COST AND MANAGEMENT ACCOUNTING BY CA. DINESH JAIN

Unique Features of Workbook:

- **One-stop solution:** The book has extensive coverage of practical problems and all-important questions from institute study material, RTP, MTP and suggested answers have been incorporated. This book can act as one-stop solution for students and they need not refer through multiple sources for preparation of Cost and Management Accounting.
- **Coverage of theory:** Full coverage of theory which can help in answering direct theory questions and also help in understanding procedure to be followed for practical problems. Questions have been categorized as per ABC analysis. **Category A are most important questions, category B are moderately important questions and category C are least important questions.**
- **Revision videos:** Revision videos for all chapters is available in Dinesh Jain Youtube channel and same can be used for understanding new concepts. Refer http://bit.ly/inter_costing for revision videos

Any suggestions/feedback will be highly appreciated and incorporated in future editions.

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CHAPTER 1: INTRODUCTION TO COST AND MANAGEMENT ACCOUNTING

1. Define cost, costing, cost accounting, cost accountancy, management accounting and cost management? **[Category B]**

Cost	Cost refers to the **amount of money that a company spends** on the creation or production of goods or services
Costing	Costing is defined as the **technique and process of ascertaining costs**
Cost Accounting	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 preparation of **periodical statements and reports for ascertaining and controlling costs**
Cost Accountancy	Cost accountancy is the application of costing and cost accounting principles, methods and techniques to the science, art and practice of **cost control and ascertainment of profitability**
Management accounting	Management accounting is application of the principles of accounting and financial management to create, protect, preserve and increase value for the stakeholders. In simple words management accounting is concerned **with providing relevant information to assist decision making**
Cost management	Application of management accounting concepts, methods of collections, analysis and presentation of data to **provide the information needed to plan, monitor and control costs**

2. What are objectives of cost accounting? **[Category C]**

Cost ascertainment	✓ Cost ascertainment refers to the **process of ascertaining cost of a product or service**. The ascertained cost can be compared with standard costs to fix responsibility for deviation in costs ✓ Cost can be ascertained either through post costing or continuous costing
Determination of selling price and profitability	✓ Selling price of the company is **determined on the basis of the cost incurred by the company** ✓ Selling price is also influenced by market conditions which are beyond control of any business. However, in such a scenario the company will try to control its costs to make profits ✓ Profit of an activity is ascertained by **matching cost with the revenue** of the activity
Cost control	✓ Set up the **target cost** of each department or operation ✓ Measure the **actual performance** ✓ Investigate into causes for **deviation between actual and target cost** ✓ Take up **corrective action**
Cost reduction	✓ Achievement of **real and permanent reduction** in the unit cost of goods manufactured or services rendered without **impairing the quality of the product**
Decision making	✓ Decision making is defined as a **process of selecting a course of action out of two or more alternative courses** ✓ Cost accounting records would help in decision making. Example: Cost volume relationships, shutting down or operating at a loss, making or buying from outside

3. Differentiate Cost control and cost reduction? **[Category A]**

Cost control	Cost reduction
1. Cost control aims at maintaining the cost in accordance with standards	1. Cost reduction is concerned with reducing costs
2. Cost control seeks to achieve lowest possible cost under existing conditions	2. Cost reduction recognizes no condition as permanent, since a change will result in lower cost
3. Emphasis is on past	3. Emphasis is on present and future
4. Preventive function	4. Corrective function
5. Cost control ends when targets are achieved	5. Cost reduction has no visible end

4.   What is the scope of cost accounting? **[Category C]**

Costing	Costing is the **technique and process for ascertaining costs** of products or services
Cost Accounting	It is a process which begins with **recording of all expenditure and ends with preparation of periodical statement** and reports for ascertaining and controlling cost
Cost Analysis	It involves the process for finding out the **factors responsible for variance in actual costs from the budgeted costs** and accordingly fix responsibility for cost differences
Cost comparisons	Cost accounting include **comparisons of cost from alternative courses of action** such as use of different technology for production, cost of making different products and activities, and **cost of same product/service over a period of time**
Cost control	Cost is analysed to know whether **cost is not exceeding its budgeted cost** and whether scope for further cost reduction exist
Cost reports	Cost reports helps in **planning and control, performance appraisal** and **managerial decision making**
Statutory compliances	Companies (cost records and audits) Rules, 2014 state specified companies have to **maintain cost records relating to utilization of material, labour and other items of cost** as applicable to production of goods or provision of services

5.   Differentiate between Cost Accounting and Management Accounting? **[Category C]**

Basis	Cost Accounting	Management Accounting
Nature	Records the quantitative aspect	Records both qualitative and quantitative aspect
Objective	Ascertainment of cost for the purpose of cost control and decision making	Provides information to management for planning and co-ordination
Area	It deals only with cost ascertainment	It is wider in scope as it includes budgeting, tax planning among others
Rules and regulations	It follows certain principles and procedures for recording of costs of different products	It does not follow any specific rules and regulations
Recording of data	It uses both past and present information	It is focused with the projection of figures for future

6.   Differentiate financial accounting and cost accounting? **[Category C]**

Basis	Financial Accounting	Cost Accounting
Objective	Provides information about financial performance	Ascertainment of cost for the purpose of cost control and decision making
Recording of data	Records historical data	Makes use of both historical and pre-determined costs
Users of information	Shareholders, creditors, financial analysts, Government etc.	Internal management
Time period	Financial statements are usually prepared for a year	Reports and statements are prepared as and when required
Presentation of information	Set format is used for presenting financial information	There is no set format for presenting cost information

7.   What are the roles and functions of cost and management accountant? **[Category C]**
The role of a cost and management accountant is to:
   ❖   **Provide relevant information** to management for decision making
   ❖   Assist management for **planning, measurement, evaluation and controlling** of business activities
   ❖   Helps in **allocation of cost to products** and inventories for both external and internal users
The functions of cost and management accountant include:
   ❖   **Collection** and accumulation of cost
   ❖   **Assigning** costs to cost objects to ascertain cost

❖ Cost and management accounting department **sets budget for a particular period and the actuals are compared** at the end of the period
❖ **Provision of relevant information** to the management for decision making. Decisions like cost optimisation, price fixation, implementation of plan related to product, process, marketing etc.

8. Who are the users of cost and management accounting? **[Category C]**

Internal users	✓ **Managers:** Managers may use the information to know the cost of a cost object, price for the product or service, measure and evaluate performance, profitability analysis and decision making
	✓ **Operational level staffs:** Operational levels staffs such as supervisors, foreman, team leaders can use it to know the objectives and performance goals, product and service specifications, performance parameters and divisional profitability
	✓ **Employees:** Employees can use to find information related to time and attendance, incentives for work, performance standards
External users	✓ **Regulatory Authorities:** Regulatory authorities can use costing information for tariff determination, subsidies, rate fixation
	✓ **Auditors:** Auditor needs information related with costing and reports reviewed by management for the purpose of financial audit/cost audit
	✓ **Shareholders:** Shareholders are concerned with information that affects their investment in entity. Management periodically communicate information on new orders received, product expansion, market share for products to the shareholders
	✓ **Creditors and Lenders:** Information which affects an entity's ability to serve lenders or creditors. Example: Net debt position and stock balances

9. What are the essentials of a good cost accounting system? **[Category B]**
❖ **Informative and simple:** Costing system should be tailor-made, practical, simple and capable of meeting the requirements of the business concern
❖ **Accurate and authentic:** The data to be used by the cost accounting system should be accurate to avoid any wrong decisions
❖ **Uniformity and consistency:** Uniformity and consistency in classification, treatment and reporting of cost data and related information
❖ **Integrated and inclusive:** Cost accounting should be integrated with other systems like financial accounting, taxation, statistics and operational research
❖ **Flexible and adaptive:** System should be flexible enough to make necessary amendment and modifications in the system
❖ **Trust on the system:** Management should have faith in the costing system and should also provide a helping hand for its development and success

10. What are the factors to be considered before installing a cost accounting system? **[Category C]**

Objective	✓ Objective of cost accounting system can either be for fixing prices or insisting a system of cost control
Nature of business or industry	✓ Every business industry has its own peculiar feature and costing objectives. Cost Accounting records are maintained based on the cost accounting information requirement
Organizational Hierarchy	✓ Costing system should fulfil the requirement of different level of management such as top management, strategic management and operational level management
Knowing the product	✓ Nature of product determines the type of costing system to be implemented
Knowing the production process	✓ Good costing system can be established with complete knowledge of the production process
	✓ Cost apportionment can be done on most scientific and appropriate basis if cost accountant can identify degree of effort or resources consumed in a particular process
Information synchronisation	✓ Information needs of various departments should be taken. For example, a typical business organisation needs to submit monthly stock statement to its lender bank, quantity wise stock details at the time of filing returns to tax authorities etc.

Method of maintenance of cost records	✓ The company should decide on whether to maintain it is integrated system or non-integrated system
Statutory compliances and audit	✓ Records are to be maintained to comply with statutory requirements, standards to be followed
Information attributes	✓ Information generated from the costing system should possess all attributes of an information such as completeness, accuracy, timeliness, confidentiality etc.

11. What is the impact of information technology on cost accounting system? **[Category B]**

❖ Information technology has led to **integration of different functional activities** and as a consequence a single entry into the cost accounting system provide custom made reports for every purpose and saves an organization from preparing different sets of documents

❖ **Move towards paperless environment** with all documents like Bill of material, Material requisition note, Goods received note being made in system

❖ Information technology with the help of internet can help in **resource procurement and mobilization**

❖ **Cost information is ascertained with accuracy in timely manner**. Cost centre and cost object is codified and all related costs are assigned using the codes

❖ **Uniformity** in preparation of report, budgets and standards can be achieved with the help of IT

❖ Cost and revenue variance reports can be prepared in **real time basis**

❖ IT enables an entity to monitor and analyse each process closely to eliminate **non-value-added activities**

12. What is a cost object? **[Category A]**

❖ Cost object is anything for which **separate measurement of cost** is required

❖ Cost object can be a product, service, project, activity, process and department

13. What is a cost unit? **[Category A]**

❖ Cost unit is a **unit of product, service or time** (or combination of these) in relation to which costs may be ascertained or expressed

❖ Example: Cost per tonne of steel, cost per tonne kilometre or cost per machine hour

❖ Cost units are usually the **units of physical measurement** like number, weight, area, volume, length, time and value

❖ Some examples of cost unit in few industries is provided in the below table:

Industry	Cost unit
Transport	Passenger KM or Tonne KM
Brewing	Barrel
Coal mining	Tonne/ton
Engineering	Contract, job
Brick-making	1,000 bricks
Gas	Cubic feet
Power	Kilo-watt hour
Hotel	Room days or meal
Hospital	Patient days
Steel	Tonne
Oil	Barrel, tonne, litre
Automobile	Numbers
Cement	Tonne/bag
Chemicals	Litre, gallon, Kilogram, tonne etc
Credit control	Accounts maintained
Selling	Customer call, value of sales, orders taken
Materials storage/handling	Requisition unit received/issued
Personnel administration	Personnel record

14. What is a cost driver? **[Category A]**

❖ A cost driver is a **factor or variable which effect level of cost.** It can also be defined as the factor influencing the level of cost.
❖ **Examples of cost drivers** are number of set up hours for set up activity, number of purchase orders for purchase department, number of inspection hours for inspection activity

15. What is a responsibility centre and its types? **[Category A]**
❖ Department/function with specific responsibility and authority are known as responsibility centres
❖ Responsibility centre can be held responsible for performance in terms of expenditure, revenue, profitability and return on investment
❖ Following are the types of responsibility centre:
   o Cost Centres
   o Revenue Centres
   o Profit Centres
   o Investment Centres

16. What is a cost centre and its types? **[Category A]**
❖ Cost centre is held responsible for incurrence of costs which are under its control. Performance of the cost centre is measured against pre-determined standards or budgets
❖ Cost centre are of the following two types:

Standard cost centre	Cost centre where output is measurable and input required for the output can be specified. The actual performance is compared with the set standards and the deviation is analysed into controllable and uncontrollable cost
Discretionary cost centre	Cost centre where output cannot be measured in financial terms and thus input-output ratio cannot be defined. In this case the cost of input is compared with the allocated budget for the activity. Example: Advertisement, Research & Development

17. What are revenue centres, profit centres and investment centres? **[Category A]**

Revenue centres	✓ Responsibility centres which are accountable for generation of revenues. **Example: Sales department** ✓ Revenue centres does not have control on expenditure it incurs but these centres can incur expenditure like sales commission
Profit centres	✓ Responsibility centres which have both responsibility for revenue generation and incurrence of expenditure ✓ Profitability is the basis for measurement of performance of these responsibility centres **Example: Decentralized branches**
Investment centres	✓ Responsibility centres which are not only responsible for profitability but also has the authority to make capital investment decisions ✓ Performance is measured on the basis of Return on Investment (ROI) ✓ Example: Maharatna, Navratna and Miniratna PSU

18. What are limitations of cost accounting system? **[Category C]**
❖ **Expensive** – It is expensive because analysis, allocation and absorption of overheads require considerable amount of additional manpower and hence additional money
❖ **Requirement of reconciliation** – Results shown by cost accounts will differ from those of financial accounts and hence reconciliation statements are necessary to verify their accuracy
❖ **Duplication of work** – Duplication of work as organization has to maintain two sets of accounts
❖ **Inefficiency** – Costing system itself does not control costs but its usage does

19. What is the cost classification on the basis of nature or element? **[Category A]**

Direct Materials	✓ Materials which are present in the finished product and can be economically identified in the product ✓ Example: Cloth in the making of shirt
Direct Employee (Labour)	✓ Labour which can be economically identified or can be attributed wholly to a cost object ✓ Example: Employees engaged in the actual production

Direct Expenses	✓ Include all expenses other than direct material or direct labour which are specially incurred for a particular cost object and can be identified economically ✓ Example: Hire Charges of machinery for specific work
Indirect materials	✓ Materials which do not form part of the finished product are known as indirect materials ✓ Example: Stores used for maintaining machines and buildings
Indirect labour	✓ Labour costs which cannot be allocated but can be apportioned to or absorbed by cost units or cost centres ✓ Example: Foreman and Supervisor salary
Indirect expenses	✓ Expenses other than direct expenses are knows as indirect expenses ✓ Indirect expenses cannot be directly, conveniently and wholly allocated to a cost centre ✓ Example: Factory rent and rates
Overheads	✓ It is the aggregate of indirect material, indirect labour and indirect expenses ✓ Overheads are sub-divided into production/works overheads, administration overheads, selling & distribution overheads

20. Explain the cost classification on the basis of function? **[Category B]**

Under this classification, costs are classification on the basis of the function for which they are incurred. It includes the following:
- ❖ Direct Material Cost
- ❖ Direct Employee (labour) Cost
- ❖ Direct Expenses
- ❖ Production/manufacturing overheads
- ❖ Administration overheads
- ❖ Selling Overheads
- ❖ Distribution Overheads
- ❖ Research and Development Costs

21. Explain the cost classification on the basis of variability or behaviour? **[Category A]**

Fixed costs	✓ These are the costs which are incurred for a period and which tend to be unaffected by fluctuations in the level of activity. ✓ These costs do not tend to increase or decrease with the changes in output ✓ Example: Rent
Variable costs	✓ These costs tend to vary with the volume of activity ✓ Increase in the level of activity will result in an increase in variable costs and vice-versa ✓ Example: Direct Materials, Direct Wages
Semi-variable costs	✓ These costs contain both fixed and variable component and are thus partly affected by fluctuations in the level of activity ✓ Semi-variable cost can be split into variable and fixed component using the following steps: **Steps:** ✓ **Step 1:** Compute variable cost per unit. Variable cost per unit = Change in total cost / Change in units ✓ **Step 2:** Calculate total fixed cost. Total fixed cost = Total cost – total variable costs.

