sale, when desired profit is ₹ 4,75,000

(v) Margin of Safety at a profit of ₹ 2,70,000

Solution:

Workings:

Profit in year 2012-13 = ₹ 25,00,000 × 10% = ₹ 2,50,000

Profit in year 2013-14 = ₹ 20,00,000 × 8% = ₹ 1,60,000

So, P/V Ratio $= \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$

$= \frac{₹ 2,50,000 - ₹ 1,60,000}{₹ 25,00,000 - ₹ 20,00,000} \times 100 = \frac{₹ 90,000}{₹ 5,00,000} \times 100 = 18\%$

(i) Fixed Cost = Contribution (in year 2012-13) – Profit (in year 2012-13)

= (Sales × P/V Ratio) – ₹2,50,000

= (₹ 25,00,000 × 18%) – ₹ 2,50,000

= ₹4,50,000 – ₹ 2,50,000

= ₹ 2,00,000

(ii) Break-even Point (in Sales) = $\frac{\text{Fixed Cost}}{\text{P / V Ratio}}$

$= \frac{₹ 2,00,000}{18\%}$ = ₹ 11,11,111 (Approx)

(iii) Calculation of profit, if sale is ₹ 30,00,000

Profit = Contribution – Fixed Cost

= (Sales × P/V Ratio) – Fixed Cost

= (₹ 30,00,000 × 18%) - ₹ 2,00,000

= ₹ 5,40,000 – ₹ 2,00,000

= ₹3,40,000

So profit is ₹ 3,40,000, if Sale is ₹ 30,00,000.

(iv) Calculation of Sale, when desired Profit is ₹ 4,75,000

Contribution Required = Desired Profit + Fixed Cost

= ₹ 4,75,000 + ₹ 2,00,000

= ₹ 6,75,000

Sales = $\frac{\text{Contribution}}{\text{P / V Ratio}} = \frac{₹ 6,75,000}{18\%}$ = ₹ 37,50,000

Sales is ₹ 37,50,000 when desired profit is ₹ 4,75,000.

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

$= \frac{₹\ 2,70,000}{18\%} = ₹\ 15,00,000$

So Margin of Safety is ₹ 15,00,000 at a profit of ₹ 2,70,000

Question 15

Zed Limited sells its product at ₹ 30 per unit. During the quarter ending on 31st March, 2014, it produced and sold 16,000 units and' suffered a loss of ₹ 10 per unit. If the volume of sales is raised to 40,000 units; it can earn a profit of ₹ 8 per unit.

You are required to calculate:

(i) Break Even Point in Rupees.

(ii) Profit if the sale volume is 50,000 units.

(iii) Minimum level of production where the company needs not to close the production if unavoidable fixed cost is ₹ 1,50,000.

Solution:

Units sold	Sales value (₹)	Profit/ (loss) (₹)
16,000 units	4,80,000 (₹ 30 × 16,000 units)	(1,60,000) (₹ 10 × 16,000 units)
40,000 units	12,00,000 (₹ 30 × 40,000 units)	3,20,000 (₹ 8 × 40,000 units)

P/V Ratio $= \frac{\text{Change in profit}}{\text{Change in sales value}} \times 100 = \frac{₹\ 3,20,000 - (-₹\ 1,60,000)}{₹\ 12,00,000 - ₹\ 4,80,000} \times 100$

$= \frac{₹\ 4,80,000}{₹\ 7,20,000} \times 100 = 66.67\%$

Total Contribution in case of 40,000 units = Sales Value × P/V Ratio

= ₹ 12,00,000 × 66.67%

= ₹ 8,00,000

So, Fixed cost = Contribution – Profit

= ₹ 8,00,000 – ₹ 3,20,000

= ₹ 4,80,000

(i) Break-even Point in Rupees $= \frac{\text{Fixed Cost}}{\text{P / V Ratio}}$

$= \frac{₹\,4,80,000}{66.67\%} = ₹\,7,20,000$

(ii) If sales volume is 50,000 units, then profit = Sales Value × P/V Ratio – Fixed Cost

= (50,000 units× ₹ 30×66.67% - ₹ 4,80,000)

= ₹ 5,20,000

(iii) Minimum level of production where the company needs not to close the production, if unavoidable fixed cost is ₹ 1,50,000:

$= \frac{\text{Avoidable fixed cost}}{\text{Contribution per unit}}$

$= \frac{\text{Total fixed cost} - \text{Unavoidable fixed cost}}{\text{Contribution per unit}}$

$= \frac{₹\,4,80,000 - ₹\,1,50,000}{₹\,30 \times 66.67\%}$

$= \frac{₹\,3,30,000}{₹\,20}$ = 16,500 units.

At production level of ≥ 16,500 units, company needs not to close the production.

Question 16

ABC Limited started its operation in the year 2013 with a total production capacity of 2,00,000 units. The following information, for two years, are made available to you:

	Year 2013	*Year 2014*
Sales (units)	*80,000*	*1,20,000*
Total Cost (₹)	*34,40,000*	*45,60,000*

There has been no change in the cost structure and selling price and it is anticipated that it will remain unchanged in the year 2015 also.

Selling price is ₹ 40 per unit.

Calculate :

(i) Variable cost per unit.

(ii) Profit Volume Ratio.

(iii) Break-Even Point (in units)

(iv) Profit if the firm operates at 75% of the capacity.

Solution:

(i) Variable Cost per unit $= \dfrac{\text{Change in total cost}}{\text{Change in sales volume}}$

$= \dfrac{₹\,45{,}60{,}000 - ₹\,34{,}40{,}000}{1{,}20{,}000 \text{ units} - 80{,}000 \text{ units}}$

$= \dfrac{₹\,11{,}20{,}000}{40{,}000 \text{ units}} = ₹\,28$

(ii) Profit Volume Ratio $= \dfrac{\text{Contribution per unit}}{\text{Selling price per unit}} \times 100$

$= \dfrac{₹\,40 - ₹\,28}{₹\,40} \times 100 = 30\%$

(iii) Break-Even Point (in units) $= \dfrac{\text{Fixed cost}}{\text{Contribution per unit}}$

Fixed Cost = Total Cost in 2013 – Total Variable Cost in 2013

= ₹ 34,40,000 – (₹ 28 × 80,000 units)

= ₹ 34,40,000 – ₹ 22,40,000

= ₹ 12,00,000

Therefore, Break-Even Point $= \dfrac{₹\,12{,}00{,}000}{₹\,12}$ = 1,00,000 units

(iv) Profit if the firm operates at 75% of the capacity:

Number of units to be produced and sold = 2,00,000 units × 75% = 1,50,000 units

Profit = Total contribution – Fixed Cost

Or, = ₹ 12 × 1,50,000 units – ₹ 12,00,000

Or, = ₹ 18,00,000 – ₹ 12,00,000

Or, Profit = ₹ 6,00,000

Question 17

Maximum Production capacity of KM (P) Ltd. is 28000 units per month. Output at different levels along with cost data is furnished below:

Particulars of Costs	***Activity Level***		
	16,000 units	***18,000 units***	***20,000 units***
Direct Material	*₹ 12,80,000*	*₹ 14,40,000*	*₹ 16,00,000*
Direct labour	*₹ 17,60,000*	*₹ 19,80,000*	*₹ 22,00,000*
Total factory overheads	*₹ 22,00,000*	*₹ 23,70,000*	*₹ 25,40,000*

You are required to work out the selling price per unit a an activity level of 24,000 units by considering profit at the rate of 25% on sales.