Note:
- ❖ **A reference to a change in variable cost has to be interpreted as change in variable cost per unit**
- ❖ **A reference to a change in fixed cost has to be interpreted as change in total fixed cost**
- ❖ **All items of cost under prime cost unless stated otherwise is a variable cost**

22. What are the methods to segregate semi-variable costs into fixed and variable costs? **[Category C]**

Method 1: Graphical Method:

- ❖ Large number of observations regarding the total costs at different levels of output are plotted on a graph with output on x-axis and total cost on y-axis
- ❖ A line of "best fit" which passes through all or most of the points is drawn
- ❖ The point at which this line cuts the y-axis indicates total fixed cost component in the total cost
- ❖ Variable cost is computed by deducting the fixed cost from the overall cost

Method 2: High points and Low points method:
- ❖ Under this method the difference between the total cost at highest and lowest sales volume is divided by the difference between the sales value at these two points
- ❖ Variable cost ratio = Change in cost / Change in sales

Method 3: Analytical Method:
- ❖ Experienced cost accountant tries to judge what proportion of semi-variable cost would be variable and what would be fixed

Method 4: Comparison by period or level of activity method:
- ❖ Variable overhead may be determined by comparing two levels of output with the amount of expenses at those levels
- ❖ Variable cost per unit = Change in cost / Change in output

Method 5: Least squares method:
- ❖ This is a statistical method and is based on finding out a line of best fit for a number of observations
- ❖ $Y = mx + c$
  - o Where Y = Total cost
  - o m = Variable cost per unit
  - o c = Total fixed cost
  - o x = Volume of output

23. Explain the cost classification on the basis of controllability? **[Category A]**

Controllable costs	✓ Cost that can be controlled, typically by a cost, profit or investment centre manager is called controllable cost ✓ Example: Direct Material cost
Uncontrollable costs	✓ Costs which cannot be influenced by the action of a specified member of an undertaking are known as uncontrollable costs ✓ Example: Expenditure incurred on tool-room

24. Explain the cost Classification on the basis of normality? **[Category A]**

Normal cost	✓ Cost which is normally incurred at a given level of output under the conditions in which the level of output is normally attained
Abnormal cost	✓ It is a cost which is incurred in excess of the normal cost. These costs are charged to costing profit & loss account

25. Explain the cost classification on the basis of managerial decision making? **[Category A]**

Pre-determined cost	✓ Cost which is computed in advance before production or operations start on the basis of the specifications of all the factors affecting the cost
Standard cost	✓ Pre-determined cost which is calculated from management's expected standard of efficient operation. This is used as the basis for price fixing and for cost control through variance analysis
Marginal cost	✓ Cost increase or decrease due to change in output
Estimated cost	✓ Expected costs of manufacture on the basis of available information in absence of actual production or purchase. ✓ Estimated costs are prospective costs since they refer to prediction of costs
Differential costs	✓ It represents the change in total cost (variable as well as fixed) due to change in activity level, technology, process or method of production
Imputed costs	✓ These costs are notional costs which do not involve any cash outlay. Example: Interest on capital

Capitalized costs	✓ These are costs which are initially treated as assets and subsequently treated as expenses in the form of depreciation
Product costs	✓ These are costs which are associated with the purchase and sale of goods (in the case of traded goods). ✓ Costs associated with acquisition and conversion of materials and all other manufacturing inputs into finished product for sale
Opportunity cost	✓ Cost refers to the value of sacrifice made or benefit of opportunity foregone in accepting an alternative course of action
Out-of pocket cost	✓ It is that portion of total cost which involves cash outflow
Shut down costs	✓ These costs which continue to be incurred even when a plant is temporarily shut down. Example: Rent, Depreciation
Sunk costs	✓ Historical costs incurred in the past are known as sunk costs. They play no role in decision making for the current period
Absolute cost	✓ These costs refer to the cost of any product, process or unit in its totality ✓ When costs are presented in statement form, various cost statements may be shown in absolute amount or as a percentage of total cost or as per unit cost or all together. When they are shown as absolute amount then they are called as absolute cost
Discretionary costs	✓ Costs which arise from periodic decisions and can be avoided if the firm opts not to incur it. Example: Advertising
Period Costs	✓ These are the costs which are not assigned to the products but are charged as expenses against the revenues of the period in which they are incurred ✓ All non-manufacturing costs are to be recognized as period costs
Engineered costs	✓ These are costs that result specifically from a clear cause and effect relationships between inputs and outputs
Explicit costs	✓ These are also known as out-of pocket costs and refer to costs involving immediate payment of cash
Implicit costs	✓ These do not have any immediate cash payment. They are not recorded in the books of accounts and they are also known as economic costs

26. Explain the different methods of costing? **[Category A]**

Method	Description
Job costing	✓ Cost of each job is ascertained separately ✓ Suitable in all cases where work is undertaken based on customer's order like printing press, motor work shop etc.
Batch costing	✓ A batch may represent a number of small orders passed through the factory in batch ✓ Each batch is treated as a cost unit and thus costed separately
Contract costing	✓ Cost of each contract is ascertained separately ✓ Suitable for firms engaged in the construction of roads, bridges, buildings etc.
Single or output costing	✓ Cost of a single product is ascertained
Process costing	✓ Cost of completing each stage of work is ascertained. ✓ Example: Cost of making pulp and cost of making paper from pulp is ascertained separately ✓ In mechanical operations, the cost of each operation may be ascertained separately; the name given is operation costing
Operating costing	✓ Used in concerns rendering service
Multiple costing	✓ Combination of two or more methods of costing outlined above ✓ Example: Firm manufacturing bi-cycles. The parts will be costed by the system of job or batch costing but the cost of assembling bicycle will be computed by single or output costing method

Examples:

Industry	Method of costing	Suggestive cost unit
Transport	Operating Costing	Passenger KM or Tonne KM

Power	Operating costing	Kilowatt hours
Hotel	Operating costing	Room days
Hospital	Operating costing	Patient days
Steel	Process costing /Single costing	Tonne
Coal	Single costing	Tonne
Bicycles	Multiple costing	Number
Bridge construction	Contract costing	Project/unit
Interior decoration	Job costing	Assignment
Advertising	Job costing	Assignment
Furniture	Job costing	Number
Brick works	Single costing	Per unit
Oil refining mill	Process costing	Barrel/tonne/litre
Sugar company	Process costing	Tonne
Toy making	Batch costing	Units
Cement	Single costing	Tonne
Radio assembling	Multiple costing	Units
Ship Building	Contract costing	Project/unit

27. Explain the different techniques of costing? **[Category B]**

Uniform costing	✓ When a number of firms in an industry agree to use the same system of costing in detail then they are said to be following uniform costing ✓ Uniform costing can help in making comparison of the performance with other firms/industry.
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 on profit and cost
Standard costing and variance analysis	✓ Standard costs are pre-determined and are subsequently compared with recorded actual costs to identify variances
Historical costing	✓ It is the ascertainment of costs after they have been incurred
Direct costing	✓ Practice of charging all direct costs to operations, processes or products leaving all indirect costs to be written off against profits in which they arise
Absorption costing	✓ Practice of charging all costs, both variable and fixed to operations, processes or products.

Practical Problems

1. **Cost unit**
State the unit of cost for the following industries
   a. Transport
   b. Power
   c. Hotel
   d. Hospital
   e. Steel
   f. Automobile

Answer:

Industry	Cost Unit
Transport	Passenger KM or Tonne KM
Power	Kilo Watt Hour (KWH)
Hotel	Per Room day/ Per meal
Hospital	Patient days
Steel	Tonne
Automobile	Numbers

2. **Identification of type of cost:**
State the types of cost in the following cases:
   a. Interest paid on own capital not involving any cash outflow

b. Withdrawing money from bank deposit for the purpose of purchasing new machine for expansion purpose
c. Rent paid for the factory building which is temporarily closed
d. Cost associated with the acquisition and conversion of material into finished product

Answer:
a. Imputed Cost
b. Opportunity cost
c. Shut down cost
d. Product Cost

3. **Method of costing:**

Identify the methods of costing for the following:
a. Where all costs are directly charged to a specific job
b. Where all costs are directly charged to a group of products
c. Where cost is ascertained for a single product
d. Where the nature of the product is complex and the method cannot be ascertained

Answer:
a. Job Costing
b. Batch Costing
c. Unit costing or single or output costing
d. Multiple costing

4. **Method of costing:**

State the method of costing that would be most suitable for:
a. Oil refinery
b. Bicycle manufacturing
c. Interior decoration
d. Airlines company

Answer:

Industry	Method of Costing
Oil Refinery	Process Costing
Bicycle Manufacturing	Multiple Costing
Interior Decoration	Job Costing
Airlines	Operating Costing

5. **Method Costing and cost unit**

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

Transport	Power	Hotel	Hospital
Steel	Coal	Bicycles	Bridge Construction
Interior Decoration	Advertising	Furniture	Brick-works
Oil Refining Mill	Sugar company having its own sugarcane fields	Toy Making	Cement
Radio Assembling	Ship Building	Nursing Home	

Answer:

Industry	Method of Costing	Cost Unit
Transport	Operating Costing	Passenger KM or Tonne KM
Power	Operating Costing	Kilo Watt Hours
Hotel	Operating Costing	Room days
Hospital	Operating Costing	Patient days
Steel	Process Costing/Single Costing	Tonne
Coal	Single Costing	Tonne
Bicycles	Multiple Costing	Number
Bridge Construction	Contract Costing	Project/unit
Interior Decoration	Job Costing	Assignment
Advertising	Job Costing	Assignment

Furniture	Job Costing	Number
Brick works	Single Costing	1000 units/unit
Oil refining mill	Process costing	Barrel/Tonne/Litre
Sugar company having its own sugarcane field	Process Costing	Tonne
Toy Making	Batch costing	Units
Cement	Single Costing	Tonne/per bag
Radio assembling	Multiple Costing	Units
Ship Building	Contract Costing	Project/unit
Nursing Home	Operating Costing	Bed weeks/Bed days

CHAPTER 2: MATERIAL COST

1. What is material cost and explain its importance? **[Category B]**
   ❖ The term material refers to all commodities/physical objects used by an organization. It can be a direct material or indirect material
   ❖ Materials constitute a significant part of total cost of finished product. Proper recording and control over material cost is essential due to following:

Dependence of the quality of finished product	✓ Exact quality of raw materials should be determined according to the quality of the end-product ✓ Quality and cost of raw material to be given equal consideration
Price of the product	✓ The company should strive to pay the minimum possible cost for the raw material
Continuity in production	✓ There should be no interruption in production process for want of material
Cost of holding material	✓ There should be no over-stocking of materials because the same would result in higher carrying cost
Wastages	✓ Wastages and losses in the manufacturing processes should be avoided as far as possible
Regular information about resources	✓ Information about availability of materials and stores should be continuously available to ensure proper production and procurement planning

2. What is material control and explain its objectives? **[Category B]**
   ❖ Inventory control is defined as the function of **ensuring that sufficient goods are retained in stock** to meet all requirements without carrying unnecessarily large stocks.
   ❖ Following are the objectives of material control:

Minimising interruptions in production process	✓ Ensuring constant availability of raw material so that there are no interruptions in production process for want of raw material
Optimisation of material cost	✓ Materials are procured at the lowest possible cost while ensuring adequate quality
Reduction in wastages	✓ Avoidance of unnecessary losses and wastages that may arise due to deterioration in quality
Adequate information	✓ Maintenance of proper records to ensure that reliable information is available for all items of materials and stores which would help in detecting losses and pilferages
Completion of order in time	✓ Proper material management is very necessary for fulfilling orders of the firm

3. What are requirements of material control? **[Category C]**
   ❖ Proper co-ordination of all departments involved
   ❖ Determining purchase procedure to see that purchases are made, after making suitable enquiries, at the most favourable terms to the firm
   ❖ Use of standard forms for receipt of goods, placing an order, issuing of materials
   ❖ Preparation of budgets concerning materials, supplies and equipment to ensure economy in purchasing and use of materials
   ❖ Operation of a system of internal check
   ❖ Storage of all materials and supplies in a well designated location with proper safeguards
   ❖ Operation of a system of perpetual inventory together with continuous stock taking
   ❖ Operation of a system of stores control and issue so that there will be proper delivery of materials to user departments
   ❖ Regular reports of materials purchased, issue from stock, inventory balances, obsolete stock, goods returned to vendors and spoiled/defective units

4. What are the elements of material control? **[Category B]**
Material control is a systematic control over the procurement, storage and usage of material so as to maintain an even flow of material. Material control involves efficient functioning of following operations:
   ❖ Purchasing of materials

- ❖ Receiving of materials
- ❖ Inspection of materials
- ❖ Storage of materials
- ❖ Issuing materials
- ❖ Maintenance of inventory records
- ❖ Stock audit

5. What are the documents associated with procurement of materials?

Bill of material (BOM) **[Category C]**	✓ BOM lists all material items required for making a complete product unit inclusive of all components or sub-assemblies ✓ It is easy for the purchase department to act on such advance intimation about future requirements ✓ Internal control can be established as the material can be issued for production only as per the BOM. Thus, a stores person will not issue less or more material. **Advantages of BOM:** ✓ BOM serves as an important basis of preparing material purchase requisitions by stores department ✓ BOM is used by cost accounts department for preparing an estimate/budget of material cost for a job ✓ BOM is used by production department for controlling usage of materials
Material Requisition Note (MRN) **[Category B]**	✓ MRN is an authorisation to the store keeper to issue materials. This is used as user's acknowledgement for receipts of materials and forms the basis for material accounting. ✓ MRN should clearly specify the job for which materials are required and the department which gets the materials issued. ✓ Store keeper must ensure that material requisition is signed by an authorised official and that the columns are filled in properly and legibly as any mistake will result in wrong accounting of material issued. The material requisition note should be pre numbered.
Purchase requisition (PR) **[Category B]**	✓ PR is a formal request made by production department to the purchasing department for purchasing materials ✓ The purpose of PR is to request and authorize the purchase department to order and procure the materials specified in stated quantities
Inviting tender / requesting for proposal (RFP) **[Category C]**	✓ Purchase department makes an enquiry into the market for the required materials as per PR sent by user department ✓ The company gathers information about the rate, quantity, technology, services and support etc., through RFP sent to selected vendors. Alternatively, the company can also opt for tender notification wherein all companies can participate in the tender
Selection of quotation / proposal **[Category C]**	✓ The purchase department should make a comparative assessment of various proposals of interested vendors ✓ The assessment should factor in price, quality, quantity offered, delivery commitment etc and then finally select the best quote
Purchase orders (PO) **[Category B]**	✓ The purchase department will issue a formal PO to the selected vendor ✓ PO is a written request to the supplier to supply certain specified materials at specified rates within a specified period
Goods received note (GRN) **[Category A]**	✓ GRN is prepared by the receiving section, which forms the basis of entries in the stores ledger. The note is serially numbered and prepared in multiple copies. The receiving section retains one copy. ✓ Goods along with four copies of GRN are passed on to the Inspection department. It inspects the goods and enters in appropriate columns in the note, the quantities accepted and the quantities rejected. ✓ Goods are passed on to the stores along with one copy of duly endorsed GRN. The other copies are forwarded to the accounts department, purchase department and the inspection department retain the fourth copy.

Material Returned Note [Category B]	✓ Material Returned Note is used for recording return of materials to the supplier
	✓ The material returned note is prepared by the stores or despatch department. Five copies of the same are prepared. Two are sent to supplier (one of which is sent back by supplier after he signed the same), one for stores, one for cost (stores) ledger and one copy to be retained in the material outward return book
Checking and passing bills for payment [Category C]	✓ Invoice received from supplier is sent to stores accounting section to check authenticity and mathematical accuracy
	✓ Quantity and price are checked with reference to GRN and PO. Stores accounting section after checking its accuracy finally certifies and passes the invoice for payment

6. What are the rules for valuation of material receipts? **[Category A]**
❖ Cost of material includes cost of purchase net of trade discounts, rebates, duty draw-back, cenvat credit etc and other costs incurred in bringing the inventories to their present location and condition

Steps in calculation of material cost:
Step 1: Calculate aggregate material cost. Treatment of various items associated with purchase of materials is tabulated as below

Trade discount	✓ To be deducted
Quantity discount	✓ To be deducted
Cash discount	✓ To be ignored. It is to be treated as interest and financial charges
Subsidy / grant / incentives	✓ To be deducted
Road tax / toll tax	✓ To be added
Octroi / entry tax	✓ To be added
Central Sales Tax	✓ To be added
Value added tax (VAT)	✓ To be ignored if input credit is available. Otherwise this needs to be added to cost of purchase
Excise duty	✓ To be ignored if input credit is available. Otherwise this needs to be added to cost of purchase
Custom duty	✓ To be added
Purchase tax	✓ To be ignored if input credit is available. Otherwise this needs to be added to cost of purchase
Demurrage	✓ Penalty imposed by the transporter for not taking delivery. It is an abnormal cost and hence should not be added to cost of purchase
Detention charges / Fine	✓ Abnormal cost and hence should not be added to cost of purchase
Penalty	✓ Penalty of any type is not to be included in the cost of purchase
Insurance charges	✓ Insurance charges paid for transit period is to be added with cost of purchase
Commission or brokerage paid	✓ To be added with cost of purchase
Freight inwards	✓ To be added
Cost of containers	✓ Non-returnable containers to be added with cost of purchase
	✓ Returnable containers: If the entire amount is receivable on return then the same should not be considered. However, if the entire amount is not received back then only the shortfall will be considered as cost of purchase

Step 2: Calculate effective good units. Effective good units = Total units ordered – Normal loss of material

| Normal loss of material | ✓ Good units absorb the cost of shortage due to normal reasons. Losses due to breaking of bulk, evaporation etc. |

Abnormal loss of material	✓ Shortage due to abnormal reasons such as material mishandling, pilferage etc are not absorbed by good units. Losses due to abnormal reasons are debited to costing profit and loss account

Step 3: Cost per unit = Aggregate material cost / Effective good units

7. Why should a company ensure proper storage of raw material? **[Category C]**
❖ The company has to ensure proper storage of raw material to preserve the quality of raw material
❖ If the purchased quantity is not properly stored, then material deteriorates in quality leading to loss for the company. The store-keeper has to ensure safe custody of raw material to preserve its quality

8. What are the Duties of store-keeper? **[Category C]**
❖ General control over stores
❖ Safe custody of materials
❖ Maintaining records
❖ Initiate purchase requisition
❖ Maintaining adequate level of stock
❖ Issue of materials
❖ Stock verification and reconciliation

9. What are the forms in which Store records can be maintained? **[Category B]**
The store records can be maintained in three forms

Bin Cards	Stock control cards	Store Ledger
✓ Bin refers to a box/container where materials are kept. ✓ Card is placed with each of the bin to record the details of material receipt, issue and return	✓ 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	✓ A store ledger maintains a record of both quantity and cost of stores received, issued and those in stock ✓ It is maintained by the cost accounting department
Advantages ✓ Fewer chances of entries as entries are being made at the same time as goods are received or issued ✓ Control over stock can be more effective ✓ Identification of different items of materials is facilitated by reference to the Bin Card	**Advantages** ✓ Records can be kept in a more compact manner ✓ All the records are at one place and hence it is possible to get an overall idea of the stock position	**Advantages:** ✓ Distribution of work among a greater number of clerks due to which receipts and issues are posted quickly ✓ Centralized record ✓ Testing of accuracy ✓ Cost effective ✓ Control over stock
Disadvantages ✓ Store records are dispersed over a wide area ✓ Cards are liable to be smeared with dirt and grease because of proximity to material and also because of handling of materials	**Disadvantages** ✓ On the spot comparison of the physical stock of an item with its book value is not facilitated ✓ Physical identification of materials may not be as easy as bin cards	