Solution:

Computation of Overheads:

$$\text{Variable Overhead per unit} = \frac{\text{Change in Factory Overheads}}{\text{Change in activity level}}$$

$$= \frac{23{,}70{,}000 - 22{,}00{,}000}{18{,}000 - 16{,}000} \text{ or } \frac{25{,}40{,}000 - 23{,}70{,}000}{20{,}000 - 18{,}000}$$

$$= \frac{1{,}70{,}000}{2000} = ₹\ 85 \text{ per unit}$$

Fixed Overhead

Activity level = 16,000 units

Particulars	**Amount (₹)**
Total factory overheads	22,00,000
Less : Variable overheads 16,000 units @ ₹85 per unit	13,60,000
Fixed Overhead	8,40,000

Computation of Costs at Activity Level 24,000 units

	Per Unit (₹)	**Amount (₹)**
Direct Material (12,80,000/16,000)	80.00	19,20,000
Direct Labour (17,60,000/16,000)	110.00	26,40,000
Variable Overhead (As calculated above)	85.00	20,40,000
Fixed Overhead		8,40,000
Total Cost		74,40,000

Computation of Selling Price at activity level 24,000 units

Profit required is 25% on selling price, hence cost will be 75%.

Therefore desired profit = $\frac{25 \times 74,40,000}{75}$ = ₹ 24,80,000

Cost of 24,000 units	74,40,000
Desired Profit	24,80,000
Total Sales	99,20,000

Selling Price Per Unit = $\frac{\text{Total Sales}}{\text{No of Units}} = \frac{99,20,000}{24,000}$ = ₹413.33 or ₹ 413

Question 18

SK Lit. is engaged in the manufacture of tyres. Analysis of income statement indicated a profit of ₹ 150 lakhs on a sales volume of 50,000 units. The fixed costs are ₹ 850 lakhs which appears to be high. Existing selling price is ₹ 3,400 per unit. The company is considering to revise the profit target to ₹ 350 lakhs. You are required to compute –

(i) Break- even point at existing levels in units and in rupees.

(ii) The number of units required to be sold to earn the target profit.

(iii) Profit with 15% increase in selling price and drop in sales volume by 10%.

(iv) Volume to be achieved to earn target profit at the revised selling price as calculated in (ii) above, if a reduction of 8% in the variable costs and ₹ 85 lakhs in the fixed cost is envisaged.

Solution:

Sales Volume 50,000 Units

Computation of existing contribution

Particulars	Per unit (₹)	Total (₹ In lakhs)
Sales	3,400	1,700
Fixed Cost	1,700	850
Profit	300	150
Contribution	2,000	1,000
Variable Cost	1,400	700

(i) Break even sales in units = $\frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{8,50,00,000}{2,000}$ = 42,500 units

Break even sales in rupees = 42,500 units × ₹ 3,400 = ₹ 1,445 lakhs

OR

P/V Ratio = $\frac{2,000}{3,400} \times 100$ = 58.82%

B.EP (Rupees) = $\frac{FC}{P / VRatio} = \frac{8,50,00,000}{58.82\%}$ = ₹ 1,445 lakhs (approx.)

(ii) Number of units sold to achieve a target profit of ₹350 lakhs:

Desired Contribution = Fixed Cost + Target Profit

= 850 L + 350 L = 1,200L

Number of units to be sold = $\frac{\text{Desired Contribution}}{\text{Contribution per unit}} = \frac{12,00,00,000}{2,000}$ = 60,000 units

(iii) Profit if selling price is increased by 15% and sales volume drops by 10%:

Existing Selling Price per unit = ₹ 3,400

Revised selling price per unit = ₹ 3,400 x 115% = ₹ 3,910

Existing Sales Volume = 50,000 units

Revised sales volume = 50,000 units – 10% of 50,000 = 45,000 units.

Statement of profit at sales volume of 45,000 units @ ₹ 3910 per unit

Particulars	**Per unit (₹)**	**Total (₹ In lakhs)**
Sales	3,910.00	1,759.50
Less: Variable Costs	1,400.00	630.00
Contribution	2,510.00	1,129.50
Less: Fixed Cost		850.00
Profit		279.50

(iv) Volume to be achieved to earn target profit of ₹350 lakhs with revised selling price and reduction of 8% in variable costs and ₹85 lakhs in fixed cost:

Revised selling price per unit = ₹ 3,910

Variable costs per unit existing = ₹1,400

Revised Variable Costs

Reduction of 8% in variable costs = ₹ 1,400 – 8% of 1,400

= ₹ 1,400 – ₹112

= ₹1,288

Total Fixed Cost (existing) = ₹ 850 lakhs

Reduction in fixed cost	= ₹ 85 lakhs
Revised fixed cost	= ₹ 850 lakhs – ₹ 85 lakhs = ₹765 lakhs
Revised Contribution (unit)	= Revised selling price per unit – Revised Variable Costs per units
Revised Contribution per unit	= ₹ 3,910 – ₹ 1,288 = ₹ 2,622
Desired Contribution	= Revised Fixed Cost + Target Profit
	= ₹ 765 lakhs + ₹350 lakhs = ₹1,115 lakhs
No. of units to be sold	$= \frac{\text{Desired Contribution}}{\text{Contribution per unit}} = \frac{₹1,115 \text{ lakh}}{₹2,622} = 42,525 \text{ units}$

Question 19

A company gives the following information:

Margin of Safety	*₹ 3,75,000*
Total Cost	*₹ 3,87,500*
Margin of Safety (Qty.)	*15,000 units*
Break Even Sales in Units	*5,000 units*

You are required to calculate:

(i) Selling price per unit

(ii) Profit

(iii) Profit/ Volume Ratio

(iv) Break Even Sales (in Rupees)

(v) Fixed Cost

Solution:

(i) Selling Price per unit $= \frac{\text{Margin of Safety in Rupee value}}{\text{Margin of Safety in Quantity}}$

$$= \frac{₹ 3,75,000}{15,000 \text{ units}} = ₹ 25$$

(ii) Profit = Sales Value – Total Cost

= Selling price per unit × (BEP units + MoS units) – Total Cost

= ₹ 25 × (5,000 + 15,000) units – ₹ 3,87,500

= ₹ 5,00,000 – ₹ 3,87,500 = ₹ 1,12,500

(iii) Profit/ Volume (P/V) Ratio $= \dfrac{\text{Profit}}{\text{Margin of Safety in Rupee value}} \times 100$

$= \dfrac{₹1,12,500}{₹3,75,000} \times 100 = 30\%$

(iv) Break Even Sales (in Rupees) = BEP units × Selling Price per unit

= 5,000 units × ₹ 25 = ₹ 1,25,000

(v) Fixed Cost = Contribution – Profit

= Sales Value × P/V Ratio – Profit

= (₹ 5,00,000 × 30%) – ₹ 1,12,500

= ₹1,50,000 – ₹ 1,12,500 = ₹ 37,500

Computation of Profit under Marginal Costing Method and under Absorption Costing Method and Reconciliation of Profit.

Question 20

Mega Company has just completed its first year of operations. The unit costs on a normal costing basis are as under:

		(₹)
Direct material 4 kg @ ₹ 4	=	*16.00*
Direct labour 3 hrs @ ₹ 18	=	*54.00*
Variable overhead 3 hrs @ ₹ 4	=	*12.00*
Fixed overhead 3 hrs @ ₹ 6	=	*18.00*
		100.00

Selling and administrative costs:

Variable	*₹ 20 per unit*
Fixed	*₹ 7,60,000*

During the year the company has the following activity:

Units produced	=	*24,000*
Units sold	=	*21,500*
Unit selling price	=	*₹ 168*
Direct labour hours worked	=	*72,000*

Actual fixed overhead was ₹ 48,000 less than the budgeted fixed overhead. Budgeted variable overhead was ₹ 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.