10. What is Inventory Control? **[Category B]**
❖ The main objective of inventory control is to achieve maximum efficiency in production and sales with the minimum investment in inventory
❖ The techniques commonly applied for inventory control are as follows:
    ✓ Setting of various stock levels

- ✓ ABC analysis
- ✓ Two bin system
- ✓ Establishment of system of budgets
- ✓ Use of perpetual inventory records and continuous stock verification
- ✓ Determination of economic order quantity
- ✓ Review of slow and non-moving items
- ✓ Use of control ratios

11. What is Economic Order Quantity (EOQ)? **[Category A]**
- ❖ EOQ refers to the best quantity to order. It is that quantity at which the total of ordering cost, carrying cost and material cost is lowest
- ❖ **Ordering Cost:** The term ordering cost means the cost of placing an order and receiving the quantity ordered. Example: Time & Documentation costs
- ❖ **Carrying Cost:** The term carrying cost means cost of carrying and holding inventory. Example: Storage cost, interest cost
- ❖ **Material Cost:** The term material cost refers to the basic price of the material

Relationship among quantity per order, ordering cost and carrying cost:
- ❖ Ordering cost is inversely proportional to quantity per order. If the quantity per order increase then the number of orders will decrease and hence the ordering cost will decrease
- ❖ Carrying cost is directly proportional to quantity per order. If the quantity per order increases then the no. of units carried in inventory increases and hence the carrying cost will increase
- ❖ Material cost will remain irrespective of quantity per order in case there are no price discounts

Formula:

$\text{EOQ} = \sqrt{\dfrac{2 \times \text{Annual demand of RM} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
$\text{Number of orders to be placed} = \dfrac{\text{Annual demand of RM}}{\text{Quantity per order}}$
$\text{Time lag between two orders} = \dfrac{365}{\text{No of orders}}$
Total ordering cost = Number of orders x Ordering cost per order
Total carrying cost = Average inventory x Carrying cost per unit per annum
$\text{Average inventory} = \dfrac{\text{Quantity per order}}{2}$
Material cost = Annual demand of Raw Material x Purchase Price
Total inventory cost = Material cost + Ordering cost + Carrying cost

Calculation of Carrying Cost:
- ❖ Carrying cost is normally expressed as a function of material price
- ❖ If the carrying cost is expressed as a percentage it must be applied as a percentage of material price
- ❖ Total carrying cost is computed based on average inventory. Average inventory is computed as half of quantity ordered due to uniform consumption and just in time purchases

Calculation of Annual Demand:
- ❖ EOQ is computed for the raw material and hence the annual demand for raw material is required for computation of EOQ
- ❖ In case the annual demand of FG is given then the same is converted into annual demand for raw material using the below formula
  - o **Annual Demand of RM = Annual Demand of FG * Input / Output**
- ❖ If annual demand for FG is not given then annual demand for raw material is Q
  - o **Annual Demand of RM = Normal consumption per day * 365 days**

Price-break and EOQ:
- ❖ Price break means price moves in class intervals of volume. The class intervals need not be uniform

Step 1: Compute tentative EOQ using normal formula for each class interval. Take the final order quantity as the quantity within the class interval which is closer to computed EOQ

Step 2: Compute the total cost for each of the identified quantity in each class interval. The format to be used for computing total cost is as under:

Qty per order	No of orders	Total Ordering Cost	Average Inventory	Carrying cost/unit	Total Carrying cost	Purchase Price	Material cost	Total inventory cost

12. What are the various inventory levels? **[Category A]**

Level	Definition	Formula
Re-order level	Level at which fresh order for purchase is made	Maximum lead time * maximum usage **(or)** Minimum level + (Normal consumption * Normal lead time)
Re-order quantity	The amount of quantity ordered at the re-order level	ROQ = EOQ
Maximum level	Level beyond which inventory should not be allowed to cross	ROL + ROQ – (Minimum consumption * minimum lead time)
Minimum level	Level below which inventory should not be allowed to fall. This would be below re-order level	ROL – (Normal consumption * Normal lead time)
Average level	The stock a company on an average is expected to hold	(Maximum level + Minimum level) / 2 (or) Minimum level + (ROQ/2)
Danger level	Level at which an emergency order for purchase is made	Normal consumption * Emergency lead time

PRINCIPLE:
IN FIXING INVENTORY LEVELS THE FOLLOWING FACTORS SHOULD BE KEPT IN MIND:
- ❖ THE COMPANY SHOULD NEVER EVER GO OUT OF STOCK
- ❖ THE STORE KEEPER (PERSON RESPONSIBLE FOR MAINTAING INVENTORY) SHOULD NOT HAVE AN OCASSION TO COMPLAIN THAT THE INVENTORY LEVELS COULD NOT BE MAINTAINED ON ACCOUNT OF REASONS WHICH WERE BEYOND HIS CONTROL

Drivers of inventory levels:
- ❖ Consumption – Number of units consumed. The company can calculate maximum consumption, normal consumption and minimum consumption
- ❖ Lead time - Time gap between placing an order and receiving the quantity ordered. The company should identify maximum lead time, minimum lead time and normal lead time
- ❖ Lead time and consumption should be expressed in same units of time

13. What is Safety Stock? **[Category B]**
- ❖ Safety stock is the buffer stock maintained by the company to protect themselves from stock-outs
- ❖ The company will have high stock-out cost in case of no safety stock. Alternatively, it has to incur high carrying cost in case safety stock is maintained
- ❖ **The company should select the optimum safety stock wherein the total of stock-out cost and carrying cost is the lowest**

14. What is ABC analysis? **[Category A]**
- ❖ ABC analysis is an exercise in exercising better control
- ❖ This is based on Pareto's law which is also known as 80:20 rule

❖ The Pareto's law is applied to do an ABC analysis of materials based on their consumption values in order to lead to the following situations:

Category	Nature	Consumption Value	Consumption Quantity
A	Most Important	High (60%)	Low (10%)
B	Moderately Important	Medium (30%)	Medium (30%)
C	Least important	Low (10%)	High (60%)

Steps in ABC Analysis:
❖ **Step 1:** Sort the various items in the descending order of their consumption value
❖ **Step 2:** Compute cumulative value and cumulative quantity at the end of each item of quantity
❖ **Step 3:** Compute cumulative value as percentage of total value and cumulative quantity as percentage of total quantity
❖ **Step 4:** Split the various items on the basis of a pre-determined rule such as 60:30:10 or 70:20:10.

Advantages of ABC analysis:
❖ Continuity in production – It ensures that, without there being any danger of interruption of production for want of materials or stores, minimum inventories will be made in inventories of stocks of materials or stocks to be carried
❖ Lower cost – The cost of placing orders, receiving and maintaining stocks is minimized if the system is complemented with proper EOQ
❖ Less attention required – Management time is saved since attention needs to be paid only to some of the items rather than all the items
❖ Systematic working – With ABC, work connected with purchases can be systematized on a routine basis to be handled by subordinate staff

15. What are the various other ways of inventory classification? **[Category B]**

HML	High Price, Medium Price and Low Price cost items
VED	Vital, Essential and Desirable items
FSN	Fast moving, Slow moving and Non moving
GOLF	Government supply, ordinary supply, local and foreign supply
SOS	Seasonal and off seasonal items

16. What is a Two Bin system? **[Category C]**
❖ Under this system each bin is divided into two parts (smaller and bigger part)
❖ The 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 larger part; but as soon as it becomes necessary to use quantity out of smaller part of the bin, fresh order is placed

17. How can budgets help in inventory control? **[Category C]**
❖ Inventory control can be ensured through proper budgets as the same would indicate how much raw materials will be required in future.
❖ The company should prepare raw material purchase and raw material consumption budget at the beginning of the year to ensure adequate control over material cost

18. What are perpetual records and what are its advantages? **[Category C]**
Perpetual inventory represents a system of records maintained by the stores department. It infact comprise of Bin Cards and Stores Ledger. The process to be followed as under:
❖ Maintain stores ledger containing both quantity and amount
❖ Maintain stock control cards
❖ Reconcile the quantity between stores ledger and stock control cards
❖ Daily checking of quantity between stores ledger and stock control cards. Identify reasons for discrepancies and record the same

Advantages:
❖ Physical balance can be checked and reconciled on daily basis
❖ Quick compilation of profit and loss account due to prompt availability of stock figures
❖ Discrepancies are easily located and thus corrective action can be promptly taken

19. What is continuous stock-taking and its advantages? **[Category C]**
- ❖ System of continuous stock-taking consists of counting and verifying the number of items daily throughout the year so that all items of stores are covered three or four times
- ❖ The stock verifiers are independent of the stores and the stores staff will have no prior knowledge of the items to be verified

Advantages:
- ❖ Closure of normal functioning is not necessary
- ❖ Stock discrepancies can be brought to notice and corrected much earlier than under the annual stock-taking system
- ❖ Movement of stores items can be watched more closely by the stores auditor so that the chances of obsolescence buying are reduced

20. What ratios can be used for controlling material cost? **[Category A]**

Input-output ratio:
- ❖ Input-output ratio is the ratio of quantity of input of material to the quantity of output.
- ❖ The company can compare the standard consumption with actual consumption to identify whether usage of material is favourable or adverse

Inventory Turnover Ratio
- ❖ Inventory turnover measures the speed with which the stock of inventory is being used up.
- ❖ Inventory turnover ratios can help in categorizing goods as fast-moving and slow-moving items

Inventory Turnover Ratio = RM consumed / Average stock   **Number of days inventory is maintained = 365 / Inventory Turnover Ratio**

- ❖ The material with more inventory turnover ratio and less inventory days is considered as fast-moving item

21. Explain Material issue procedure and the associated documents? **[Category C]**

Issue of Material - Material Requisition Note (MRN)	✓ MRN is an authorisation to the store keeper to issue materials. This is used as user's acknowledgement for receipts of materials and forms the basis for material accounting. ✓ MRN should clearly specify the job for which materials are required and the department which gets the materials issued. ✓ Store keeper must ensure that material requisition is signed by an authorised official and that the columns are filled in properly and legibly as any mistake will result in wrong accounting of material issued. The material requisition note should be pre numbered.
Transfer of material – Material Transfer Note (MTN)	✓ The surplus materials of a job or few unsuitable units can either be transferred back to stores or transferred to some other job ✓ MTN is required to be used for recording the transfer from one job to another job
Return of material	✓ The surplus material when it is returned to the storeroom should be accompanied by a shop credit note or alternatively called as stores debit note ✓ This document should be prepared by the department returning surplus material and a copy of this is to be given to stores and costing department

22. What are the various methods for valuation of material issues?

Method and Meaning	Advantages	Disadvantages
Specific Price Method: [Category C] ✓ This method is used when materials are purchased for a specific job and these materials are issued against the specific job	✓ Cost of materials are issued for production purposes to specific jobs and hence would represent actual and correct costs	✓ Method is difficult to operate when purchases and issues are numerous

Method and Meaning	Advantages	Disadvantages
First-in-first out method (FIFO): [Category A] ✓ FIFO method is one in which the issues are priced in the order in which they are purchased	✓ Simple to understand and easy to operate ✓ Closing stock will be represented very closely at current market price	✓ Frequent fluctuation in prices can lead to clerical errors ✓ Each issue of material is related to specific purchase price, the cost charged to the same job are likely to show a deviation from period to period
Last-in-first out method (LIFO): [Category A] ✓ LIFO method used for pricing the issues ✓ This method is based on the assumption that the last batch purchased is consumed first and hence under this method the prices of the last batch are used for pricing the issues	✓ Cost of material issued will be nearer to and or will reflect the current market price ✓ Over longer run use of LIFO method iron out the fluctuation in profits	✓ Frequent fluctuation in prices can lead to clerical errors ✓ Each issue of material is related to specific purchase price, the cost charged to the same job are likely to show a deviation from period to period ✓ This method of valuation is not acceptable to income tax authorities
Simple average price method: [Category C] ✓ 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 purchases	✓ Simple to understand and easy to operate	✓ Material issue cost does not represent actual cost price ✓ Wide fluctuation of prices can lead to incorrect results
Weighted average price method: [Category A] ✓ Under this method, the weighted average rate is calculated by dividing the total value of purchases with total quantity purchased	✓ Smoothens the price fluctuations ✓ Issue price need not be calculated for each issue unless new lot is purchased	✓ Difficult to compute since every lot purchased would require re-computation of issue prices
Replacement price method: [Category C] ✓ Material issued are valued at the replacement cost of the items ✓ Replacement cost refers to the price at which it is possible to purchase an item which is being consumed	✓ Product cost reflects the current market prices and it can be compared with the selling price	✓ Determination of market price before each issue of material can be difficult
Realisable price method: [Category C] ✓ Realisable price means a price at which the materials to be issued can be sold in the market		
Standard price method: [Category C] ✓ Materials are issued at some pre-determined rate or standard rate irrespective of	✓ Use of standard price method simplifies the task of valuing issues of materials	✓ Use of standard price does not reflect the market price and thus can result in a profit or loss

Method and Meaning	Advantages	Disadvantages
the actual purchase cost of the materials	✓ Facilitates the task of judging the efficiency of the purchase department	✓ Fixation of standard price becomes difficult when prices fluctuate frequently

23. Explain the treatment of special items associated with materials?

Materials returned to vendor [Category C]	✓ Materials which do not meet quantity and other specifications are considered to be unfit for production and are usually returned to vendor ✓ Materials returned to vendor should be returned at the stores ledger price and not at the invoice price
Materials returned to stores [Category B]	✓ There are two ways of treating the return of material from stores which are 　✓ Such returns are entered in the receipt column at the price at which they were originally issued and keep the material in suspense account to be issued at the same price against the next requisition 　✓ Include the materials in stock as if they were fresh purchases at the original issue price
Valuation of shortages [Category B]	✓ Shortages found during physical verification should be entered in the issue column and be valued at the rate as per the method adopted
Normal and abnormal loss of material [Category A]	✓ Difference between the physical quantity and book quantity has to be accounted as shortage ✓ Normal shortage will be debited to overhead control account and abnormal loss of material will be debited to costing profit and loss account
Waste [Category A]	✓ Portion of basic raw material lost in processing having no recoverable value ✓ Normal wastage of material – Normal waste is absorbed in the cost of net output ✓ Abnormal wastage of material – Abnormal waste is transferred to costing profit and loss account
Scrap [Category A]	✓ Scrap is the incidental residue from certain types of manufacture, usually of small amount and low value, recoverable without further processing ✓ **When scrap value is negligible:** This is excluded from costs. Costs of scrap is borne by good units and income from scrap is treated as other income ✓ **When scrap value is not identifiable to a particular process or job:** Sales value of scrap net of selling or distribution cost, is deducted from overhead to reduce the overhead rate ✓ **When scrap value is identifiable with a particular job or process and its value is significant:** The scrap value should be charged with full cost and the profit/loss should be transferred to costing profit and loss account
Spoilage [Category A]	✓ Materials which are badly damaged in manufacturing operations and cannot be rectified economically are called as spoilage ✓ Normal spoilage is part and parcel of manufacturing process and hence the same is treated as production overhead ✓ Abnormal spoilage is not inherent in the manufacturing process and hence the same is charged to costing profit and loss account
Defectives [Category A]	✓ Defectives refer to those units which can be rectified and turned into good units by application of additional material, labour or other service ✓ Cost of normal defectives can either be charged to good units or be treated as an overhead

	✓ Cost of abnormal defectives are charged to costing profit and loss account
Obsolescence **[Category B]**	✓ Obsolescence is defined as the loss in the intrinsic value of an asset due to its supersession ✓ Loss arising out of obsolescence are abnormal in nature and hence has to be charged to costing profit and loss account

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Practical Problems

1. Basic EOQ

PQR Limited produces a product which has a monthly demand of 52,000 units. The product requires a component X which is purchased at Rs. 15 per unit. For every finished product, 2 units of Component X are required. The Ordering cost is Rs. 350 per order and the Carrying cost is 12%p.a.

Required:

(i) Calculate the economic order quantity for Component X. Also find out the number of orders per annum. Compute the frequency of ordering to be followed by the company?

(ii) If the minimum lot size to be supplied is 52,000 units, what is the extra cost, the company has to incur?

(iii) What is the minimum carrying cost, the Company has to incur?