Solution:

(i) Computation of Unit Cost & Total Income

Unit Cost	Absorption Costing (₹)	Marginal Costing (₹)
Direct Material	16.00	16.00
Direct Labour	54.00	54.00
Variable Overhead (₹12 + ₹20,000/24,000)	12.83	12.83
Fixed Overhead	18.00	--
Unit Cost	100.83	82.83

Income Statements

Absorption Costing	(₹)
Sales (21,500 units × ₹168)	36,12,000
Less: Cost of goods sold (Refer the working note)	(21,19,917)
	14,92,083
Less: Selling & Distribution Expenses	(11,90,000)
Profit	3,02,083
Marginal Costing	**(₹)**
Sales (as above)	36,12,000
Less: Cost of goods sold (Refer the working note)	(17,80,917)
	18,31,083
Less: Selling & Distribution Expenses	(4,30,000)
Contribution	14,01,083
Less: Fixed Factory and Selling & Distribution Overhead (₹ 3,84,000 + ₹ 7,60,000)	(11,44,000)
Profit	2,57,083

(ii) Under or over absorption of overhead:

	(₹)
Fixed Overhead:	
Budgeted (₹6 × 72,000 hours)	4,32,000
Actual (₹4,32,000 – ₹48,000)	3,84,000
Over-absorption	48,000
Variable Overhead:	
Budgeted (₹4 × 72,000 hours)	2,88,000
Actual (₹2,88,000 + ₹20,000)	3,08,000
Under-absorption	20,000

(iii) Reconciliation of Profit:

Difference in Profit: ₹ 3,02,083 – ₹ 2,57,083 = ₹ 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) = ₹45,000

Working Note:

Calculation of Cost of Goods Sold

	Absorption Costing	Marginal Costing
Direct Materials (₹16 × 24,000)	3,84,000	3,84,000
Direct labour (₹54 × 24,000)	12,96,000	12,96,000
Variable OH (₹12 × 24,000 + ₹20,000)	3,08,000	3,08,000
Fixed Overhead (₹18 × 24,000)	4,32,000	--
	24,20,000	19,88,000
Add: Opening stock	--	--
Less: Closing Stock (24,000 – 21,500)	(2,52,083) $\left(\frac{₹24,20,000}{24,000 \text{ units}} \times 2,500 \text{ units}\right)$	(2,07,083) $\left(\frac{₹19,88,000}{24,000 \text{ units}} \times 2,500 \text{ units}\right)$
Cost of Goods Produced	21,67,917	17,80,917
Add: Adjustment for over/ under absorption	(48,000)	--
Cost of Goods Sold	21,19,917	17,80,917

Question 21

ABC Ltd. can produce 4,00,000 units of a product per annum at 100% capacity. The variable production costs are ₹ 40 per unit and the variable selling expenses are ₹ 12 per sold unit. The budgeted fixed production expenses were ₹ 24,00,000 per annum and the fixed selling expenses were ₹ 16,00,000. During the year ended 31st March, 2014, the company worked at 80% of its capacity. The operating data for the year are as follows:

Production	*3,20,000 units*
Sales @ ₹ 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, 2014:

(i) On the basis of marginal costing

(ii) On the basis of absorption costing

Solution:

(i) Statement of Cost and Profit under Marginal Costing for the year ending 31st March, 2014

Output = 3,20,000 units

Particulars	**Amount (₹)**	**Amount (₹)**
Sales: 3,10,000 units @ ₹ 80		2,48,00,000
Marginal cost / variable cost:		
Variable cost of production (3,20,000 × ₹ 40)	1,28,00,000	
Add: Opening stock 40,000 units @ ₹ 40	16,00,000	
	1,44,00,000	
Less: Closing Stock $\left(\frac{₹1,44,00,000}{3,60,000\,\text{units}} \times 50,000\,\text{units}^*\right)$	(20,00,000)	
Variable cost of production of 3,10,000 units	1,24,00,000	
Add: Variable selling expenses @ ₹ 12 per unit	37,20,000	1,61,20,000
Contribution (sales – variable cost)		86,80,000
Less: Fixed production cost	24,00,000	
Fixed selling expenses	16,00,000	(40,00,000)
Actual profit under marginal costing		46,80,000

* Closing stock = 40,000 + 3,20,000 – 3,10,000 = 50,000 units

(ii) Statement of Cost and Profit under Absorption Costing for the year ending 31st March, 2014

Output = 3,20,000 units

Particulars	Amount (₹)	Amount (₹)
Sales: 3,10,000 units @ ₹ 80		2,48,00,000
Less: Cost of Goods sold:		
Variable cost of production (3,20,000 @ ₹ 40)	1,28,00,000	
Add: Fixed cost of production absorbed 3,20,000 units @ ₹ 6 [(1)]	19,20,000	
	1,47,20,000	
Add: Opening Stock: $\left(\frac{₹1,47,20,000}{3,20,000} \times 40,000\right)$	18,40,000	
	1,65,60,000	
Less: Closing Stock: $\left(\frac{₹1,65,60,000}{3,60,000} \times 50,000\right)$	(23,00,000)	
Production cost of 3,10,000 units	1,42,60,000	
Adjustment for Over/ under-absorption:		
Under absorption of fixed production overheads [(2)]	4,80,000	
Cost of Goods Sold	1,47,40,000	
Selling expenses:		
Variable: ₹ 12 × 3,10,000 units	37,20,000	
Fixed	16,00,000	(2,00,60,000)
Actual profit under absorption costing		47,40,000

Workings:

1. Absorption rate for fixed cost of production = $\frac{₹\ 24,00,000}{4,00,000 \text{ units}}$ = ₹ 6 per unit

2. Fixed production overhead under absorbed = ₹ (24,00,000 – 19,20,000) = ₹ 4,80,000.

13 Budgets and Budgetary Control

Basic Concepts

Budget	CIMA official terminology has defined the term budget as "quantitative expression of a plan for a defined period of time. It may include planned sales volumes and revenues; resource quantities, costs and expenses; assets, liabilities and cash flows."
Budget Centre	A section of an organization for which separate budget can be prepared and control exercised.
Budgetary Control	Guiding and regulating activities with a view to attaining predetermined objectives, effectively and efficiently.
Budget Manual	The Budget manual is a schedule, document or booklet which shows, in written forms the budgeting organisation and procedures.
Budget Period	The period of time for which a budget is prepared and used. It may be a year, quarter or a month.
	Components of Budgetary Control System
Physical Budgets	Those budgets which contain information in terms of physical units about sales, production etc. for example, quantity of sales, quantity of production, inventories, and manpower budgets are physical budgets.
Cost Budgets	Budgets which provide cost information in respect of manufacturing, selling, administration etc. for example, manufacturing costs, selling costs, administration cost, and research and development cost budgets are cost budgets.
Profit Budgets	A budget which enables in the ascertainment of profit, for example, sales budget, profit and loss budget, etc.
Financial Budgets	A budget which facilitates in ascertaining the financial position of a concern, for example, cash budgets, capital expenditure budget, budgeted balance sheet etc.

Functional Budgets	Budgets which relate to the individual functions in an organisation 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.
Fixed Budget	According to CIMA official terminology, "a fixed budget, is a budget designed to remain unchanged irrespective of the level of activity actually attained".
Flexible Budget	According to CIMA official terminology, "a flexible budget is defined as a budget which, by recognizing the difference between fixed, semi-variable and variable costs is designed to change in relation to the level of activity attained."

SECTION-A

Question-1

Explain briefly the concept of 'flexible budget'.

Solution:

Flexible Budget: A flexible budget is defined as "a budget which, by recognizing the difference between fixed, semi-variable and variable cost is designed to change in relation to the level of activity attained". In flexibility budgetary control system, a series of budgets are prepared one for the each of a number of alternative production levels or volumes. Flexible budgets represent the amount of expense that is reasonably necessary to achieve each level of output specified. In other words, the allowances given under flexibility budgetary control system serve as standards of what costs should be at each level of output.

Question-2

Discuss the components of budgetary control system.

Solution:

Components of budgetary control system

The policy of a business for a defined period is represented by the master budget the details of which are given in a number of individual budgets called functional budgets. The functional budgets are broadly grouped under the following heads:

(a) Physical Budgets – Sales Quantity, Product Quantity., Inventory, Manpower budget.

(b) Cost Budgets – Manufacturing Cost, Administration Cost, Sales & Distribution cost, R & D Cost.

(c) Profit Budget.

Question-3

List the eight functional budgets prepared by a business.

Solution:

The various commonly used Functional budgets are:

- Sales Budget
- Production Budget
- Plant Utilisation Budget
- Direct Material Usage Budget
- Direct Material Purchase Budget
- Direct Labour (Personnel) Budget
- Factory Overhead Budget
- Production Cost Budget.

Question-4

Distinguish between Fixed and flexible budget.

Solution:

Difference between Fixed and Flexible Budgets

	Fixed Budget	**Flexible Budget**
1.	It does not change with actual volume of activity achieved. Thus it is rigid	It can be re-casted on the basis of activity level to be achieved. Thus it is not rigid.
2.	It operates on one level of activity and under one set of conditions	It consists of various budgets for different level of activity.
3.	If the budgeted and actual activity levels differ significantly, then cost ascertainment and price fixation do not give a correct picture.	It facilitates the cost ascertainment and price fixation at different levels of activity.
4.	Comparisons of actual and budgeted targets are meaningless particularly when there is difference between two levels.	It provided meaningful basis of comparison of actual and budgeted targets.

Question-5

Explain the Essentials of budget.

Solution:

Essentials of budget

- It is prepared in advance and is based on a future plan of actions
- It relates to a future period and is based on objectives to be attained.

It is a statement expressed in monetary and/ or physical units prepared for the implementation of policy formulated by management.

Question-6

State the considerations on which capital expenditure budget is prepared.

Solution:

The preparation of Capital Expenditure Budget is based on the following considerations:

1. Overhead on production facilities of certain departments as indicated by the plant utilisation budget.
2. Future development plans to increase output by expansion of plant facilities.
3. Replacement requests from the concerned departments
4. Factors like sales potential to absorb the increased output, possibility of price reductions, increased costs of advertising and sales promotion to absorb increased output, etc.

Question-7

Describe the steps involved in the budgetary control technique.

Solution:

There are certain steps involved in the budgetary control technique. They are as follows:

(i) Definition of objectives: A budget being a plan for the achievement of certain operational objectives, it is desirable that the same are defined precisely. The objectives should be written out; the areas of control demarcated; and items of revenue and expenditure to be covered by the budget stated.

(ii) Location of the key (or budget) factor: There is usually one factor (sometimes there may be more than one) which sets a limit to the total activity. Such a factor is known as key factor. For proper budgeting, it must be located and estimated properly.

(iii) Appointment of controller: Formulation of a budget usually required whole time services of a senior executive known as budget controller; he must be assisted in this work by a Budget Committee, consisting of all the heads of department along with the Managing Director as the Chairman.

(iv) Budget Manual: Effective budgetary planning relies on the provision of adequate information which are contained in the budget manual. A budget manual is a collection of documents that contains key information for those involved in the planning process.

(v) Budget period: The period covered by a budget is known as budget period. The Budget Committee determines the length of the budget period suitable for the business. It may be months or quarters or such periods as coincide with period of trading activity.

(vi) Standard of activity or output: For preparing budgets for the future, past statistics cannot be completely relied upon, for the past usually represents a combination of good and bad factors. Therefore, though results of the past should be studied but these should only be applied when there is a likelihood of similar conditions repeating in the future.

Question-8

Describe the salient features of budget manual.

Solution:

Salient features of Budget Manual

- Budget manual contains many information which are required for effective budgetary planning.
- A budget manual is a collection of documents that contains key information for those involved in the planning process.
- An introductory explanation of the budgetary planning and control process, including a statement of the budgetary objective and desired results is included in Budget Manual

- Budget Manual contains a form of organisation chart to show who is responsible for the preparation of each functional budget and the way in which the budgets are interrelated.
- In contains a timetable for the preparation of each budget.
- Copies of all forms to be completed by those responsible for preparing budgets, with explanations concerning their completion is included in Budget Manual.

SECTION-B

Question 1

TQM Ltd. has furnished the following information for the month ending 30th June, 2014:

	Master Budget	Actual	Variance
Units produced and sold	80,000	72,000	
Sales (₹)	3,20,000	2,80,000	40,000 (A)
Direct material (₹)	80,000	73,600	6,400 (F)
Direct wages (₹)	1,20,000	1,04,800	15,200 (F)
Variable overheads (₹)	40,000	37,600	2,400 (F)
Fixed overhead (₹)	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 (₹)
Direct materials (1 kg. at the rate of ₹ 1 per kg.)	1.00
Direct wages (1 hour at the rate of ₹ 1.50)	1.50
Variable overheads (1 hour at the rate of ₹ 0.50)	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.

Solution:

(i) Statement showing Flexible Budget and its comparison with actual

		Master Budget 80,000 units	Flexible Budget (at standard cost) Per unit	72,000 units	Actual for 72,000 units	Variance
A.	Sales	3,20,000	4.00	2,88,000	2,80,000	8,000 (A)
B.	Direct material	80,000	1.00	72,000	73,600	1,600 (A)
C.	Direct wages	1,20,000	1.50	1,08,000	1,04,800	3,200 (F)
D.	Variable overhead	40,000	0.50	36,000	37,600	1,600 (A)
E.	Total variable cost	2,40,000	3.00	2,16,000	2,16,000	–
F.	Contribution	80,000	1.00	72,000	64,000	–
G.	Fixed overhead	40,000	0.50	40,000	39,200	800 (F)
H.	Net profit	40,000	0.50	32,000	24,800	7,200 (A)

(ii) *Variances:*

- Sales Price Variance = Actual Quantity (Standard Rate – Actual Rate)
  = 72,000 units (₹ 4.00 – ₹ 3.89) = ₹ 8,000 (A)
- Direct Material Cost Variance = Standard Cost for Actual output – Actual cost
  = ₹ 72,000 – ₹ 73,600 = ₹ 1,600 (A)
- Direct Material Price Variance = Actual Quantity (Standard rate – Actual Rate)
  $$= 78{,}400\text{units}\left(₹1.00 - \frac{₹73{,}600}{78{,}400\text{units}}\right)$$
  = ₹ 4,800 (F)
- Direct Material Usage Variance = Standard Rate (Std. Qty. – Actual Quantity)
  = ₹1 (72,000 units – 78,400 units) = ₹ 6,400 (A)
- Direct Labour Cost Variance = Standard Cost for actual output – Actual cost
  = ₹ 1,08,000 – ₹ 1,04,800 = ₹ 3,200 (F)
- Direct Labour Rate Variance = Actual Hour (Standard Rate – Actual Rate)
  $$= 70{,}400\text{hours}\left(₹1.5 - \frac{₹1{,}04{,}800}{70{,}400\text{hours}}\right)$$
  = ₹ 800 (F)

➢ Direct Labour Efficiency	= Standard Rate (Standard Hour – Actual Hour)
	= ₹ 1.5 (72,000 – 70,400) = ₹ 2,400 (F)
➢ Variable Overhead	= Recovered variable overhead – Actual variable overhead
	= (72,000 units × ₹ 0.50) – ₹ 37,600 = ₹ 1,600 (A)
➢ Fixed Overhead Expenditure	= Budgeted fixed overhead – Actual fixed overhead
	= ₹ 40,000 – ₹ 39,200 = ₹ 800 (F)
➢ Sales Volume (Profit) Variance	= Std. Profit (Budgeted Quantity – Actual Quantity)
	= ₹ 0.50 (80,000 – 72,000) = ₹4,000 (A)

Question 2

Following is the sales budget for the first six months of the year 2014 in respect of PQR Ltd. :

Month :	Jan.	Feb.	March	April	May	June
Sales (units) :	10,000	12,000	14,000	15,000	15,000	16,000

Finished goods inventory at the end of each month is expected to be 20% of budgeted sales quantity for the following month. Finished goods inventory was 2,700 units on January 1, 2014. There would be no work-in-progress at the end of any month.

Each unit of finished product requires two types of materials as detailed below:

Material X : 4 kg. @ ₹ 10/kg

Material Y : 6 kg. @ ₹ 15/kg

Material on hand on January 1, 2014 was 19,000 kg. of material X and 29,000 kg. of material Y. Monthly closing stock of material is budgeted to be equal to half of the requirements of next month's production.

Budgeted direct labour hour per unit of finished product is ¾ hour.

Budgeted direct labour cost for the first quarter of the year 2014 is ₹ 10,89,000.