(iv) Determine when the next order should be placed. (Assume that the company does maintain a safety stock and that the present inventory level be 12,480 units with a year of 360 working days. The lead time for the supply of material is 2 days)

Answer:

WN 1: Computation of EOQ:

Base data:

Annual demand of FG	52,000 x 12 = 6,24,000 units
Annual demand of RM	Annual demand of FG x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ 6,24,000 x $\left(\dfrac{2}{1}\right)$ = 12,48,000 units
Ordering cost per order	Rs.350 per order
Carrying cost per unit per annum	12% of purchase price 12% x 15 = Rs.1.80 per unit

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 12,48,000 \times 350}{1.80}}$
EOQ	**=**	**22,030 units**

Number of orders calculation:

Number of orders	=	$\dfrac{\text{Annual demand}}{\text{Quantity per order}}$
Number of orders	=	$\dfrac{12,48,000}{22,030}$ = 56.65 Orders *

* Number of orders can also be rounded off to 57

Frequency of ordering:

Frequency of ordering	=	$\dfrac{360 \text{ days}}{\text{Number of orders}}$
Frequency of ordering	=	$\dfrac{360 \text{ days}}{56.65}$ = 6.35 days

WN 2: Comparison of EOQ and Minimum Lot size:

Particulars	EOQ	Minimum Lot size

1.	Annual Demand	12,48,000	12,48,000
2.	Quantity per order	22,030	52,000
3.	Number of orders (1/2)	56.65	24
4.	Ordering cost per order	350	350
5.	**Total ordering cost (3 x 4)**	**19,828**	**8,400**
6.	Average inventory (QPD/2)	11,015	26,000
7.	Carrying cost per unit per annum	1.80	1.80
8.	**Total carrying cost (6 x 7)**	**19,827**	**46,800**
9.	**Total of ordering and carrying cost (5+8)**	**39,655**	**55,200**
10.	**Extra cost due to minimum lot size (55,200 – 39,655)**		**15,545**

- **Minimum carrying cost = Minimum of (19,827 and 46,800) = Rs.19,827**

WN 3: Timing of next order:

Number of days of current inventory:
12,48,000 = 360 days
12,480 = ?
12,480 = 3.60 days
Current inventory is sufficient for 3.6 days of consumption
Timing of next order = Current inventory days – Lead time for supply
Timing of next order = 3.60 days – 2 days = 1.60 days
Hence next order should be placed in 1.60 days

Summary:

EOQ = 22,030 units (WN 1)
Number of orders = 56.65 orders (WN 1)
Frequency of ordering = 6.35 days (WN 1)
Extra cost due to Minimum lot size = Rs.15,545 (WN 2)
Minimum carrying cost = Rs.19,827 (WN 2)
Timing of next order = 1.60 days (WN 3)

2. Computation of EOQ

ZED Company supplies plastic crockery to fast food restaurants in metropolitan city. One of its products is a special bowl, disposable after initial use, for serving soups to its customers. Bowls are sold in pack 10 pieces at a price of Rs. 50 per pack. The demand for plastic bowl has been forecasted at a fairly steady rate of 40,000 packs every year. The company purchases the bowl direct from manufacturer at Rs. 40 per pack within a three days lead time. The ordering and related cost is Rs. 8 per order. The storage cost is 10% per 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 the next order should 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.

Answer:
WN 1: Computation of EOQ:
Base data:

Annual demand of FG	40,000 packs
Annual demand of RM	40,000 packs
Ordering cost per order	Rs.8 per order
Carrying cost per unit per annum	10% of purchase price 10% of Rs.40 = Rs.4/Pack

EOQ Calculation

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

EOQ	=	$\sqrt{\dfrac{2 \times 40,000 \times 8}{4}}$
EOQ	**=**	**400 Packs**

Number of orders calculation:

Number of orders	=	$\dfrac{\text{Annual demand}}{\text{Quantity per order}}$
Number of orders	=	$\dfrac{40,000}{400}$ = 100 Orders

WN 2: Calculation of total ordering and carrying cost:

Particulars	Amount
1. Annual Demand	40,000
2. Quantity per order	400
3. Number of orders (1/2)	100
4. Ordering cost per order	8
5. Total ordering cost (3 x 4)	**800**
6. Average inventory (QPD/2)	200
7. Carrying cost per unit per annum	4
8. Total carrying cost (6 x 7)	**800**
9. Total of ordering and carrying cost (5+8)	**1,600**

WN 3: Timing of next order:

Number of days of current inventory:
40,000 = 360 days
333 = ?
333 = 3 days
Current inventory is sufficient for 3 days of consumption
Timing of next order = Current inventory days – Lead time for supply
Timing of next order = 3 days – 3 days = 0(today)
Hence next order should be placed immediately

Summary:

EOQ = 400 Packs (WN 1)
Number of orders = 100 orders (WN 1)
Total of ordering and carrying cost = Rs.1,600 (WN 2)
Timing of next order = Immediate (WN 3)

3. Quantity discount and EOQ

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

- Annual demand of Alpha   :   8000 units
- Cost of placing an order   :   Rs.200 per order
- Cost per unit of Alpha   :   Rs.400
- 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:

- Compute the economic order quantity
- Advise whether the quantity discount can be accepted
- Find out the level of discount at which the company would be indifferent between purchase of 4,000 and EOQ units.

Answer:

WN 1: Computation of EOQ:

Base data:

Annual demand of FG	Not available
Annual demand of RM	8,000 units

Ordering cost per order	Rs.200 per order
Carrying cost per unit per annum	20% of purchase price 20% x 400 = Rs.80/unit

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 8{,}000 \times 200}{80}}$
EOQ	**=**	**200 units**

WN 2: Comparison of EOQ and Quantity Discount:

Particulars	EOQ	Quantity Discount
1. Annual Demand	8,000	8,000
2. Quantity per order	200	4,000
3. Number of orders (1/2)	40	2
4. Ordering cost per order	200	200
5. Total ordering cost (3 x 4)	**8,000**	**400**
6. Average inventory (QPD/2)	100	2,000
7. Carrying cost per unit per annum	80 (20% x 400)	76.80 (20% x 384)
8. Total carrying cost (6 x 7)	**8,000**	**1,53,600**
9. Annual Demand	8,000	8,000
10. Purchase Price	400	384
11. Material Cost (9 x 10)	**32,00,000**	**30,72,000**
12. Total Inventory Cost (5 + 8 + 11)	**32,16,000**	**32,26,000**

- The company should not accept the quantity discount as the cost under EOQ is lower.

WN 3: Computation of indifferent level of discount:

- Indifferent level of discount is one where the cost under quantity discount model is Rs.32,16,000 (equal to EOQ cost)
- Let us assume purchase price to be X

Particulars	Quantity Discount
1. Annual Demand	8,000
2. Quantity per order	4,000
3. Number of orders (1/2)	2
4. Ordering cost per order	200
5. Total ordering cost (3 x 4)	**400**
6. Average inventory (QPD/2)	2,000
7. Carrying cost per unit per annum	0.2X (20% of X)
8. Total carrying cost (6 x 7)	**400X**
9. Annual Demand	8,000
10. Purchase Price	X
11. Material Cost (9 x 10)	**8,000X**
12. Total Inventory Cost (5 + 8 + 11)	**400 + 8,400X = 32,16,000**

400 + 8,400 X = 32,16,000 8,400 X = 32,15,600 $X = \left(\dfrac{\mathbf{32,15,600}}{\mathbf{8,400}}\right) = \mathbf{382.81}$ Amount of discount = 400 – 382.81 = 17.19

$$\text{\% of discount} = \frac{17.19}{400} \times 100 = 4.30\%$$

4. Computation of EOQ

A company manufactures a product from a raw material, which is purchased at Rs.60 per kg. The company incurs a handling cost of Rs.360 plus freight of Rs.390 per order. The incremental carrying cost of inventory of raw material is Rs. 0.50 per kg per month. In addition, the cost of working capital finance on the investment in inventory of raw material is Rs.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 orders for procurement should 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?

Answer:

WN 1: Computation of EOQ:

Base data:

Annual demand of FG	1,00,000 units
Annual demand of RM	Annual demand of FG x $\left(\frac{\text{Input}}{\text{Output}}\right)$ $1,00,000 \times \left(\frac{1}{2.5}\right) = 40,000$ Kgs.
Ordering cost per order	360 + 390 = Rs.750 per order
Carrying cost per unit per annum	(0.50 x 12) + 9 = Rs.15 per Kg.

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 40,000 \times 750}{15}}$
EOQ	**=**	**2,000 Kgs**

WN 2: Frequency of ordering:

Number of orders	=	$\dfrac{\text{Annual demand}}{\text{Quantity per order}}$
Number of orders	=	$\dfrac{40,000}{2,000} = 20$ orders

Frequency of ordering:

Frequency of ordering	=	$\dfrac{365 \text{ days}}{\text{Number of orders}}$
Frequency of ordering	=	$\dfrac{365 \text{ days}}{20} = 18.25$ days

WN 3: Computation of discount for quarterly ordering:

- Annual demand of the company is 40,000 kgs and quantity per order in case of quarterly ordering is 10,000 kgs
- Let us assumed purchase price under quarterly ordering to be X

Particulars	EOQ	Quarterly Ordering
1. Annual Demand	40,000	40,000
2. Quantity per order	2,000	10,000
3. Number of orders (1/2)	20	4
4. Ordering cost per order	750	750
5. Total ordering cost (3 x 4)	**15,000**	**3,000**
6. Average inventory (QPD/2)	1,000	5,000

7.	Carrying cost per unit per annum	15	15
8.	**Total carrying cost (6 x 7)**	**15,000**	**75,000**
9.	Annual Demand	40,000	40,000
10.	Purchase Price	60	X
11.	**Material Cost (9 x 10)**	**24,00,000**	**40,000X**
12.	**Total Inventory Cost (5 + 8 + 11)**	**24,30,000**	**40,000X + 78,000 = 24,30,000**

40,000X + 78,000 = 24,30,000
40,000X = 23,52,000
$X = \left(\dfrac{23,52,000}{40,000}\right) = 58.80$
Amount of discount = 60 – 58.80 = 1.20
% of discount $= \dfrac{1.20}{60}$ x 100 = 2%

5. EOQ and allied calculation

The annual demand for an item of raw material is 4,000 units and the purchase price is expected to be Rs. 90 per unit. The incremental cost of processing an order is Rs. 135 and the annual cost of storage is estimated to be Rs. 12 per unit. What is the optimal order quantity and total relevant cost of this order quantity?

Suppose that Rs. 135 as estimated to be the incremental cost of processing an order is incorrect and should have been Rs. 80. All other estimates are correct. What is the difference in cost on account of this error?

Assume at the commencement of the period that a supplier offers 4,000 units at a price of Rs. 86. The materials will be delivered immediately and placed in the stores. Assume that the incremental cost of placing the order is zero and original estimate of Rs. 135 for placing an order for the economic batch is correct. Should the order be accepted?

Answer:

WN 1: Computation of EOQ:

Base data:

Annual demand of FG	Not available
Annual demand of RM	4,000 units
Ordering cost per order	Rs.135/order
Carrying cost per unit per annum	Rs.12/unit

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \text{ x Annual demand x Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \text{ x } 4,000 \text{ x } 135}{12}}$
EOQ	**=**	**300 units**

WN 2: Computation of revised EOQ if ordering cost is Rs.80 per unit:

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \text{ x Annual demand x Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \text{ x } 4,000 \text{ x } 80}{12}}$
EOQ	**=**	**231 units**

WN 3: Calculation of extra cost due to incorrect EOQ:

Particulars	Incorrect EOQ	Correct EOQ
1. Annual Demand	4,000	4,000

2.	Quantity per order	300	231
3.	Number of orders (1/2)	13.33 ~ 14	17.32 ~ 18
4.	Ordering cost per order	135	80
5.	**Total ordering cost (3 x 4)**	**1,890**	**1,440**
6.	Average inventory (QPD/2)	150	116.50
7.	Carrying cost per unit per annum	12	12
8.	**Total carrying cost (6 x 7)**	**1,800**	**1,386**
9.	**Total Cost (5+8)**	**3,690**	**2,826**
10.	**Extra cost due to wrong EOQ (3,690 – 2,826)**	**864**	

WN 4: Analysis of discount:

Particulars	EOQ	Single order
1. Annual Demand	4,000	4,000
2. Quantity per order	300	4,000
3. Number of orders (1/2)	13.33 ~ 14	1
4. Ordering cost per order	135	0#
5. Total ordering cost (3 x 4)	**1,890**	**0**
6. Average inventory (QPD/2)	150	2,000
7. Carrying cost per unit per annum	12	12
8. Total carrying cost (6 x 7)	**1,800**	**24,000**
9. Annual Demand	4,000	4,000
10. Purchase Price	90	86
11. Material Cost (9 x 10)	**3,60,000**	**3,44,000**
12. Total Inventory Cost (5 + 8 + 11)	**3,63,690**	**3,68,000**

#Ordering cost has been given as zero in case we place a single order for entire 4,000 units
Conclusion:
The special offer should not be accepted as the total cost is higher by Rs.4,310

6.   EOQ for multiple materials

Arnav Ltd. manufactures a product X which requires two raw materials A and B in a ratio of 1:4. The sales department has estimated a demand of 5,00,000 units for the product for the year. To produce one unit of finished product, 4 units of material A is required.

Stock position at the beginning of the year is as below:
- Product- X 12,000 units
- Material A 24,000 units
- Material B 52,000 units

To place an order the company has to spend Rs.15,000. The company is financing its working capital using a bank cash credit @13% p.a. Product X is sold at Rs.1,040 per unit. Material A and B is purchased at Rs.150 and Rs.200 respectively. Required:

COMPUTE economic order quantity (EOQ):
   (i)   If purchase order for the both materials is placed separately.
   (ii)   If purchase order for the both materials is not placed separately.
Answer:
WN 1: Computation of EOQ if purchase order is placed seperately
Base data:

Annual demand of FG	5,00,000 units
Annual production of FG (Sales – opening stock)	4,88,000 units
Annual requirement of Material A	Annual production of FG x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ 4,88,000 x $\left(\dfrac{4}{1}\right)$ = 19,52,000 units
Annual purchase of A (Requirement – Opening stock)	19,28,000 units

Annual requirement of Material B	Annual production of FG x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ $4,88,000 \times \left(\dfrac{16}{1}\right) = 78,08,000$ units
Annual purchase of B (Requirement – Opening stock)	77,56,000 units
Ordering cost per order	Rs.15,000 per order
Carrying cost of A	13% x 150 = Rs.19.50 per unit
Carrying cost of B	13% x 200 = Rs.26.00 per unit

EOQ Calculation
Material A

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 19,28,000 \times 15,000}{19.50}}$
EOQ	**=**	**54,462 Units**

Material B

EOQ	=	$\sqrt{\dfrac{2 \times 77,56,000 \times 15,000}{26.00}}$
EOQ	**=**	**94,600 units**

WN 2: Computation of EOQ if order is not placed separately:

Annual purchase of A and B	19,28,000 + 77,56,000 = 96,84,000
Ordering cost per order	Rs.15,000 per order
Carrying cost of A and B (weighted average)	13% x 190 = Rs.24.70 per unit
Weighted average purchase price	$\dfrac{(19,28,000 \times 150) + (77,56,000 \times 200)}{19,28,000 + 77,56,000} = $ Rs. 190 per unit

Note: In case of a single purchase order we should calculate the weighted average price and weighted average carrying cost. This is because a single ordering cost would be incurred for buying material A and B together.

EOQ calculation:

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 96,84,000 \times 15,000}{24.70}}$
EOQ (combined)	**=**	**1,08,452 units**
EOQ of material A	**=**	$1,08,452 \times \dfrac{19,28,000}{96,84,000} = 21,592$ units,
EOQ of material B	**=**	$1,08,452 \times \dfrac{77,56,000}{96,84,000} = 86,860$ units,

7. **Computation of EOQ and material cost:**
HBL Limited produces product 'M' which has a quarterly demand of 20,000 units. Each product requires 3 kg. and 4 kg. of material X and Y respectively. Material X is supplied by a local supplier and can be procured at factory stores at any time, hence, no need to keep inventory for material X. The material Y is not locally available, it requires to be purchased from other states in a specially designed truck container with a capacity of 10 tons.

The cost and other information related with the materials are as follows:

Particulars	Material – X	Material - Y

Purchase price per Kg. (excluding GST)	Rs.140	Rs.640
Rate of GST	18%	18%
Freight per trip (fixed, irrespective of quantity)	-	Rs.28,000
Loss of material in transit*	-	2%
Loss in process*	4%	5%

* on purchased quantity

Other information:
- The company has to pay 15% p.a. to bank for cash credit facility
- Input credit is available on GST paid on materials

Required:
- (i)   Calculate cost per kg. of material X and Y
- (ii)   Calculate the EOQ for both the materials

Answer:
WN 1: Computation of Cost per KG of Material X and Material Y:

Particulars	Material X	Material Y
1. Annual demand of M	80,000	80,000
2. Input: Output Ratio	3:1	4:1
3. Annual demand of RM	2,40,000 (80,000 x 3)	3,20,000 (80,000 x 4)
4. Units to be purchased (Note 1)	**2,50,000**	**3,44,086**
5. Purchase Price	140	640
6. Total Purchase cost	3,50,00,000	22,02,15,040
7. Freight cost	0	9,80,000 (28,000 x 35*)
8. Total cost of purchase	**3,50,00,000**	**22,11,95,040**
9. Good units purchased	2,40,000	3,20,000
10. Effective cost per unit (8/9)	**145.83**	**691.23**

Note 1: Computation of units to be purchased

Particulars	Material X	Material Y
1. Units purchased (assumed)	100	100
2. Loss in Transit (% of purchased quantity)	0	(2)
3. Units received	**100**	**98**
4. Loss in process (% of purchased quantity)	(4)	(5)
5. Good units consumed	**96**	**93**

Material X:
- If company purchases 100 units, they will be able to consume 96 Good units. Company needs 2,40,000 KG and hence overall purchase will be 2,50,000 Kg [2,40,000 x (100/96)]

Material Y:
- If company purchases 100 units, they will be able to consume 93 Good units. Company needs 3,20,000 KG and hence overall purchase will be 3,44,086 Kg [3,20,000 x (100/93)]

* Number of trips = 3,44,086/10,000 = 34.41. This will be rounded off to 35 trips

WN 2: Computation of EOQ:
Material X:
- Material X can be purchased at any time. There is no ordering cost mentioned in the question and hence there is no EOQ for Material X.

Material Y:
Base data:

Annual demand of FG	80,000 units
Annual demand of RM	3,44,086 (WN 1)
Ordering cost per order	28,000 (Freight)
Carrying cost per unit per annum	15% of effective purchase price

	15% x 691.23 = Rs.103.69

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 3,44,086 \times 28,000}{103.69}}$
EOQ	=	**13,632 Kgs**

Note:
- Cost per Kg in WN 1 could have been calculated without freight element. This would have ensured that there is no double counting of freight cost [considered in purchase as well as ordering]

8. Computation of EOQ

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

Answer:

Particulars	Calculation	Amount
Total Carrying cost		Rs.9,000
Carrying cost per unit		Rs.3.6
Average Inventory	$\dfrac{9,000}{3.6}$	2,500
EOQ	Average inventory x 2	5,000

9. Price Break and EOQ

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

Price per tonne	Tonnes number
Rs. 9,600	Less than 50
Rs. 9,360	50 and less than 100
Rs. 9,120	100 and less than 200
Rs. 8,880	200 and less than 300
Rs. 8,640	300 and above

The annual requirement for the material is 500 tonnes. The ordering cost per order is Rs.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 tonne is Rs.10,500.