Actual data for the quarter one, ended on March 31, 2014 is as under:

Actual production quantity : 40,000 units
Direct material cost
(Purchase cost based on materials actually issued to production)
Material X : 1,65,000 kg. @ ₹ 10.20 / kg.
Material Y : 2,38,000 kg. @ ₹ 15.10/ kg.

Actual direct labour hours worked :	*32,000 hours*
Actual direct labour cost :	*₹ 13,12,000*

Required :

(a) Prepare the following budgets:

(i) Monthly production quantity for the quarter one.

(ii) Monthly raw material consumption quantity budget from January, 2014 to April, 2014.

(iii) Materials purchase quantity budget for the quarter one.

(b) Compute the following variances :

(i) Material cost variance

(ii) Material price variance

(iii) Material usage variance

(iv) Direct labour cost variance

(v) Direct labour rate variance

(vi) Direct labour efficiency variance

Solution:

(a) (i) Production Budget for January to March 2014 (Quantitative)

	Jan	Feb	Mar	April
Budgeted Sales	10,000	12,000	14,000	15,000
Add: Budgeted Closing Stock (20% of sales of next month)	2,400	2,800	3,000	3,000
	12,400	14,800	17,000	18,000
Less: Opening Stock	2,700	2,400	2,800	3,000
Budgeted Output	9,700	12,400	14,200	15,000

Total Budgeted Output for the Quarter ended March 31, 2014

= (9,700 + 12,400 + 14,200)= 36,300 units.

(ii) Raw Material Consumption Budget (in quantity)

Month	Budgeted Output (Units)	Material 'X' @ 4 kg per unit (Kg)	Material 'Y' @ 6 kg per unit (Kg)
January	9,700	38,800	58,200
February	12,400	49,600	74,400
March	14,200	56,800	85,200

April	15,000	60,000	90,000
Total		2,05,200	3,07,800

(iii) Raw Materials Purchase Budget for the Quarter ended March 31, 2014 (in quantity)

	Material X (kg)	Material Y (kg)
Raw material required for production	1,45,200	2,17,800
Add: Closing Stock of raw material	30,000	45,000
	1,75,200	2,62,800
Less: Opening Stock of raw material	19,000	29,000
Material to be purchased	1,56,200	2,33,800

(b) Calculation of Material Cost Variance

(a)		(b)	
Std Price × Std Mix × Std Qty for actual output		Std. Price × Std. Mix × Actual Qty.	
X – 10 × 4 × 40,000 =	16,00,000	X – 10 × $\frac{4}{10}$ × 4, 03,000 =	16,12,000
Y – 15 × 6 × 40,000 =	36,00,000	Y – 15 × $\frac{6}{10}$ × 4,03,000 =	36,27,000
	52,00,000		52,39,000

(c)		(d)	
Std Price × Actual Mix × Actual Qty		Actual Price × Actual Mix × Actual Qty.	
X – 10 × 1,65,000 =	16,50,000	X – 10.20 × 1,65,000 =	16,83,000
Y – 15 × 2,38,000 =	35,70,000	Y – 15.10 × 2,38,000	35,93,800
	52,20,000		52,76,800

Direct Material Usage Variance = (a – c)

X – 16,00,000 – 16,50,000 = 50,000 (A)

Y – 36,00,000 – 35,70,000 = 30,000 (F)

52,00,000 – 52,20,000 = 20,000 (A)

Direct Material Price Variance = (c – d)

X – 16,50,000 – 16,83,000 = 33,000 (A)

Y – 35,70,000 – 35,93,800 = 23,800 (A)

52,20,000 – 52,76,800 = 56,800 (A)

Direct Material Cost Variance = (a – d)

X – 16,00,000 – 16,83,000 = 83,000 (A)

Y – 36,00,000 – 35,93,800 = 6,200 (F)

52,00,000 – 52,76,800 = 76,800 (A)

Verification:

Direct Material Cost Variance = Direct Material Usage Variance + Direct Material Price Variance

= 20,000 (A) + 56,800 (A)

= 76,800 (A)

Alternative Solution (Total basis)

Direct Material Cost Variance = 52, 00,000 – 52, 76,800 =76,800 (A)

Direct Material Price Variance = 52, 20,000 – 52, 76,800 = 56,800 (A)

Direct Material Usage Variance = 52, 20,000 -52, 00,000 = 20,000 (A)

Calculation of Labour Cost Variances:

Budgeted output for the quarter = 36,300 units

Budgeted direct labour hours = 36,300 × ¾ hrs.

= 27,225 hours

Standard or Budgeted labour rate per hour

$$= \frac{\text{Budgeted direct labour cost}}{\text{Budgeted direct labour hours}}$$

$$= \frac{₹10,89,000}{27,225\text{ hours}} = ₹40$$

Standard labour hours for actual output:

= 40,000 units × ¾ hour

= 30,000 hours

Actual labour hour rate = $\frac{₹13,12,000}{32,000\text{ hrs}}$ = ₹41

Direct Labour Efficiency Variance = Standard Rate × (Std. hrs – Actual hrs.)

= ₹ 40 × (30,000 – 32,000)

= ₹ 80,000 (A)

Direct Labour Rate Variance = Actual hrs. × (Std. Rate – Actual Rate)

= 32,000 × (40 – 41)

= ₹32,000 (A)

Direct Labour Cost Variance = (Std. rate × Std. hrs.) – (Actual rate × Actual hrs.)

= (40 × 30,000) – (41 × 32,000)

= 12,00,000 – 13,12,000

= 1,12,000 (A)

Verification:

Direct Labour Cost Variance = Direct Labour Efficiency Variance + Direct Labour Rate Variance

= ₹80,000 (A) + ₹32,000 (A)

= 1,12,000 (A)

Question 3

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:

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

$$75\% = \frac{\text{AH}}{6{,}000 \text{ Units} \times 4 \text{ hour per unit}}$$

$$0.75 = \frac{\text{AH}}{24{,}000 \text{ Hours}}$$

AH = 18,000 Hours

$$\text{Efficiency Ratio} = \frac{\text{Actual Output in term of Standard Hours}}{\text{Actual Working Hours}} \times 100$$

$$= \frac{5{,}000 \text{ units} \times 4 \text{ hours per unit}}{18{,}000 \text{ Hours}} \times 100$$

$$= \frac{20{,}000 \text{ Hours}}{18{,}000 \text{ Hours}} \times 100 = 111.11\%$$

$$\text{Activity Ratio} = \frac{\text{Actual Output in term of Standard Hours}}{\text{Budgeted Output in term of Standard Hours}} \times 100$$

$$= \frac{20{,}000 \text{ Units}}{6{,}000 \text{ Units} \times 4 \text{ hour per unit}} \times 100$$

$$= \frac{20{,}000 \text{ Units}}{24{,}000 \text{ Units}} \times 100$$

= 83.33%

Question 4

AK Limited produces and sells a single product. Sales budget for calendar year 2013 by a quarters is as under:

Quarters	***I***	***II***	***III***	***IV***
No. of units to be sold	*18,000*	*22,000*	*25,000*	*27,000*

The year is expected to open with an inventory of 6,000 units of finished products and close with inventory of 8,000 units. Production is customarily scheduled to provide for 70% of the current quarter's sales demand plus 30% of the following quarter demand. The budgeted selling price per unit is ₹ 40. The standard cost details for one unit of the product are as follows:

Variable Cost ₹ 34.50 per unit

Fixed Overheads 2 hours 30 minutes @₹ 2 per hour based on a budgeted production volume of 1,10,000 direct labour hours for the year. Fixed overheads are evenly distributed through-out the year.

You are required to:

(i) Prepare Quarterly Production Budget for the year.

(ii) In which quarter of the year, company expected to achieve bread-even point.

Solution:

(i) Production Budget for the year 2013 by Quarters

		I	**II**	**III**	**IV**	**Total**
	Sales demand(Unit)	18,000	22,000	25,000	27,000	92,000
I	Opening Stock	6,000	7,200	8,100	8,700	30,000
II	70% of Current Quarter 's Demand	12,600	15,400	17,500	18,900	64,400
III	30% of Following Quarter's Demand	6,600	7,500	8,100	7,400*	29,600
IV	Total Production(II &III)	19,200	22,900	25,600	26,300	94,000
V	Closing Stock (I+IV-Sales)	7,200	8,100	8,700	8,000	32,000

*Balancing Figure

(ii) Break Even Point = Fixed Cost ÷ PV Ratio

= ₹ 2,20,000 ÷ 13.75% = ₹16,00,000 or 40,000 units.

P/V Ratio = (₹40 - ₹34.50 = ₹ 5.50) ÷ 40 × 100 =13.75%

(Or, Break Even Point = Fixed Cost ÷ Contribution = ₹ 2,20,000 ÷ ₹ 5.50 = 40,000 Units)

Total sales in the quarter II is 40,000 equal to BEP means BEP achieved in II quarter.

Question 5

Pentax Limited has prepared its expense budget for 20,000 units in its factory for the year 2013 as detailed below:

	(₹ per unit)
Direct Materials	*50*
Direct Labour	*20*
Variable Overhead	*15*
Direct Expenses	*6*
Selling Expenses (20% fixed)	*15*
Factory Expenses (100% fixed)	*7*
Administration expenses (100% fixed)	*4*
Distribution expenses (85% variable)	*12*
Total	*129*

Prepare an expense budget for the production of 15,000 units and 18,000 units.

Solution:

Expense Budget of M/s Pentax Ltd.

Particulars	**20,000 Units (₹)**	**15,000 Units (₹)**	**18,000 Units (₹)**
Direct Material	10,00,000 (20,000 x 50)	7,50,000 (15,000 x 50)	9,00,000 (18,000 x 50)
Direct Labour	4,00,000 (20,000 x 20)	3,00,000 (15,000 x 20)	3,60,000 (18,000 x 20)
Variable Overhead	3,00,000 (20,000 x 15)	2,25,000 (15,000 x 15)	2,70,000 (18,000 x 15)
Direct Expenses	1,20,000 (20,000 x 6)	90,000 (15,000 x 6)	1,08,000 (18,000 x 6)
Selling Expenses (Variable)*	2,40,000 (20,000 x 12)	1,80,000 (15,000 x 12)	2,16,000 (18,000 x 12)
Selling Expenses (Fixed)* (3 x 20,000)	60,000	60,000	60,000

Factory Expenses (Fixed) (7 x 20,000)	1,40,000	1,40,000	1,40,000
Administration Expenses (Fixed) (4 x 20,000)	80,000	80,000	80,000
Distribution Expenses (Variable)**	2,04,000 (10.20 x 20,000)	1,53,000 (10.20 x 15,000)	1,83,600 (10.20 x 18,000)
Distribution Expenses (Fixed)** (1.80 x 20,000)	36,000	36,000	36,000
	25,80,000	20,14,000	23,53,600

*Selling Expenses: Fixed cost per unit = ₹15 x 20% = ₹3

Fixed Cost = ₹3 x 20,000 units = ₹60,000

Variable Cost Per unit = ₹15 – ₹3 = ₹12

**Distribution Expenses: Fixed cost per unit = ₹12 x 15% = ₹1.80

Fixed Cost = ₹1.80 x 20,000 units = ₹36,000

Variable cost per unit = ₹12 – ₹1.80 = ₹10.20

Question 6

Jigyasa Ltd. is drawing a production plan for its two products Minimax (MM) and Heavyhigh (HH) for the year 2013-14. The company's policy is to hold closing stock of finished goods at 25% of the anticipated volume of sales of the succeeding month. The following are the estimated data for two products:

	Minimax (MM)	Heavyhigh (HH)
Budgeted Production units	*1,80,000*	*1,20,000*
	(₹)	(₹)
Direct material cost per unit	*220*	*280*
Direct labour cost per unit	*130*	*120*
Manufacturing overhead	*4,00,000*	*5,00,000*

The estimated units to be sold in the first four months of the year 2013-14 are as under

	April	May	June	July
Minimax	*8,000*	*10,000*	*12,000*	*16,000*
Heavyhigh	*6,000*	*8,000*	*9,000*	*14,000*

Prepare production budget for the first quarter in monthwise.

Solution:

Production Budget of Product Minimax and Heavyhigh (in units)

	April		May		June		Total	
	MM	HH	MM	HH	MM	HH	MM	HH
Sales	8,000	6,000	10,000	8,000	12,000	9,000	30,000	23,000
Add: Closing Stock (25% of next month's sale)	2,500	2,000	3,000	2,250	4,000	3,500	9,500	7,750
Less: Opening Stock	2,000*	1,500*	2,500	2,000	3,000	2,250	7,500	5,750
Production units	8,500	6,500	10,500	8,250	13,000	10,250	32,000	25,000

* Opening stock of April is the closing stock of March, which is as per company's policy 25% of next month'' sale.

Production Cost Budget

Element of cost	Rate (₹)		Amount (₹)	
	MM (32,000 units)	HH (25,000 units)	MM	HH
Direct Material	220	280	70,40,000	70,00,000
Direct Labour	130	120	41,60,000	30,00,000
Manufacturing Overhead				
(4,00,000 ÷ 1,80,000 × 32,000)			71,111	
(5,00,000 ÷ 1,20,000 × 25,000)				1,04,167
			1,12,71,111	1,01,04,167

Question 7

M/s NNSG Ltd, specialized in manufacturing of piston rings for motor vehicle. It has prepared budget for 8,000 units per annum at budgeted cost of ₹ 21,64,400 as detailed below:

	(₹)	*(₹)*
Fixed cost (Manufacturing)		*2,28,000*
Variable costs:		
Power	*18,000*	
Repairs, etc.	*16,000*	
Other variable cost	*6,400*	
Direct material	*6,16,000*	
Direct labour	*12,80,000*	*19,36,400*
		21,64,400

Considering the possible impact on sales turnover by market trends, the company decides to prepare flexible budget with a production target of 4,000 and 6,000 units. On behalf of the company you are required to prepare a flexible budget for production levels at 50% and 75%.

Assuming the selling price per unit is maintained at ₹ 400 as at present, indicate the effect on net profit. Administration, selling and distribution overheads continue at ₹ 72,000.

Solution:

Flexible Budget

Activity Level	**50%**	**75%**	**100%**
Production (units)	**4,000**	**6,000**	**8,000**
	(₹)	(₹)	(₹)
Sales @ ₹ 400 per unit	16,00,000	24,00,000	32,00,000
Variable costs :			
Direct Materials	3,08,000	4,62,000	6,16,000
Direct Labour	6,40,000	9,60,000	12,80,000
Power	9,000	13,500	18,000
Repairs etc.	8,000	12,000	16,000
Other variable cost	3,200	4,800	6,400
Total Variable Costs:	9,68,200	14,52,300	19,36,400
Fixed costs :			
Manufacturing	2,28,000	2,28,000	2,28,000
Administration, Selling and Distribution	72,000	72,000	72,000
Total Fixed Costs:	3,00,000	3,00,000	3,00,000
Total Costs	12,68,200	17,52,300	22,36,400
Profit (Sales – Variable Cost) – Fixed Cost	3,31,800	6,47,700	9,63,600

Question 8

Concorde Ltd. manufactures two products using two types of materials and one grade of labour. Shown below is an extract from the company's working papers for the next month's budget:

	Product-A	***Product-B***
Budgeted sales (in units)	*2,400*	*3,600*
Budgeted material consumption per unit (in kg):		
Material-X	*5*	*3*
Material-Y	*4*	*6*
Standard labour hours allowed per unit of product	*3*	*5*

Material-X and Material-Y cost ₹ 4 and ₹ 6 per kg and labours are paid ₹ 25 per hour. Overtime premium is 50% and is payable, if a worker works for more than 40 hours a week. There are 180 direct workers.

The target productivity ratio (or efficiency ratio) for the productive hours worked by the direct workers in actually manufacturing the products is 80%. In addition the non-productive down-time is budgeted at 20% of the productive hours worked.