Answer:

WN 1: Computation of quantity per order for every class interval:

Particulars	0 to 49	50 to 99	100 to 199	200 to 299	>300
1. Annual Demand	500	500	500	500	500
2. Ordering cost per order	12,500	12,500	12,500	12,500	12,500
3. Carrying cost per unit [25 % of purchase price]	2,400	2,340	2,280	2,220	2,160
4. Tentative EOQ $\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$	72	73	74	75	76
5. **Final quantity per order (Note)**	**49**	**73**	**100**	**200**	**300**

Note:

- Final quantity per order is selected as the number which is closest to tentative EOQ. For instance, 0 to 49 units has tentative EOQ of 72 units. However, 72 units is not possible in first class interval and hence quantity per order is 49 units (closest to 72).

WN 2: Computation of total cost at different purchase levels:

Particulars	0 to 49	50 to 99	100 to 199	200 to 299	>300
1. Annual Demand	500	500	500	500	500
2. Quantity per order	49	73	100	200	300
3. Number of orders (1/2)	10.20	6.85	5.00	2.50	1.67
4. Ordering cost per order	12,500	12,500	12,500	12,500	12,500
5. Total ordering cost (3 x 4)	**1,27,500**	**85,625**	**62,500**	**31,250**	**20,875**
6. Average inventory (QPD/2)	24.50	36.50	50.00	100.00	150.00
7. Carrying cost per unit per annum	2,400	2,340	2,280	2,220	2,160
8. Total carrying cost (6 x 7)	**58,800**	**85,410**	**1,14,000**	**2,22,000**	**3,24,000**
9. Annual Demand	500	500	500	500	500
10. Purchase Price	9,600	9,360	9,120	8,880	8,640
11. Material Cost (9 x 10)	**48,00,000**	**46,80,000**	**45,60,000**	**44,40,000**	**43,20,000**
12. Total Inventory Cost (5 + 8 + 11)	49,86,300	48,51,035	47,36,500	46,93,250	46,64,875

- Most economical purchase level = 300 tonnes; this is because the overall cost is lowest when quantity per order is 300 tonnes.

WN 3: Computation of EOQ if there are no quantity discounts:
Base data:

Annual demand of FG	Not available
Annual demand of RM	500 Tonnes
Ordering cost per order	Rs.12,500 per order
Carrying cost per unit per annum	25% of purchase price = 25% x 10,500 = 2,625

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 500 \times 12{,}500}{2{,}625}}$
EOQ	**=**	**69 Tonnes**

10. **EOQ and limitation on number of purchases:**

Aditya Ltd. has a monthly requirement for an item of raw material is 1,000 units. The purchase price per unit of material is Rs.60. The cost of processing an order is Rs.540 and the carrying cost is 20%. There is a single supplier for the material which offers quantity discounts as under:

Order Quantity (in units)	Price Per Unit
Less than 2,000 units	60.00
2,000 units and less than 4,000 units	59.80
4,000 units and less than 6,000 units	59.50
6,000 units and less than 8,000 units	58.90
8,000 units and above	58.40

The company uses the cash credit facility provided by the company's banker to finance its raw material purchase. The bank due to its own infrastructural constraint, can accommodate a maximum of five fund transfer (NEFT/ RTGS) requests for any single beneficiary per annum. The company in short term is unable to arrange any other source of finance.
Required:
    (i)   Calculate the optimum purchase order size for the company;

(ii)   Calculate the order level where the company could have minimised its total cost;

(iii)   The amount of loss that the company has to bear due to bank's inability to process fund transfer requests.

Answer:

WN 1: Computation of quantity per order for every class interval:

Particulars	<2,000	2,000 to 3,999	4,000 to 5,999	6,000 to 7,999	>8,000
1. Annual Demand	12,000	12,000	12,000	12,000	12,000
2. Ordering cost per order	540	540	540	540	540
3. Carrying cost per unit [20 % of purchase price]	12.00	11.96	11.90	11.78	11.68
4. Tentative EOQ $\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$	1,039	1,041	1,044	1,049	1,053
5. Final quantity per order	**1,039**	**2,000**	**4,000**	**6,000**	**8,000**

WN 2: Computation of total cost at different purchase levels:

Particulars	<2,000	2,000 to 3,999	4,000 to 5,999	6,000 to 7,999	>8,000
1. Annual Demand	12,000	12,000	12,000	12,000	12,000
2. Quantity per order	1,039	2,000	4,000	6,000	8,000
3. Number of orders (1/2)	11.55	6	3	2	1.50
4. Ordering cost per order	540	540	540	540	540
5. Total ordering cost (3 x 4)	**6,237**	**3,240**	**1,620**	**1,080**	**810**
6. Average inventory (QPD/2)	519.50	1,000	2,000	3,000	4,000
7. Carrying cost per unit per annum	12.00	11.96	11.90	11.78	11.68
8. Total carrying cost (6 x 7)	**6,234**	**11,960**	**23,800**	**35,340**	**46,720**
9. Annual Demand	12,000	12,000	12,000	12,000	12,000
10. Purchase Price	60	59.80	59.50	58.90	58.40
11. Material Cost (9 x 10)	**7,20,000**	**7,17,600**	**7,14,000**	**7,06,800**	**7,00,800**
12. Total Inventory Cost (5 + 8 + 11)	**7,32,471**	**7,32,800**	**7,39,420**	**7,43,220**	**7,48,330**

- Most economical purchase level = 1,039 units; this is because the overall cost is lowest when quantity per order is 300 tonnes.
- Number of orders to minimize cost = 11.55 orders

WN 3: Computation of amount of loss due to restriction on five fund transfers:

- The company can do only five fund transfers and hence it would be able to place only five orders.
- Quantity per order = 12,000/5 = 2,400 units

Particulars	Amount
1. Annual Demand	12,000
2. Quantity per order	2,400
3. Number of orders (1/2)	5
4. Ordering cost per order	540
5. Total ordering cost (3 x 4)	**2,700**
6. Average inventory (QPD/2)	1,200
7. Carrying cost per unit per annum	11.96
8. Total carrying cost (6 x 7)	**14,352**
9. Annual Demand	12,000
10. Purchase Price	59.80
11. Material Cost (9 x 10)	**7,17,600**
12. Total Inventory Cost (5 + 8 + 11)	**7,34,652**

- Amount of loss = 7,34,652 – 7,32,471 = Rs.2,181

11. ABC Analysis

You have just joined as a management accountant of an engineering company. Its costs are in shambles and there appears to be very little control over what's happening around. As a smart professional you spot material consumption as the first source of plugging cost leaks. You have collected the following data relating to the 12 items of material used in the company. You intend to do an ABC analysis. Present the analysis.

Item	Quantity	Rate	Value
A	200	501	1,00,200
B	600	83	49,800
C	250	250	62,500
D	470	50	23,500
E	250	64	16,000
F	300	85	25,500
G	400	25	10,000
H	280	400	1,12,000
I	400	55	22,000
J	300	40	12,000
K	250	30	7,500
L	1000	15	15,000
Total	4700		4,56,000

Answer:
ABC Analysis of materials:

Item	Quantity	Value	Cumulative Quantity	Cumulative value	Cumulative Quantity as % of total quantity	Cumulative value as % of total value	Category
H	280	1,12,000	280	1,12,000	5.96	24.56	A
A	200	1,00,200	480	2,12,200	10.21	46.54	A
C	250	62,500	730	2,74,700	15.53	60.24	A
B	600	49,800	1,330	3,24,500	28.30	71.16	A
F	300	25,500	1,630	3,50,000	34.68	76.75	B
D	470	23,500	2,100	3,73,500	44.68	81.91	B
I	400	22,000	2,500	3,95,500	53.19	86.73	B
E	250	16,000	2,750	4,11,500	58.51	90.24	B
L	1,000	15,000	3,750	4,26,500	79.79	93.53	C
J	300	12,000	4,050	4,38,500	86.17	96.16	C
G	400	10,000	4,450	4,48,500	94.68	98.36	C
K	250	7,500	4,700	4,56,000	100.00	100.00	C

- The above analysis has been done by following 70:20:10 rule for Category A, B and C respectively

Summary of ABC analysis:

Category	Nature	Items	% of value	% of quantity
A	Most important	H, A, C and B	71.16%	28.30%
B	Moderately important	F, D, I and E	19.08% [90.24-71.16]	30.21% [58.51-28.30]
C	Least important	L, J, G and K	9.76% [100-90.24]	41.49% [100-58.51]

12. ABC Analysis:

A store keeper has prepared the below list of items kept in the store of the factory.

Item	Units	Unit Cost
A	12,000	30.00

B	18,000	3.00
C	6,000	35.00
D	750	220.00
E	3,800	75.00
F	400	105.00
G	600	300.00
H	300	350.00
I	3,000	250.00
J	20,000	7.50
K	11,500	27.50
L	2,100	75.00

The store keeper required your help to classify the items for prioritization. You are required to apply ABC Analysis to classify the store items as follows:

Store items which constitutes approx. 70%, 20% and 10% of total value as A, B and C respectively

Answer:

ABC Analysis of Materials:

Item	Quantity	Rate	Value	Cumulative Quantity	Cumulative value	Cumulative Quantity as % of total quantity	Cumulative value as % of total value	Category
I	3,000	250	7,50,000	3,000	7,50,000	3.82	27.03	A
A	12,000	30	3,60,000	15,000	11,10,000	19.12	40.00	A
K	11,500	27.5	3,16,250	26,500	14,26,250	33.78	51.40	A
E	3,800	75	2,85,000	30,300	17,11,250	38.62	61.67	A
C	6,000	35	2,10,000	36,300	19,21,250	46.27	69.24	A
G	600	300	1,80,000	36,900	21,01,250	47.04	75.73	B
D	750	220	1,65,000	37,650	22,66,250	47.99	81.67	B
L	2,100	75	1,57,500	39,750	24,23,750	50.67	87.35	B
J	20,000	7.5	1,50,000	59,750	25,73,750	76.16	92.76	B
H	300	350	1,05,000	60,050	26,78,750	76.55	96.54	C
B	18,000	3	54,000	78,050	27,32,750	99.49	98.49	C
F	400	105	42,000	78,450	27,74,750	100.00	100.00	C

Summary of ABC analysis:

Category	Nature	Items	% of value	% of quantity
A	Most important	I, A, K, E and C	69.24%	46.27%
B	Moderately important	G, D, L and J	23.52% [92.76-69.24]	29.89% [76.16 – 46.27]
C	Least important	H, B and F	7.24% [100 – 92.76]	23.84% [100 – 76.16]

13. Stock levels

PQR Ltd, manufactures a special product, 'ZED'. The following particulars were collected for the year 2005-06:

(i)	Monthly demand of Zed	7,500 units
(ii)	Cost of placing an order	Rs. 500
(iii)	Re-order period	5 to 8 weeks
(iv)	Cost per unit	Rs. 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.
(vi) Rework the re-order quantity if ZED was the raw material.
(vii) Rework the re-order level if the company maintains safety stock of 1000 units.

Answer:
Computation of Re-order quantity (EOQ):
Base data:

Annual demand of FG	90,000 units [7,500 x 12]
Annual demand of RM	Normal consumption x 52 weeks 500 x 52 = 26,000 units
Ordering cost per order	Rs.500 per order
Carrying cost per unit per annum	10% of 60 = Rs.6 per unit per annum

ROQ Calculation

ROQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
ROQ	=	$\sqrt{\dfrac{2 \times 26,000 \times 500}{6}}$
ROQ	**=**	**2,082 units**

Computation of Re-order level:

Re-order level = Maximum consumption x Maximum Lead time
Re-order level = 750 units x 8 weeks
Re-order level = 6,000 units

Computation of Minimum level:

Minimum level = Re-order level – (Normal consumption x Normal Lead Time)
Minimum level = 6,000 – (500 x 6.5)

Minimum level = 2,750 units

Computation of maximum level:

Maximum level = ROL + ROQ – (Minimum consumption x Minimum Lead time)
Maximum level = 6,000 + 2,082 – (250 x 5)
Maximum level = 6,832 units

Computation of average level:
Formula 1:

Average level $= \dfrac{\text{Maximum level} + \text{Minimum level}}{2}$
Average level $= \dfrac{6,832 + 2,750}{2}$
Average level = 4,791 units

Formula 2:

Average level $= \text{Minimum level} + \left(\dfrac{\text{ROQ}}{2}\right)$
Average level $= 2,750 + \dfrac{2,082}{2}$
Average level = 3,791 units

Computation of revised ROQ if ZED is the raw material:
Base data:

Annual demand of FG	Not available
Annual demand of RM	90,000 units [7,500 x 12]
Ordering cost per order	Rs.500 per order
Carrying cost per unit per annum	10% of 60 = Rs.6 per unit per annum

ROQ Calculation

ROQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
ROQ	=	$\sqrt{\dfrac{2 \times 90,000 \times 500}{6}}$
ROQ	**=**	**3,873 units**

Computation of Re-order level with safety stock:

Re-order level = (Maximum consumption x Maximum Lead time) + Safety stock
Re-order level = (750 units x 8 weeks) + 1,000
Re-order level = 7,000 units

14. **Calculation of inventory levels:**

Arnav Electronics manufactures electronic home appliances. It follows weighted average cost method for inventory valuation. Following are the data of component X:

Date	Particulars	Units	Rate per unit
15-12-19	Purchase order – 008	10,000	9,930
30-12-19	Purchase order – 009	10,000	9,780
01-01-20	Opening stock	3,500	9,810
05-01-20	GRN*-008 (against the purchase order – 008)	10,000	-
05-01-20	MRN**-003 (against the purchase order – 008)	500	-
06-01-20	Material Requisition – 011	3,000	-
07-01-20	Purchase order – 010	10,000	9,750
10-01-20	Material requisition – 012	4,500	-
12-01-20	GRN-009 (against the Purchaser Order – 009)	10,000	-
12-01-20	MRN-004 (against the Purchaser Order – 009)	400	-
15-01-20	Material Requisition – 013	2,200	-

24-01-20	Material Requisition – 014	1,500	-
25-01-20	GRN-010 (against the Purchase Order – 010)	10,000	-
28-01-20	Material Requisition-015	4,000	-
31-01-20	Material Requisition – 016	3,200	

*GRN – Goods Received Note, **MRN – Material Returned Note

Based on the above data, you are required to calculate:

    (i)   Re-order level
    (ii)   Maximum stock level
    (iii)   Minimum stock level
    (iv)   Prepare stores ledger for the period January 2020 and Determine the value of stock as on 31-01-2020
    (v)   Value of components used during the month of January, 2020
    (vi)   Inventory Turnover Ratio

Answer:

WN 1: Analysis of lead time and consumption:

Particulars	Calculation	Amount
1. Maximum lead time	Order no.008 – Gap between 15th December and 5th January	22 days
2. Minimum lead time	Order no.009 – Gap between 30th December and 12th January	14 days
3. Average lead time	(22 days + 14 days)/2	18 days
4. Maximum consumption	Material requisition – 012	4,500
5. Minimum consumption	Material requisition – 014	1,500
6. Average consumption	(4,500 + 1,500)/2	3,000

WN 2: Computation of re-order level, maximum level and minimum level:

Re-order level = Maximum consumption x Maximum lead time **Re-order level = 4,500 x 22 days = 99,000 units**
Maximum level = ROL + ROQ – (Minimum consumption x Minimum lead time) **Maximum level = 99,000 + 10,000 – (1,500 x 14) = 88,000 units**
Minimum level = ROL – (Normal consumption x Normal lead time) **Minimum level = 99,000 – (3,000 x 18 days) = 45,000**

WN 3: Priced Stores Ledger:

Date	Particulars	Receipts			Issues			Balance		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
01-Jan	Op balance							3,500	9,810	3,43,35,000
05-Jan	Purchase	9,500	9,930	9,43,35,000				13,000	9,898	12,86,70,000
06-Jan	Issue				3,000	9,898	2,96,94,000	10,000	9,898	9,89,76,000
10-Jan	Issue				4,500	9,898	4,45,41,000	5,500	9,898	5,44,35,000
12-Jan	Purchase	9,600	9,780	9,38,88,000				15,100	9,823	14,83,23,000
15-Jan	Issue				2,200	9,823	2,16,10,600	12,900	9,823	12,67,12,400
24-Jan	Issue				1,500	9,823	1,47,34,500	11,400	9,823	11,19,77,900
25-Jan	Purchase	10,000	9,750	9,75,00,000				21,400	9,789	20,94,77,900
28-Jan	Issue				4,000	9,789	3,91,56,000	17,400	9,789	17,03,21,900

31-Jan	Issue					3,200	9,789	3,13,24,800	14,200	9,789	13,89,97,100

- Value of closing stock = Rs.13,89,97,100
- Value of component used = Rs.18,10,60,900

WN 4: Computation of inventory turnover ratio:

Particulars	Calculation	Amount
1. RM consumed	WN 3	18,10,60,900
2. Average stock	$\dfrac{3,43,35,000 + 13,89,97,100}{2}$	8,66,66,050
3. Inventory turnover ratio (1/2)		2.09 Times

15. EOQ/ROL/Safety stock:

SK Enterprise manufactures a special product "ZE". The following particulars were collected for the year 2004:

- Annual consumption   12,000 units (360 days)
- Cost per unit   Rs.1
- Ordering cost   Rs.12 per order
- Inventory carrying cost   24%
- Normal lead time   15 days
- Safety stock   30 days consumption

Required:
a. Re-order quantity
b. Re-order level
c. What should be the inventory level (ideally) immediately before the material order is received?

Answer:

WN 1: Computation of Re-order Quantity (ROQ = EOQ):

Base data:

Annual demand of FG	Not available
Annual demand of RM	12,000 units
Ordering cost per order	Rs.12 per order
Carrying cost per unit per annum	= 24% of Rs.1 = Rs.0.24 per unit per annum

ROQ Calculation

ROQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
ROQ	=	$\sqrt{\dfrac{2 \times 12{,}000 \times 12}{0.24}}$
EOQ	=	1,095 units

WN 2: Computation of Re-order level:

Re-order level = (Maximum consumption x Maximum lead time) + Safety stock
Consumption per day $= \dfrac{12{,}000}{360} = 33.33$ units
Lead time = 15 days
Safety stock = 30 days consumption = 30 x 33.33 = 1,000 units
ROL = (33.33 x 15) + 1,000 = 1,500 units

Note:

- Maximum consumption, minimum consumption and normal consumption will be taken as 33.33 days in absence of information. Similarly, maximum, minimum and normal lead time will be taken as 15 days

WN 3: Stock level before the material order is received:

- The company places an order when the stock level reaches 1,500 units. It will take 15 days for the company to receive material. The company will consume 33.33 units per day and hence total consumption will be 500 units
- **Stock level before material order is received = 1,500 units – 500 units = 1,000 units**

16. Stock levels
Re-order quantity of material 'X' is 5000 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'.

Answer:
Computation of ROL:

Maximum level = ROL + ROQ – (Minimum consumption x Minimum Lead time)
8,000 = ROL + 5,000 – (400* x 4)
ROL = 8,000 – 5,000 + 1,600
ROL = 4,600 kgs

* Minimum consumption = 50 kgs per hour (or) 400 kgs per day (50 kgs x 8 working hours)

17. Inventory levels:
A company uses three raw material 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?

Answer:
WN 1: Computation of Minimum stock (Minimum Level) of A:

Minimum level = ROL – (Normal consumption x Normal Lead time)
Normal consumption = 200 units x 10 kg per unit = 2,000 kg
Minimum level = 8,000 – (2,000 x 2) = 4,000 kgs

WN 2: Computation of maximum stock(Maximum level) of B:

Maximum level = ROL + ROQ – (Minimum consumption x Minimum Lead time)
Minimum consumption = 175 units x 4 kgs per unit = 700 kgs
Maximum level = 4,750 + 5,000 – (700 x 3) = 7,650 kgs

WN 3: Computation of ROL of C:

ROL = Maximum consumption x Maximum lead time
Maximum consumption = 225 units x 6 kgs per unit = 1,350 kgs
ROL = 1,350 kgs x 4 = 5,400 kgs

WN 4: Computation of Average level of A:
Formula 1:

Average level $= \dfrac{\text{Minimum level} + \text{Maximum level}}{2} = \dfrac{4,000 + 16,250}{2} = 10,125 \text{ kgs}$
Maximum level = ROL + ROQ – (Minimum consumption x Minimum Lead time)
Minimum consumption = 175 units x 10 kgs per unit = 1,750 kgs
Maximum level = 8,000 + 10,000 – (1,750 x 1) = 16,250

Formula 2:

$$\textbf{Average level} = \textbf{Minimum level} + \left(\frac{\textbf{EOQ}}{\textbf{2}}\right) = \textbf{4,000} + \frac{\textbf{10,000}}{\textbf{2}} = \textbf{9,000 kg}$$

18. Levels

From the following details given below, calculate:
- Re-ordering level
- Maximum level
- Minimum level
- Danger level

Re-ordering quantity is to be calculated based on the following information:

Cost of placing a purchase order is Rs.20

Number of units to be purchased during the year is 5,000

Purchase price per unit inclusive of transportation costs is Rs.50

Annual cost of storage per unit is Rs.5

Details of lead time   : Average 10 days, maximum 15 days, minimum 6 days
                                        For emergency purchases 4 days

Rate of consumption   : Average 15 units per day and Maximum 20 units per day

Answer:

Computation of ROL:

Re-order level = (Maximum consumption x Maximum Lead time)
Re-order level = (20 units x 15 days)
Re-order level = 300 units

Computation of maximum level:

Part 1: Computation of ROQ:

Base data:

Annual demand of FG	Not available
Annual demand of RM	5,000 units
Ordering cost per order	20
Carrying cost per unit per annum	Rs.5 per unit

ROQ Calculation

ROQ	=	$\sqrt{\dfrac{2 \text{ x Annual demand x Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
ROQ	=	$\sqrt{\dfrac{2 \text{ x } 5,000 \text{ x } 20}{5}}$
ROQ	**=**	**200 units**

Part 2: Computation of maximum level:

Maximum level = ROL + ROQ – (Minimum consumption x Minimum Lead time)
Maximum level = 300 + 200 – (10# x 6 days)
Maximum level = 440 units

 # Minimum consumption:
- Average consumption = 15 units. Maximum consumption is 20 units
- Average consumption = (Min + Max)/2
- Minimum consumption = 10 units

Computation of Minimum level:

Minimum level = ROL – (Normal consumption x Normal Lead time)
Minimum level = 300 units – (15 units x 10 days)
Minimum level = 150 units

Computation of Danger Level:

Danger level = Normal consumption x Lead time for emergency purchases	
Danger level = 15 units x 4 days	
Danger level = 60 units	

19. EOQ and safety stock:

You are given the following data relating to AMC Co. Limited:

Cost of placing each order (ordering cost)	Rs.4.50
Annual demand (annual consumption)	8,000 units
Stock holding cost as a percentage of average stock value	16%
Price per unit	Rs.5
Normal lead time	9 days
Safety stock	18 days
Maximum usage	60 units

From the above, calculate:
- i. What is the quantity that should be ordered each time?
- ii. How many orders should be placed with the supplier during a year?
- iii. What would be the level of stock just before the material which has been ordered is received?
- iv. When should the material be ordered? (under certainty)

Answer:
WN 1: Computation of Re-order Quantity (ROQ = EOQ):
Base data:

Annual demand of FG	Not available
Annual demand of RM	8,000 units
Ordering cost per order	Rs.4.50 per order
Carrying cost per unit per annum	Rs.5 per unit

ROQ Calculation

ROQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
ROQ	=	$\sqrt{\dfrac{2 \times 8,000 \times 4.5}{5}}$
EOQ	**=**	**300 units**

WN 2: Computation of no of orders:

Number of orders	=	$\dfrac{\text{Annual demand}}{\text{Quantity per order}}$
Number of orders	=	$\dfrac{8,000}{300} = 26.67$ orders

WN 3: Stock level before the material order is received:
- Safety stock will be the stock level of the company before receipt of new order
- Consumption per day = (8,000/360) = 22.22 units
- **Safety stock = 18 days x 22.22 units = 400 units**

Note: It is assumed that there are 360 days

WN 4: Computation of Re-order level under certainty:

Re-order level = Maximum consumption x Maximum lead time
ROL = 60 units x 9 days = 540 units

20. EOQ and inventory levels:

M/s Fujitech Limited is the manufacture of monitors for PCs. The following are the details of its operation during 2011:

Ordering Cost	Rs.1,000 per order
Inventory carrying cost	20% per annum

Cost of monitors	Rs.3,500 per monitor
Normal usage	425 monitors per week
Minimum usage	49 monitors per week
Maximum usage	710 monitors per week
Lead time to supply	3-5 weeks

Compute from the above:

i.   Economic order quantity. If the supplier is willing to supply quarterly 5500 units at a discount of 5%, is it worth accepting?
ii. Reorder level
iii. Maximum level of stock
iv. Minimum level of stock

Answer:
WN 1: Computation of EOQ:
Base data:

Annual demand of FG	Not available
Annual demand of RM	425 x 52 = 22,100 units
Ordering cost per order	Rs.1,000 per order
Carrying cost per unit per annum	20% x 3,500 = Rs.700 per unit

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 22{,}100 \times 1{,}000}{700}}$
EOQ	**=**	**251 monitors**

WN 2: Decision on discount of 5 percent:

Particulars	EOQ	Quarterly Discount
1. Annual Demand	22,100	22,100
2. Quantity per order	251	5,500
3. Number of orders (1/2)	88.05	4.02
4. Ordering cost per order	1,000	1,000
5. Total ordering cost (3 x 4)	**88,050**	**4,020**
6. Average inventory (QPD/2)	125.50	2,750
7. Carrying cost per unit per annum	700 (20% x 3,500)	665 (20% x 3,325)
8. Total carrying cost (6 x 7)	**87,850**	**18,28,750**
9. Annual Demand	22,100	22,100
10. Purchase Price	3,500	3,325
11. Material Cost (9 x 10)	**7,73,50,000**	**7,34,82,500**
12. Total Inventory Cost (5 + 8 + 11)	**7,75,25,900**	**7,53,15,270**

Conclusion:

- The company should go ahead with quantity discount as the overall cost is lower with 5 percent discount

Note: There is a mistake in the question with respect to quarterly ordering quantity. Ordering 5,500 per quarter will lead to 22,000 units of purchase. However, the annual demand is 22,100 units and hence the number of orders is arrived as 4.02 orders.

WN 3: Computation of ROL, Maximum Level and Minimum Level:
Computation of ROL of C:

ROL = Maximum consumption x Maximum lead time
ROL = 710 x 5 weeks = 3,550 units

Computation of Minimum Level:

Minimum level = ROL – (Normal consumption x Normal Lead time)
Minimum level = 3,550 – (425 x 4) = 1,850 units

Computation of Maximum level

Maximum level = ROL + ROQ – (Minimum consumption x Minimum Lead time)
Maximum level = 3,550 + 251 – (49 x 3) = 3,654 units

Note: It is assumed that ROQ for the above formula is as per computed EOQ. This can alternatively be solved taking ROQ as 5,500 units.

21. **Stock levels with safety stock**

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

Cost of placing an order	: Rs.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 calculate:
  i. Economic Order Quantity for material 'Rex'.
 ii. Re-order Level
iii. Maximum Stock Level
 iv. Average Stock Level

Answer:
Computation of EOQ:
Base data:

Annual demand of FG	Not available
Annual demand of RM	60,000 units
Ordering cost per order	Rs.800 per order
Carrying cost per unit per annum	15% x 10 = Rs.1.5 per unit

EOQ Calculation

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

$$EOQ = \sqrt{\frac{2 \times 60,000 \times 800}{1.5}}$$

$$EOQ = 8,000 \text{ units}$$

Computation of ROL:

Re-order level = (Maximum consumption x Maximum Lead time) + Safety Stock
Re-order level = (200 units x 10 days) + 600 units
Re-order level = 2,600 units

Note:
- Consumption per day $= \frac{60,000}{300} = 200$ units per day
- It is assumed that maximum consumption, minimum consumption and normal consumption will be 200 units per day
- Re-order period = 10 days. It is assumed that maximum, minimum and normal lead time is 10 days

Computation of Maximum level:

Maximum level = ROL + ROQ – (Minimum consumption x Minimum Lead time)
Maximum level = 2,600 + 8,000 – (200 units x 10 days)
Maximum level = 8,600 units

Computation of Minimum level:

| Minimum level = ROL – (Normal consumption x Normal Lead time) |
| Minimum level = 2,600 units – (200 units x 10 days) |
| **Minimum level = 600 units** |

Computation of average level:
Formula 1:

| Average level $= \dfrac{\text{Maximum level + Minimum level}}{2}$ |
| Average level $= \dfrac{8,600 + 600}{2}$ |
| **Average level = 4,600 units** |

Formula 2:

| Average level = Minimum level $+ \left(\dfrac{\text{ROQ}}{2}\right)$ |
| Average level $= 600 + \dfrac{8,000}{2}$ |
| **Average level = 4,600 units** |

22. EOQ and safety stock:

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

You are required to determine:
   a. The most economic order quantity and frequency of orders in a year
   b. The order point and
   c. The most economic order quantity if the valves cost Rs.4.50 each instead of Rs.1.50 each

Answer:
WN 1: Computation of EOQ:
Base data:

Annual demand of FG	Not available
Annual demand of RM	75,000 units
Ordering cost per order	Rs.18 per order
Carrying cost per unit per annum	20% x 1.50 = Rs.0.30 per unit

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \text{ x Annual demand x Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \text{ x } 75,000 \text{ x } 18}{0.30}}$
EOQ	**=**	**3,000 units**

Number of orders calculation:

| Number of orders | = | $\dfrac{\text{Annual demand}}{\text{Quantity per order}}$ |
| Number of orders | = | $\dfrac{75,000}{3,000}$ = 25 orders |

Frequency of ordering:

| Frequency of ordering | = | $\dfrac{360 \text{ days}}{\text{Number of orders}}$ |
| Frequency of ordering | = | $\dfrac{360 \text{ days}}{25}$ = 14.4 days |

Note: It is assumed that there are 360 days in a year

WN 2: Computation of re-order point:

Re-order level = (Maximum consumption x Maximum lead time) + Safety stock
Consumption per day $= \dfrac{75,000}{360} = 208.33$ days
Lead time = 45 days
Safety stock = 3,250 units
ROL = (208.33 x 45) + 3,250 = 9,375 + 3,250 = 12,625 units

WN 3: Computation of EOQ if valves cost is Rs.4.50 per unit:
- Carrying cost per unit will increase to Rs.0.90 per unit (4.50 x 20%)
- **EOQ Calculation**

EOQ	=	$\sqrt{\dfrac{2 \text{ x Annual demand x Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \text{ x } 75,000 \text{ x } 18}{0.90}}$
EOQ	**=**	**1,732 units**

23. EOQ and maximum level:

Arnav Udyog, a small scale manufacturer, produces a product X by using two raw materials A and B in the ratio of 3:2. Material A is perishable in nature and if not used within 5 days of purchase it becomes obsolete. Material B is durable in nature and can be used even after one year. The company has estimated a sales volume of 30,000 kg. for the month of July 2016 and expects that the trend will continue for the entire year. The ratio of input and output is 5:3. The purchase price of per kilogram of raw material A and B is Rs.15 and Rs.22 respectively exclusive of taxes. Material A can be purchased from the local market within 1 to 2 days period. On the other hand Material B is purchased from neighbouring state and it takes 2 to 4 days to receive the material in the store. To place an order the company has to incur an administrative cost of Rs.120. Carrying cost for Material A and B is 15% and 5% respectively. At present Material A is purchased in a lot of 8,000 kg. to avail 10% discount on market price. VAT applicable for material A is 4% (credit available) and CST on Material B is 2% (credit not available). Company works for 25 days in a month and production is carried out evenly.

You are required to calculate:
- (i) Economic Order Quantity (EOQ) for each material;
- (ii) Maximum stock level for Material A;
- (iii) Calculate saving/ loss in Material A if purchase quantity equals to EOQ.

Answer:

WN 1: Computation of EOQ:

Base data:

Particulars	Material A	Material B
Annual demand of FG	30,000 x 12 = 3,60,000 kg	
Annual demand of RM	$3,60,000 \text{ x } \left(\dfrac{5}{3}\right) = 6,00,000$ kg	
Annual demand of RM	$6,00,000 \text{ x } \left(\dfrac{3}{5}\right) = 3,60,000$ kg	$6,00,000 \text{ x } \left(\dfrac{2}{5}\right) = 2,40,000$ kg
Ordering cost per order	Rs.120 per order	Rs.120 per order
Carrying cost per unit per annum	15% x 15 = Rs.2.25 per unit	5% x 22.44# = Rs.1.122 per unit

Material B has CST of 2 percent and there is no input credit available and hence effective purchase price is Rs.22.44 [22 + 2%]

EOQ Calculation

		Material A	Material B
EOQ	=	$\sqrt{\dfrac{2 \text{ x Annual demand x Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$	$\sqrt{\dfrac{2 \text{ x Annual demand x Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \text{ x } 3,60,000 \text{ x } 120}{2.25}}$	$\sqrt{\dfrac{2 \text{ x } 2,40,000 \text{ x } 120}{1.122}}$

EOQ	=	6,197 KG	7,165 KG

WN 2: Computation of maximum level of stock A:

Maximum level = ROL + ROQ – (Minimum consumption x Minimum Lead Time)
Consumption per day = 3,60,000/(25 x 12) = 1,200 KG
ROL = Maximum consumption x Maximum Lead Time ROL = 1,200 x 2 days = 2,400 KG
Maximum Level = 2,400 + 8,000 – (1,200 x 1) = 9,200 KG

- Material A is perishable in nature and has a life of 5 days. Hence, we should ensure that maximum level does not exceed 5 days
- Maximum level = 5 days of consumption = 5 days x 1,200 = 6,000 KG
- **Hence, in this case maximum level is restricted to 6,000 KG**

WN 3: Computation of saving/extra cost in EOQ:

Particulars	EOQ	Discount
1. Annual Demand (Note 1)	3,78,120	4,80,000
2. Quantity per order	6,197	8,000
3. Number of orders (1/3)	60	60
4. Ordering cost per order	120	120
5. Total ordering cost (3 x 4)	**7,200**	**7,200**
6. Average inventory (QPD/2)	3,098.50	4,000
7. Carrying cost per unit per annum	2.25 (15% x 15)	2.025 (15% x 13.50)
8. Total carrying cost (6 x 7)	**6,972**	**8,100**
9. Annual Demand	3,78,120	4,80,000
10. Purchase Price	15	13.50
11. Material Cost (9 x 10)	**55,77,300**	**64,80,000**
12. Total Inventory Cost (5 + 8 + 11)	**55,91,472**	**64,95,300**
13. Cost savings in EOQ	**9,03,828**	

Note:
1. Company places an order of 6,197 under EOQ. However, any units purchased in excess of 6,000 will become obsolete as the life is only for five days. Hence, we will only get good 6,000 units in every order and we should place 60 orders both in EOQ and discount. Units to be ordered in EOQ = 3,78,120 (60 x 6,197). Units to be ordered in discount model = 4,80,000 (60 x 8,000)

24. Inventory levels - advanced

ABC Limited 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 be able to sell 10,000 units of Exe in the coming year. The following is the information regarding the raw material DEE:

- The re-order quantity is 200 kg less than economic order quantity (EOQ)
- Maximum consumption per day is 20kg. more than average consumption per day
- There is an opening stock of 1,000 kg.
- Time required to get the raw materials from the suppliers is 4 to 8 days
- The purchase price is Rs.125 per kg.