There are four 5-days weeks in the budgeted period and it is anticipated that sales and production will occur evenly throughout the whole period.

It is anticipated that stock at the beginning of the period will be:

Product-A	*400 units*
Product-B	*200 units*
Material-X	*1,000 kg.*
Material-Y	*500 kg.*

The anticipated closing stocks for budget period are as below:

Product-A	*4 days sales*
Product-B	*5 days sales*
Material-X	*10 days consumption*
Material-Y	*6 days consumption*

Required:

Calculate the Material Purchase Budget and the Wages Budget for the direct workers, showing the quantities and values, for the next month.

Solution:

Number of days in budget period = 4 weeks × 5 days = 20 days

Number of units to be produced

	Product-A (units)	**Product-B (units)**
Budgeted Sales	2,400	3,600
Add: Closing stock $\left(\frac{2{,}400\text{ units}}{20\text{ days}} \times 4\text{ days}\right)\left(\frac{3{,}600\text{ units}}{20\text{ days}} \times 5\text{ days}\right)$	480	900
Less: Opening stock	400	200
	2,480	4,300

(i) Material Purchase Budget

	Material-X (Kg.)	Material-Y (Kg.)
Material required :		
Product-A	12,400 (2,480 units × 5 kg.)	9,920 (2,480 units × 4 kg.)
Product-B	12,900 (4,300 units × 3 kg.)	25,800 (4,300 units × 6 kg.)
	25,300	35,720
Add: Closing stock $\left(\frac{25{,}300\text{ kgs.}}{20\text{ days}} \times 10\text{ days}\right)\left(\frac{35{,}720\text{ kgs.}}{20\text{ days}} \times 6\text{ days}\right)$	12,650	10,716
Less: Opening stock	1,000	500
Quantity to be purchased	36,950	45,936
Rate per kg. of Material	₹ 4	₹ 6
Total Cost	₹ 1,47,800	₹ 2,75,616

(ii) Wages Budget

	Product-A (Hours)	Product-B (Hours)
Units to be produced	2,480 units	4,300 units
Standard hours allowed per unit	3	5
Total Standard Hours allowed	7,440	21,500
Productive hours required for production	$\frac{7{,}440\text{ hours}}{80\%} = 9{,}300$	$\frac{21{,}500\text{ hours}}{80\%} = 26{,}875$
Add: Non-Productive down time	1,860 hours. (20% of 9,300 hours)	5,375 hours. (20% of 26,875 hours)
Hours to be paid	11,160	32,250

Total Hours to be paid	= 43,410 hours (11,160 + 32,250)
Hours to be paid at normal rate	= 4 weeks × 40 hours × 180 workers = 28,800 hours
Hours to be paid at premium rate	= 43,410 hours – 28,800 hours = 14,610 hours
Total wages to be paid	= 28,800 hours × ₹ 25 + 14,610 hours × ₹ 37.5
	= ₹ 7,20,000 + ₹ 5,47,875
	= ₹ 12,67,875

Question 9

RST, Limited is presently operating at 50% capacity and producing 30000 units. The entire output is sold at a price of ₹ 200 per unit. The cost structure at the 50% level of activity is as under:

	(₹)
Direct Material	*75 per unit*
Direct Wages	*25 per unit*
Variable Overheads	*25 per unit*
Direct Expenses	*15 per unit*
Factory Expenses (25% fixed)	*20 per unit*
Selling and Distribution Exp. (80% variable)	*10 per unit*
Office and Administrative Exp. (100% fixed)	*5 per unit*

The company anticipates that the variable costs will go up by 10% and fixed costs will go up by 15%.

You are required to prepare an Expense budget, on the basis of marginal cost for the company at 50% and 60% level of activity and find out the profits at respective levels.

Solution:

Expense Budget of RST Ltd. for the period

	Per unit (₹)	**30,000 units**	**36,000 units**
		Amount (₹)	**Amount (₹)**
Sales **(A)**	200.00	60,00,000	72,00,000
Less: Variable Costs:			
- Direct Material	82.50	24,75,000	29,70,000
- Direct Wages	27.50	8,25,000	9,90,000
- Variable Overheads	27.50	8,25,000	9,90,000
- Direct Expenses	16.50	4,95,000	5,94,000
- Variable factory expenses (75% of ₹ 20 p.u.)	16.50	4,95,000	5,94,000
- Variable Selling & Dist. exp. (80% of ₹ 10 p.u.)	8.80	2,64,000	3,16,800
Total Variable Cost **(B)**	179.30	53,79,000	64,54,800
Contribution **(C) = (A – B)**	20.70	6,21,000	7,45,200
Less: Fixed Costs:			
- Office and Admin. exp. (100%)	--	1,72,500	1,72,500
- Fixed factory exp. (25%)	--	1,72,500	1,72,500

- Fixed Selling & Dist. exp. (20%)		--	69,000	69,000
Total Fixed Costs	**(D)**	--	4,14,000	4,14,000
Profit	**(C – D)**	--	2,07,000	3,31,200

Question 10

A Light Motor Vehicle manufacturer has prepared sales budget for the next few months, and the following draft figures are available:

Month	***No. of vehicles***
October	*4,000*
November	*3,500*
December	*4,500*
January	*6,000*
February	*6,500*

To manufacture a vehicle a standard cost of ₹ 2,85,700 is incurred and sold through dealers at an uniform selling price of ₹ 3,95,600 to customers. Dealers are paid 12.5% commission on selling price on sale of a vehicle.

Apart from other materials four units of Part-X are required to manufacture a vehicle. It is a policy of the company to hold stocks of Part-X at the end of the each month to cover 40% of next month's production. 4,800 units of Part-X are in stock as on 1st October.

There are 950 nos. of completed vehicles are in stock as on 1st October and it is policy to have stocks at the end of each month to cover 20% of the next month's sales.

You are required to

(a) Prepare Production budget (in nos.) for the month of October, November, December and January.

(b) Prepare a Purchase budget for Part-X (in units) for the months of October, November and December.

(c) Calculate the budgeted gross profit for the quarter October to December.

Solution:

(a) Preparation of Production Budget (in nos.)

	October	**November**	**December**	**January**
Demand for the month (Nos.)	4,000	3,500	4,500	6,000
Add: 20% of next month's demand	700	900	1,200	1,300
Less: Opening Stock	(950)	(700)	(900)	(1,200)
Vehicles to be produced	3,750	3,700	4,800	6,100

(b) Preparation of Purchase budget for Part-X

	October	November	December
Production for the month (Nos.)	3,750	3,700	4,800
Add: 40% of next month's production	1,480 (40% of 3,700)	1,920 (40% of 4,800)	2,440 (40% of 6,100)
	5,230	5,620	7,240
No. of units required for production	20,920 (5,230 × 4 units)	22,480 (5,620 × 4 units)	28,960 (7,240 × 4 units)
Less: Opening Stock	(4,800)	(5,920) (1,480 × 4 units)	(7,680) (1,920 × 4 units)
No. of units to be purchased	16,120	16,560	21,280

(c) Budgeted Gross Profit for the Quarter October to December

	October	November	December	Total
Sales in nos.	4,000	3,500	4,500	12,000
Net Selling Price per unit*	₹ 3,46,150	₹ 3,46,150	₹ 3,46,150	
Sales Revenue (₹ in lakh)	13,846	12,115.25	15,576.75	41,538
Less: Cost of Sales (₹ in lakh) (Sales unit × Cost per unit)	11,428	9,999.50	12,856.50	34,284
Gross Profit (₹ in lakh)	2,418	2,115.75	2,720.25	7,254

* Net Selling price unit = ₹ 3,95,600 – 12.5% commission on ₹ 3,95,600 = ₹ 3,46,150

Question 11

S Ltd. has prepared budget for the coming year for its two products A and B.

	Product A (₹)	*Product B (₹)*
Production & Sales unit	*6,000 units*	*9,000 units*
Raw material cost per unit	*60.00*	*42.00*
Direct labour cost per unit	*30.00*	*18.00*
Variable overhead per unit	*12.00*	*6.00*
Fixed overhead per unit	*8.00*	*4.00*
Selling price per unit	*120.00*	*78.00*

After some marketing efforts, the sales quantity of the Product A & B can be increased by 1,500 units and 500 units respectively but for this purpose the variable overhead and fixed overhead will be increased by 10% and 5% respectively for the both products.

You are required to prepare flexible budget for both the products:

(a) Before marketing efforts

(b) After marketing efforts.

Solution:

(a) Flexible Budget before marketing efforts:

	Product A (₹) 6,000 units		Product B (₹) 9,000 units	
	Per unit	Total	Per unit	Total
Sales	120.00	7,20,000	78.00	7,02,000
Raw material cost	60.00	3,60,000	42.00	3,78,000
Direct labour cost per unit	30.00	1,80,000	18.00	1,62,000
Variable overhead per unit	12.00	72,000	6.00	54,000
Fixed overhead per unit	8.00	48,000	4.00	36,000
Total cost	110.00	6,60,000	70.00	6,30,000
Profit	10.00	60,000	8.00	72,000

(b) Flexible Budget after marketing efforts:

	Product A (₹) 7,500 units		Product B (₹) 9,500 units	
	Per unit	Total	Per unit	Total
Sales	120.00	9,00,000	78.00	7,41,000
Raw material cost	60.00	4,50,000	42.00	3,99,000
Direct labour cost per unit	30.00	2,25,000	18.00	1,71,000
Variable overhead per unit	13.20	99,000	6.60	62,700
Fixed overhead per unit	6.72	50,400	3.98	37,800
Total cost	109.92	8,24,400	70.58	6,70,500
Profit	10.08	75,600	7.42	70,500

Question 12

XY Co. Ltd manufactures two products viz., X and Y and sells them through two divisions, East and West. For the purpose of Sales Budget to the Budget Committee, following information has been made available for the year 2014-15:

Product	*Budgeted Sales*		*Actual Sales*	
	East Division	*West Division*	*East Division*	*West Division*
X	*400 units at ₹ 9*	*600 units at ₹ 9*	*500 units at ₹ 9*	*700 units at ₹ 9*
Y	*300 units at ₹ 21*	*500 units at ₹ 21*	*200 units at ₹ 21*	*400 units at ₹ 21*

Adequate market studies reveal that product X is popular but under priced. It is expected that if the price of X is increased by ₹ 1, it will, find a ready market. On the other hand, Y is overpriced and if the price of Y is reduced by ₹ 1 it will have more demand in the market. The company management has agreed for the aforesaid price changes. On the basis of these price changes and the reports of salesmen, following estimates have been prepared by the Divisional Managers:

Percentage increase in sales over budgeted sales

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

With the help of intensive advertisement campaign, following additional sales (over and above the above mentioned estimated sales by Divisional Mangers) are possible:

Product	***East Division***	***West Division***
X	*60 units*	*70 units*
Y	*40 units*	*50 units*

You are required to prepare Sales Budget for 2015-16 after incorporating above estimates and also show the Budgeted Sales and Actual Sales of 2014-15.

Solution:

Statement Showing Sales Budget for 2015-16

Division	**Product X**			**Product Y**			**Total**
	Qty.	**Rate (₹)**	**Amt. (₹)**	**Qty.**	**Rate (₹)**	**Amt. (₹)**	**Amt. (₹)**
East	500[1]	10	5,000	400[3]	20	8,000	13,000
West	700[2]	10	7,000	600[4]	20	12,000	19,000
Total	1,200		12,000	1,000		20,000	32,000

Workings

1. 400 × 110% + 60 = 500 units
2. 600 × 105% + 70 = 700 units
3. 300 × 120% + 40 = 400 units
4. 500 × 110% + 50 = 600 units

Statement Showing Sales Budget for 2014-15

Division	Product X			Product Y			Total
	Qty.	Rate (₹)	Amt. (₹)	Qty.	Rate (₹)	Amt. (₹)	Amt. (₹)
East	400	9	3,600	300	21	6,300	9,900
West	600	9	5,400	500	21	10,500	15,900
Total	1,000		9,000	800		16,800	25,800

Statement Showing Actual Sales for 2014-15

Division	Product X			Product Y			Total
	Qty.	Rate (₹)	Amt. (₹)	Qty.	Rate (₹)	Amt. (₹)	Amt. (₹)
East	500	9	4,500	200	21	4,200	8,700
West	700	9	6,300	400	21	8,400	14,700
Total	1,200		10,800	600		12,600	23,400

Question 13

G Ltd. manufactures two products called 'M' and 'N'. Both products use a common raw material Z. The raw material Z is purchased @ ₹ 36 per kg from the market. The company has decided to review inventory management policies for the forthcoming year.

The following forecast information has been extracted from departmental estimates for the year ended 31st March 2016 (the budget period):

	Product M	*Product N*
Sales (units)	*28,000*	*13,000*
Finished goods stock increase by year-end	*320*	*160*
Post-production rejection rate (%)	*4*	*6*
Material Z usage (per completed unit, net of wastage)	*5 kg*	*6 kg*
Material Z wastage (%)	*10*	*5*

Additional information:

- *Usage of raw material Z is expected to be at a constant rate over the period.*
- *Annual cost of holding one unit of raw material in stock is 11% of the material cost.*
- *The cost of placing an orders is ₹ 320 per order.*
- *The management of G Ltd. has decided that there should not be more than 40 orders in a year for the raw material Z.*

Required:

(a) Prepare functional budgets for the year ended 31st March 2016 under the following headings:

(i) Production budget for Products M and N (in units).

(ii) Purchases budget for Material Z (in kgs and value).

(b) Calculate the Economic Order Quantity for Material Z (in kgs).

(c) If there is a sole supplier for the raw material Z in the market and the supplier do not sale more than 4,000 kg. of material Z at a time. Keeping the management purchase policy and production quantity mix into consideration, calculate the maximum number of units of Product M and N that could be produced.

Solution:

(a) (i) Production Budget (in units) for the year ended 31st March 2016

	Product M	Product N
Budgeted sales (units)	28,000	13,000
Add: Increase in closing stock	320	160
No. good units to be produced	28,320	13,160
Post production rejection rate	4%	6%
No. of units to be produced	29,500 $\left(\frac{28,320}{0.96}\right)$	14,000 $\left(\frac{13,160}{0.94}\right)$

(ii) Purchase budget (in kgs and value) for Material Z

	Product M	Product N
No. of units to be produced	29,500	14,000
Usage of Material Z per unit of production	5 kg.	6 kg.
Material needed for production	1,47,500 kg.	84,000 kg.
Materials to be purchased	1,63,889 kg. $\left(\frac{1,47,500}{0.90}\right)$	88,421 kg. $\left(\frac{84,000}{0.95}\right)$
Total quantity to be purchased	2,52,310 kg.	
Rate per kg. of Material Z	₹36	
Total purchase price	₹90,83,160	

(b) Calculation of Economic Order Quantity for Material Z

EOQ = $\sqrt{\frac{2 \times 2,52,310 \text{ kg.} \times ₹320}{₹36 \times 11\%}}$ = $\sqrt{\frac{16,14,78,400}{₹3.96}}$ = 6,385.72 kg.

(c) Since, the maximum number of order per year can not be more than 40 orders and the maximum quantity per order that can be purchased is 4,000 kg. Hence, the total quantity of Material Z that can be available for production:

= 4,000 kg. × 40 orders = 1,60,000 kg.

	Product M	**Product N**
Material needed for production to maintain the same production mix	1,03,929 kg. $\left(1,60,000 \times \frac{1,63,889}{2,52,310}\right)$	56,071 kg. $\left(1,60,000 \times \frac{88,421}{2,52,310}\right)$
Less: Process wastage	10,393 kg.	2,804 kg.
Net Material available for production	93,536 kg.	53,267 kg.
Units to be produced	18,707 units $\left(\frac{93,536 \text{ kg.}}{5 \text{ kg.}}\right)$	8,878 units $\left(\frac{53,267 \text{ kg.}}{6 \text{ kg.}}\right)$