There is an opening stock of 900 units of finished product EXE. The rate of interest charged by bank on cash credit facility is 13.76 percent. To place an order the company has to incur Rs.720 on paper and documentation work. From the above information find out the following:

- Re-order quantity
- Maximum stock level
- Minimum stock level
- Calculate the impact on the profitability of the company by not ordering EOQ

[Take 364 days for a year]

Answer:
WN 1: Computation of EOQ:
Base data:

Annual sales of FG (EXE)	10,000 units
Annual production of EXE	Sales + Closing stock = Opening stock + production

	10,000 units + 0 units = 900 units + Production Production = 9,100 units
Annual RM consumed	Production x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ = 9,100 x $\left(\dfrac{2}{1}\right)$ = 18,200 Kgs
Annual RM purchased	Opening stock + Purchases – Closing stock = RM consumed 1,000 kgs + Purchases – 0 kgs = 18,200 kgs **Purchases = 17,200 kgs**
Ordering cost per order	Rs.720 per order
Carrying cost per unit per annum	13.76% x 125 = Rs.17.20 per kg per annum

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \text{ x Annual demand x Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \text{ x } 17,200 \text{ x } 720}{17.20}}$
EOQ	=	**1,200 kgs**
ROQ	=	**1,000 kgs [200 kg less than EOQ)**

WN 2: Computation of maximum level and minimum level:

Average consumption per day = $\dfrac{\text{Annual consumption}}{364 \text{ days}} = \dfrac{18,200}{364}$ = 50 Kg
Maximum consumption per day = 50 Kg + 20 Kg = 70 Kg
Minimum consumption per day = 50 Kg – 20 Kg = 30 Kg
Re-order level = (Maximum consumption x Maximum Lead time) = (70 x 8) = 560 Kgs
Maximum level = ROL + ROQ – (Minimum consumption x Minimum Lead time) **Maximum level = 560 + 1,000 – (30 x 4) = 1,440 Kg**
Minimum level = ROL – (Normal consumption x Normal Lead time) **Minimum level = 560 – (50 x 6) = 260 kg**

WN 3: Financial impact of not ordering EOQ:

Particulars	EOQ	ROQ
1. Annual Demand	17,200	17,200
2. Quantity per order	1,200	1,000
3. Number of orders (1/2)	14.33	17.20
4. Ordering cost per order	720	720
5. Total ordering cost (3 x 4)	**10,320**	**12,384**
6. Average inventory (QPD/2)	600	500
7. Carrying cost per unit per annum	17.20	17.20
8. Total carrying cost (6 x 7)	**10,320**	**8,600**
9. Total of ordering and carrying cost (5+8)	**20,640**	**20,984**
10. Impact on profitability due to not ordering EOQ		**344**

25. **EOQ with discounts**

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 Rs.100 and the inventory carrying cost is Rs.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 (Rs.)
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.

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

Answer:

WN 1: Computation of EOQ:

Base data:

Annual demand of FG	80,000 units [20,000 x 4]
Annual demand of RM	$80,000 \times \dfrac{0.5}{1} = 40,000$ kg
Ordering cost per order	Rs.100 per order
Carrying cost per unit per annum	Rs.2 per kg per annum

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 40,000 \times 100}{2}}$
EOQ	**=**	**2,000 kgs**

WN 2: Computation of number of orders which will minimize total cost:

Particulars	1 order	2 orders	4 orders	6 orders	EOQ
1. Annual Demand	40,000	40,000	40,000	40,000	40,000
2. Quantity per order (1/3)	40,000	20,000	10,000	6,667	2,000
3. Number of orders	1	2	4	6	20
4. Ordering cost per order	100	100	100	100	100
5. Total ordering cost (3 x 4)	**100**	**200**	**400**	**600**	**2,000**
6. Average inventory (QPD/2) + Safety stock	21,000	11,000	6,000	4,333.50	2,000
7. Carrying cost per unit per annum	2	2	2	2	2
8. Total carrying cost (6 x 7)	**42,000**	**22,000**	**12,000**	**8,667**	**4,000**
9. Discount	4,000	3,200	2,000	400	0
10. Total cost (5 + 8 – 9)	38,100	19,000	10,400	8,867	**6,000**

- The company should place 20 orders to minimize its total cost

WN 3: Computation of Re-order level:

Re-order level = (Maximum consumption x Maximum Lead time) + Safety Stock
Re-order level = (111.1111 kgs x 36 days) + 1,000 kgs
Re-order level = 5,000 kgs

Note:

- Consumption per day $= \dfrac{40,000}{360} = 111.1111$ kgs per day
- It is assumed that maximum consumption, minimum consumption and normal consumption will be 111.1111 kgs per day
- Lead time = 36 days. It is assumed that maximum, minimum and normal lead time is 10 days

26. Inventory Turnover

From the following data for the year ended 31st December 2011 calculate the inventory turnover ratio of the two items and put forward your comments on the same.

Particulars	Material A Rs.	Material B Rs.
Opening stock	10,000	9,000
Purchases	52,000	27,000
Closing stock	6,000	11,000

Answer:

Computation of inventory turnover ratio:

$$\text{Inventory Turnover Ratio} = \frac{\text{RM Consumed}}{\text{Average stock}}$$

Particulars	Material A	Material B
1. Opening stock	10,000	9,000
2. Purchases	52,000	27,000
3. Closing stock	6,000	11,000
4. RM consumed (1+2-3)	56,000	25,000
5. Average stock	8,000	10,000
6. Inventory turnover ratio (4/5)	**7 Times**	**2.5 Times**
7. No of days inventory is maintained [365/Inventory Turnover Ratio]	**52 days**	**146 days**

- Material A is fast-moving item as it has higher inventory turnover ratio and lower inventory days. Similarly, Material B is slow-moving item due to lower inventory turnover ratio and higher inventory days

27. Maintenance of safety stock:

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 Rs. 800 per casting. The castings are used evenly throughout the year in the production process on a 360-day-per-year basis. The company estimates that it costs Rs.9,000 to place a single purchase order and about Rs.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 Rs.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 Rs.720 per year.

- Calculate the new EOQ?
- How frequently would the company be placing an order as compared to the old purchasing policy?

Answer:

WN 1: Computation of EOQ:

Base data:

Annual demand of FG	Not available
Annual demand of RM	54,000 castings
Ordering cost per order	Rs.9,000 per order
Carrying cost per unit per annum	Rs.300 per unit per annum

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 54,000 \times 9,000}{300}}$

EOQ	=	1,800 castings

WN 2: Analysis of delivery times

No. of days	% of occurrence	Cumulative %	Stockout risk %
6	75	75	25
7	10	85	15
8	5	90	10
9	5	95	5
10	5	100	0

WN 3: Computation of re-order level and safety stock for 15% stockout risk:
- The company is willing to take 15% stockout risk and hence it should fix ROL equal to 7 days of consumption
- Consumption per day = 54,000/360 days = 150 castings
- **Re-order level = 150 castings x 7 days = 1,050 castings**
- Safety stock = 150 castings x 1 day = 150 castings

WN 4: Computation of re-order level and safety stock for 5% stockout risk:
- The company is willing to take 5% stockout risk and hence it should fix ROL equal to 9 days of consumption
- **Re-order level = 150 castings x 9 days = 1,350 castings**
- Safety stock = 150 castings x 3 days = 450 castings

WN 5: Computation of total ordering and carrying cost at 5% stockout risk:

Particulars	Amount
1. Annual Demand	54,000
2. Quantity per order	1,800
3. Number of orders (1/2)	30
4. Ordering cost per order	9,000
5. Total ordering cost (3 x 4)	**2,70,000**
6. Average inventory (QPD/2) + Safety stock	1,350
7. Carrying cost per unit per annum	300
8. Total carrying cost (6 x 7)	**4,05,000**
9. Total of ordering and carrying cost (5+8)	**6,75,000**

WN 6: Computation of new EOQ:
Base data:

Annual demand of FG	Not available
Annual demand of RM	54,000 castings
Ordering cost per order	Rs.600 per order
Carrying cost per unit per annum	Rs.720 per order

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 54,000 \times 600}{720}}$
EOQ	**=**	**300 castings**

WN 7: Comparison of frequency of purchasing:

Particulars	Old EOQ	New EOQ
1. Annual demand	54,000	54,000
2. Quantity per order	1,800	300
3. No of orders	30	180
4. Frequency of ordering [360/No of orders)	12 days	2 days

- The company will place an order once in 2 days as compared to old policy of once in 12 days

28. Carrying cost versus stock-out costs

Alians Limited distributes wide range of water purifier systems. One of its best selling items is a standard water purifier. The company uses the EOQ decision model to determine optimal number of standard water purifiers to order. Management now wants to determine how much safety stock to hold. Alians Limited estimates annual demand (360 working days) to be 36,000 standard water purifiers. Using the EOQ decision model, the company orders 3,600 standard water purifiers at a time. The lead-time for an order is 6 days. The annual carrying cost of one standard purifier is Rs.450. Management has also estimated the additional stock out costs would be Rs.900 for shortage of each standard water purifier.

Alians Limited has analysed the demand during 200 past re-order periods. The records indicate the following patterns:

Demand during lead times	No of times
540	6
560	12
580	16
600	130
620	20
640	10
660	6
	200

- Determine the level of safety stock for standard water purifier that the Alians Limited should maintain in order to minimize expected stock out costs and carrying costs. Carrying costs should be computed on safety stock which shall remain in hand at all times during the year
- What would be the Alians Limited's new re-order point

Answer:

WN 1: Computation of normal ROL without safety stock:

Re-order level = (Maximum consumption x Maximum Lead time)
Re-order level = (100 units x 6 days)
Re-order level = 600 units

Note:
- Consumption per day $= \frac{36,000}{360} = 100$ units per day

WN 2: Identification of safety stock level:
- Demand during lead time can range between 540 units to 660 units. Company will not have any stockout if the demand is below 600 units
- Stockouts will be 20,40 and 60 units if demand is 620, 640 and 660 units respectively
- Following are the possible safety stock levels to reduce stockout cost:
  - 20 units
  - 40 units
  - 60 units

Safety stock	Carrying cost	Stockout cost	Total cost
0	0	52,200	52,200
20	9,000 [450 x 20]	19,800	28,800
40	**18,000 [450 x 40]**	**5,400**	**23,400**
60	27,000 [450 x 60]	0	27,000

- **Optimum safety stock level = 40 units as the total cost is lowest**
- **New re-order point = Normal ROL + Safety stock = 600 units + 40 units = 640 units**

WN 3: Computation of stockout costs:
Part 1: Analysis of past demand:

Demand	No of times	Probability
540	6	0.03

560	12	0.06
580	16	0.08
600	130	0.65
620	20	0.10
640	10	0.05
660	6	0.03
Total	**200**	

Stockout cost if safety stock is 0 units:

Demand	Probability	Stockout	Expected stockout
620	0.10	20	2
640	0.05	40	2
660	0.03	60	1.80
Total			**5.80**

- Stockout costs for a single order = 5.80 x 900 = Rs.5,220
- **Stockout costs for 10 orders (per year) = 5,220 x 10 = Rs.52,200**

Stockout cost if safety stock is 20 units:

Demand	Probability	Stockout	Expected stockout
620	0.10	0	0
640	0.05	20	1
660	0.03	40	1.20
Total			**2.20**

- Stockout costs for a single order = 2.20 x 900 = 1,980
- **Stockout costs for 10 orders (per year) = 1,980 x 10 orders = Rs.19,800**

Stockout cost if safety stock is 40 units:

Demand	Probability	Stockout	Expected stockout
620	0.10	0	0
640	0.05	0	0
660	0.03	20	0.60
Total			**0.60**

- Stockout costs for a single order = 0.60 x 900 = Rs.540
- **Stockout costs for 10 orders (per year) = 540 x 10 = Rs.5,400**

29. Costing of material receipts

A manufacturer of Surat purchased chemicals A, B and C from Bombay. The invoice gave the following information:

Particulars	Amount
Chemical A : 3,000 kg @ Rs.4.20 per kg	12,600
Chemical B : 5,000 kg @ Rs.3.80 per kg	19,000
Chemical C : 2,000 kg @ Rs.4.75 per kg	9,500
Sales Tax	2,055
Railway freight	1,000
Total Cost	44,155

A shortage of 200 kg in Chemical A, of 280 kg in Chemical B and of 100 kg in Chemical C was noticed due to breakages. At Surat, the manufacturer paid Octroi duty @Rs.0.10 per kg. He also paid cartage @Rs.22 for Chemical A, Rs.63.12 for Chemical B and Rs.31.80 for Chemical C. Calculate the stock rate that you would suggest for pricing issue of materials assuming a provision of 5% towards further deterioration.

Answer:
WN 1: Computation of total material cost:

Particulars	Chemical A	Chemical B	Chemical C
1. Basic purchase cost	12,600	19,000	9,500
2. Sales tax (based on value)	630	950	475
3. Freight (based on quantity)	300	500	200
4. Octroi duty	280	472	190

	[2,800 x 0.1]	[4,720 x 0.1]	[1,900 x 0.1]
5. Cartage	22	63.12	31.80
6. Total cost	**13,832**	**20,985.12**	**10,396.80**

WN 2: Computation of effective good units:

Particulars	Chemical A	Chemical B	Chemical C
1. Units ordered	3,000	5,000	2,000
2. Less: Breakages (assumed to be normal)	(200)	(280)	(100)
3. Units received	**2,800**	**4,720**	**1,900**
4. Less: Provision for further loss	(140)	(236)	(95)
5. Effective good units	**2,660**	**4,484**	**1,805**

WN 3: Computation of cost per unit:

Particulars	Chemical A	Chemical B	Chemical C
1. Total cost (WN 1)	13,832	20,985.12	10,396.80
2. Effective good units (WN 2)	2,660	4,484	1,805
3. Cost per unit (1/2)	**5.20**	**4.68**	**5.76**

30. **Pricing receipts**

The particulars relevant to the import of product A made by ABC & Co during October is given below:
- Product A: 1,000 pieces invoiced @ $ 2.00 C.I.F, Bombay port
- Customs duty was paid @ 100% on invoice value (which was converted into Indian Currency by adopting an exchange rate of Rs.60 per USD)
- Clearing charges: Rs.1,800 for the entire consignment
- Freight charges: Rs.1,400 for transporting the consignment from Bombay port to Factory Premises

It was found on inspection that 100 pieces of the above material were broken and therefore rejected. There is no scrap value for the rejected part. No refund for the broken material would be admissible as per the terms of the contract. The management decided to treat 60 pieces as normal loss and the rest as abnormal loss. The entire quantity of 900 pieces was issued to production.

Calculate (a) Total cost of material and (b) Unit cost of material issued to production.

Answer:

WN 1: Computation of total material cost:

Particulars	Calculation	Amount
1. Basic price	1,000 x 2 USD x 60	1,20,000
2. Customs duty	100% x 1,20,000	1,20,000
3. Clearing charges		1,800
4. Freight charges		1,400
5. Total material cost		**2,43,200**

WN 2: Computation of effective good units:

Particulars	Units
1. Units ordered	1,000
2. Less: Normal loss	(60)
3. Effective good units	**940**

WN 3: Computation of cost per unit:

Particulars	Amount
1. Total cost (WN 1)	2,43,200
2. Effective good units (WN 2)	940
3. Cost per unit (1/2)	**258.72**
4. Value of material issued [900 x 258.72]	**2,32,848**
5. Value of abnormal loss [40 x 258.72]	**10,349**

31. **Valuation of stock under FIFO, LIFO and Weighted Average Method**

The following is the record of an item in a stores ledger

Date	Particulars	Units	Amount	Date	Particulars	Units	Amount

Jan 1	To balance B/d	10,000	20,000	Jan 15	By issue	14,000	30,000
Jan 10	To Purchase	5,000	12,000	Feb 8	By issue	6,000	15,000
Feb 3	To Purchase	20,000	55,000	Mar 15	By issue	22,000	60,000
Mar 10	To Purchase	10,000	30,000	Mar 31	By Bal c/d	3,000	12,000
		45,000	**1,17,000**			**45,000**	**1,17,000**

Redraft the above PSL according to the following methods and calculate the value of closing stock:

- FIFO Method
- LIFO Method
- Weighted average method

Answer:

WN 1: Priced stores ledger under FIFO Method

Date	Particulars	Receipts			Issues			Balance		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Jan 1	Opening balance							10,000	2.00	20,000
Jan 10	Purchase	5,000	2.40	12,000				10,000	2.00	20,000
								5,000	2.40	12,000
Jan 15	Issue				10,000	2.00	20,000	1,000	2.40	2,400
					4,000	2.40	9,600			
Feb 3	Purchase	20,000	2.75	55,000				1,000	2.40	2,400
								20,000	2.75	55,000
Feb 8	Issue				1,000	2.40	2,400	15,000	2.75	41,250
					5,000	2.75	13,750			
Mar 10	Purchase	10,000	3.00	30,000				15,000	2.75	41,250
								10,000	3.00	30,000
Mar 15	Issue				15,000	2.75	41,250	**3,000**	**3.00**	**9,000**
					7,000	3.00	21,000			

- **Value of closing stock under FIFO method = Rs.9,000**

WN 2: Priced stores ledger under LIFO Method

Date	Particulars	Receipts			Issues			Balance		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Jan 1	Opening balance							10,000	2.00	20,000
Jan 10	Purchase	5,000	2.40	12,000				10,000	2.00	20,000
								5,000	2.40	12,000
Jan 15	Issue				5,000	2.40	12,000	1,000	2.00	2,000
					9,000	2.00	18,000			
Feb 3	Purchase	20,000	2.75	55,000				1,000	2.00	2,000
								20,000	2.75	55,000
Feb 8	Issue				6,000	2.75	16,500	1,000	2.00	2,000
								14,000	2.75	38,500
Mar 10	Purchase	10,000	3.00	30,000				1,000	2.00	2,000
								14,000	2.75	38,500
								10,000	3.00	30,000
Mar 22	Issue				10,000	3.00	30,000	1,000	2.00	2,000
					12,000	2.75	33,000	2,000	2.75	5,500

- **Value of closing stock as per LIFO method = Rs.7,500**

WN 3: Priced stores ledger under weighted average method

Date	Particulars	Receipts			Issues			Balance		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Jan 1	Opening balance							10,000	2.00	20,000
Jan 10	Purchase	5,000	2.40	12,000				15,000	2.1333	32,000

Jan 15	Issue				14,000	2.1333	29,866	1,000	2.1333	2,134
Feb 3	Purchase	20,000	2.75	55,000				21,000	2.7207	57,134
Feb 8	Issue				6,000	2.7207	16,324	15,000	2.7207	40,810
Mar 10	Purchase	10,000	3.00	30,000				25,000	2.8324	70,810
Mar 15	Issue				22,000	2.8324	62,313	3,000	2.8324	8,497

- **Value of closing stock as per weighted average method = Rs.8,497**

32. Priced stores ledger:

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		Issues	
Date	**Quantity (kg.)**	**Rate per Kg.**	**Date**	**Quantity (kg.)**
April 10	1,600	5.00	April 4	1,100
April 20	2,400	4.90	April 24	1,600
May 5	1,000	5.10	May 10	1,500
May 17	1,100	5.20	May 26	1,700
May 25	800	5.25	June 15	1,500
June 11	900	5.40	June 21	1,200
June 24	1,400	5.50		

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

Answer:

Stock Ledger of XY Company Limited (Weighted Average Method)

Date	Particulars	Receipts			Issues			Balance		
		Qty	**Rate**	**Amount**	**Qty**	**Rate**	**Amount**	**Qty**	**Rate**	**Amount**
Apr 1	Opening stock							1,500	4.80	7,200
Apr 4	Issue				1,100	4.80	5,280	400	4.80	1,920
Apr 10	Receipt	1,600	5.00	8,000				2,000	4.96	9,920
Apr 20	Receipt	2,400	4.90	11,760				4,400	4.93	21,680
Apr 24	Issue				1,600	4.93	7,888	2,800	4.93	13,792
May 5	Receipt	1,000	5.10	5,100				3,800	4.97	18,892
May 10	Issue				1,500	4.97	7,455	2,300	4.97	11,437
May 17	Receipt	1,100	5.20	5,720				3,400	5.05	17,157
May 25	Receipt	800	5.25	4,200				4,200	5.09	21,357
May 26	Issue				1,700	5.09	8,653	2,500	5.09	12,704
May 31	Shortage				80	-	-	2,420	5.25	12,704
Jun 11	Receipt	900	5.40	4,860				3,320	5.29	17,564
Jun 15	Issue				1,500	5.29	7,935	1,820	5.29	9,629
Jun 21	Issue				1,200	5.29	6,348	620	5.29	3,281
Jun 24	Receipt	1,400	5.50	7,700				2,020	5.44	10,981
Jun 30	Shortage				60	-	-	1,960	5.60	10,981

Comments:

- Shortage is recorded as issue. There is no value written as the policy of the company is to inflate the per unit cost of existing stock
- **Amount in balance column = Previous Amount + Receipts – Issues**
- **Rate in balance column = Amount/Quantity**

33. Priced stores ledger:

Prepare a store ledger Account from the following transactions of XY Company Limited.

Date (April, 2014)	Transaction
1	Opening balance 200 units @ Rs.10 per unit
5	Receipt 250 units costing Rs.2,000
8	Receipt 150 units costing Rs.1,275
10	Issue 100 units
15	Receipt 50 units costing Rs.500
20	Shortage 10 units
21	Receipt 60 units costing Rs.540
22	Issue 400 units

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

Answer:

Stock Ledger of XY Company Limited (LIFO till April 10 and FIFO from April 11)

Date	Particulars	Receipts			Issues			Balance		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Apr 1	Opening stock							200	10.00	2,000
Apr 5	Receipt	250	8.00	2,000				200	10.00	2,000
								250	8.00	2,000
Apr 8	Receipt	150	8.50	1,275				200	10.00	2,000
								250	8.00	2,000
								150	8.50	1,275
Apr 10	Issue				100	8.50	850	200	10.00	2,000
								250	8.00	2,000
								50	8.50	425
Apr 15	Purchase	50	10.00	500				200	10.00	2,000
								250	8.00	2,000
								50	8.50	425
								50	10.00	500
Apr 20	Shortage				10	10.00	100.00	190	10.00	1,900
								250	8.00	2,000
								50	8.50	425
								50	10.00	500
Apr 21	Receipt	60	9.00	540				190	10.00	1,900
								250	8.00	2,000
								50	8.50	425
								50	10.00	500
								60	9.00	540
Apr 22	Issue				190	10.00	1,900	40	8.00	320
					210	8.00	1,680	50	8.50	425
								50	10.00	500
								60	9.00	540

Notes:

- Value of closing stock = 320+425+500+540 = 1,785

34. Priced stores ledger:

Aditya Limited 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. @ Rs.475 per kg.
Feb 5	Issued 975 kgs. to mechanical division vide material requisition no. Mec 09/13
Feb 6	Received 3,500 kgs @ Rs.460 per kg. vide purchase order no.159/2013
Feb 7	Issued 2,400 kgs. to electrical division against material requisition no. Ele 012/13
Feb 9	Retuned to stores 475 kgs. by electrical division against material requisition no. Ele 012/13

Feb 15	Received 1,800 kgs @ Rs.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.

Answer:

Stock Ledger of Aditya Limited (Weighted Average Method)

Date	Particulars	Receipts			Issues			Balance		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Feb 1	Opening stock							1,200	475.00	5,70,000
Feb 5	Issue				975	475.00	4,63,125	225	475.00	1,06,875
Feb 6	Receipt	3,500	460.00	16,10,000				3,725	460.91	17,16,875
Feb 7	Issue				2,400	460.91	11,06,175	1,325	460.91	6,10,700
Feb 9	Return	475	460.91	2,18,932				1,800	460.91	8,29,632
Feb 15	Receipt	1,800	480.00	8,64,000				3,600	470.45	16,93,632
Feb 17	Return				140	480.00	67,200	3,460	470.07	16,26,432
Feb 20	Issue				1,900	470.07	8,93,133	1,560	470.06	7,33,299
Feb 28	Abnormal loss				180	470.06	84,611	1,380	470.06	6,48,688

Notes:

- Abnormal loss of Feb 28 will be debited to Costing Profit and Loss Account
- **Return from production to stores on Feb 9 will be recorded as per the prevailing weighted average rate of Rs.460.91. However, this was issued at Rs.475 per unit but return will get recorded at current rate of Rs.460.91 per unit**
- **Return to supplier on Feb 17 will be recorded at the price at which purchase was made**

35. Computation of inventory levels:

ACE Limited process a product EMM using a material 'REX'. To produce one unit of EMM 0.80 kg of 'REX' is required. As per the sales forecast conducted by the company it will be able to sell 45,600 units of product EMM in coming year. There is an opening stock of 3,150 units of product EMM and company desires to maintain closing stock equal to one month's forecast sale. Following is the information regarding material 'REX':

Purchase price per KG.	25
Cost of placing order	Rs.240 per order
Storage cost	2% per annum
Interest rate	10% per annum
Average lead time	8 days
Difference between minimum and maximum lead time	6 days
Maximum usage	150 kg
Minimum usage	90 kg

Required:

    I.   Compute the EOQ and total cost as per EOQ

   II.   Compute the reorder level and maximum level

  III.   If the company places an order of 7,500 kg of REX at a time, it gets 2% discount, should the offer be accepted?

Answer:

WN 1: Computation of EOQ and total cost:

Base data:

Annual sales of FG	45,600
Annual production of FG	= Sales + Closing stock – Opening stock = 45,600 + (45,600/12) – 3,150 = 46,250 units
Annual consumption of RM	Annual production of FG x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ 46,250 x $\left(\dfrac{0.8}{1}\right)$ = 37,000 Kgs.
Annual purchase of RM	= Consumption + Closing stock – Opening stock = 37,000 + 2,310 – 2,100 = 37,210 kgs
Ordering cost per order	Rs.240 per order
Carrying cost per unit per annum	Rs.25 x 12% = Rs.3 per kg per annum

EOQ Calculation

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$
EOQ	=	$\sqrt{\dfrac{2 \times 37,210 \times 240}{3}}$
EOQ	**=**	**2,440 kgs.**

Computation of total cost:

Particulars	EOQ
1. Annual Demand	37,210
2. Quantity per order	2,440
3. Number of orders (1/2)	15.25
4. Ordering cost per order	240
5. Total ordering cost (3 x 4)	**3,660**
6. Average inventory (QPD/2)	1,220
7. Carrying cost per unit per annum	3
8. Total carrying cost (6 x 7)	**3,660**
9. Annual Demand	37,210
10. Purchase Price	25
11. Material Cost (9 x 10)	**9,30,250**
12. Total Inventory Cost (5 + 8 + 11)	**9,37,570**

WN 2: Computation of re-order level and maximum level:
ROL calculation:

Re-order level = Maximum consumption x Maximum lead time
Re-order level = 150 kg x 11 = 1,650 kg

Maximum level:

Maximum level = ROL + ROQ – (Minimum consumption x Minimum lead time)
Maximum level = 1,650 + 2,440 – (90 x 5) = 3,640 kg

Note: Analysis of lead time:

Average lead time = 8 days
$\dfrac{\text{Max lead time + Min lead time}}{2}$ = 8 days
Max lead time + Min lead time = 16 days …………………. Equation (1)
Max lead time – Min lead time = 6 days ………………..Equation (2)
Subtracting equation 2 from equation 1, we get 2(Max lead time) = 22 days
Max lead time = 11 days; Min lead time = 5 days

WN 3: Analysis of discount offer:

Particulars	Discount
1. Annual Demand	37,210
2. Quantity per order	7,500
3. Number of orders (1/2)	4.96
4. Ordering cost per order	240
5. Total ordering cost (3 x 4)	**1,191**
6. Average inventory (QPD/2)	3,750
7. Carrying cost per unit per annum (12% of purchase price)	2.94
8. Total carrying cost (6 x 7)	**11,025**
9. Annual Demand	37,210
10. Purchase Price	24.50
11. Material Cost (9 x 10)	**9,11,645**
12. Total Inventory Cost (5 + 8 + 11)	**9,23,861**

Conclusion: The company should go ahead with ordering 7,500 kgs at time as the overall cost declines from Rs.9,37,570 to Rs.9,23,861.

36. Selection of material source:

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 Rs. 100 as compared to Source I. The defective units of material can be rectified for use at a cost of Rs. 5 per unit. You are required to find out which of the two sources is more economical.

Answer:

Comparative statement of procuring material from two sources:

Particulars	Source 1	Source 2
Units supplied	1,000	1,000
Defective %	2%	2.8%
No of defectives	20	28
Rectification cost of defect (units x 5)	100	140
Savings in purchase cost	-	(100)
Net Cost	**100**	**40**

On comparing the total cost per lot of 1,000 units, we observe that it is more economical to procure materials from Source II

Additional Problems for Practice

37. EOQ - Basics

a) Compute E.O.Q. and the total variable cost for the following:

Annual Demand	=	5,000 units
Unit price	=	Rs. 20.00
Order cost	=	Rs. 16.00
Storage rate	=	2% per annum
Interest rate	=	12% per annum
Obsolescence rate	=	6% per annum

b) Determine the total variable cost that would result for the items if an incorrect price of Rs. 12.80 is used.

Answer:

WN 1: Computation of EOQ and total cost:

Base data:

Particulars	Price of 16	Price of 12.80
Annual demand of FG	Not available	Not available
Annual demand of RM	5,000 units	5,000 units
Ordering cost per order	Rs.16 per order	Rs.16 per order
Carrying cost per unit per annum	20% x 20 = 4.00 per unit	20% x 12.80 = 2.56

EOQ Calculation

	Price of 16	Price of 12.80

EOQ	=	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$	
EOQ	=	$\sqrt{\dfrac{2 \times 5{,}000 \times 16}{4.00}}$	$\sqrt{\dfrac{2 \times 5{,}000 \times 16}{2.56}}$
EOQ	**=**	**200 units**	**250 units**

Computation of total cost:

Particulars	Price of 20	Price of 12.80
1. Annual Demand	5,000	5,000
2. Quantity per order	200	250
3. Number of orders (1/2)	25	20
4. Ordering cost per order	16	16
5. Total ordering cost (3 x 4)	**400**	**320**
6. Average inventory (QPD/2)	100	125
7. Carrying cost per unit per annum	4	2.56
8. Total carrying cost (6 x 7)	**400**	**320**
9. Annual Demand	5,000	5,000
10. Purchase Price	20	12.80
11. Material Cost (9 x 10)	**1,00,000**	**64,000**
12. Total Inventory Cost (5 + 8 + 11)	**1,00,800**	**64,640**

38. EOQ and quantity discount

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 Rs.30. The annual demand is 250 units. Ordering cost is Rs.20 per order and annual inventory carrying cost is Rs.4 per unit. Determine the optimal order quantity and the associated minimal total cost of inventory and purchasing costs, if shortages are not allowed.

Answer:

WN 1: Computation of EOQ

Particulars	Amount
1. Annual Demand	250
2. Ordering cost per order	20
3. Carrying cost per unit	4.00
4. EOQ $\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$	50

WN 2: Computation of total cost at different purchase levels:

Particulars	0 to 49	50 to 99	100 to 199	≥ 200
1. Annual Demand	250	250	250	250
2. Quantity per order (Note 1)	49	50	100	200
3. Number of orders (1/2)	5.10	5	2.50	1.25
4. Ordering cost per order	20	20	20	20
5. Total ordering cost (3 x 4)	**102**	**100**	**50**	**25**
6. Average inventory (QPD/2)	24.50	25	50	100
7. Carrying cost per unit per annum	4	4	4	4
8. Total carrying cost (6 x 7)	**98**	**100**	**200**	**400**

9. Annual Demand	250	250	250	250
10. Purchase Price	30	28.50	27.00	26.40
11. Material Cost (9 x 10)	**7,500**	**7,125**	**6,750**	**6,600**
12. Total Inventory Cost (5 + 8 + 11)	**7,700**	**7,325**	**7,000**	**7,025**

- Most economical purchase level = 100 units; this is because the overall cost is lowest when quantity per order is 100 units

Note: Computed EOQ is 50 units. Final order quantity in each class interval will be taken as closest to 50 units. Hence in first class interval QPD is taken as 49 and similarly it is calculated for other class interval.

39. ABC Analysis

A factory uses 4,000 varieties of inventory. In terms of inventory holding and inventory usage, the following information is compiled:

No. of varieties of inventory	%	value of inventory holding (average)	% of inventory usage (in end-product)
3,875	96.875	20	5
110	2.750	30	10
15	0.375	50	85
4,000	100.000	100	100

Classify the items of inventory as per ABC analysis with reasons.

Answer:

Classification of the items of inventory as per ABC analysis

1. 15 number of varieties of inventory items should be classified as 'A' category items because of the following reasons:
- Constitute 0.375% of total number of varieties of inventory handled by stores of factory, which is minimum as per given classification in the table.
- 50% of total use value of inventory holding (average) which is maximum according to the given table.
- Highest in consumption about 85% of inventory usage (in end-product).

2. 110 number of varieties of inventory items should be classified as 'B' category items because of the following reasons:
- Constitute 2.750% of total number of varieties of inventory items handled by stores of factory.
- Requires moderate investment of about 30% of total use value of inventory holding (average).
- Moderate in consumption about 10% of inventory usage (in end–product).

3. 3,875 number of varieties of inventory items should be classified as 'C' category items because of the following reasons:
- Constitute 96.875% of total varieties of inventory items handled by stores of factory.
- Requires about 20% of total use value of inventory holding (average).
- Minimum inventory consumption i.e. about 5% of inventory usage (in end-product).

40. Stockouts

ABC Limited trades in four wheelers and tubes. It stock sufficient quantity of tyres of almost every vehicle. In year ended 2011-12, the report revealed that ABC Limited experienced stock-out of tyres. The stock-out data is as follows:

Stock-out of tyres	No of times
100	2
80	5
50	10
20	20
10	30
0	33

ABC Limited loses Rs.150 per unit due to stock-out and spends Rs.50 per unit on carrying of inventory. Determine optimum safest stock level.

Answer:

WN 1: Identification of safety stock level:
- Stockouts will be 10,20,50,80 and 100 and hence we should look at having safety stock level of same number of units to avoid stockouts

Safety stock	Carrying cost	Stockout cost	Total cost
0	0	2,700	2,700
10	500 [10 x 50]	1,695	2,195
20	1,000 [20 x 50]	1,140	2,140
50	2,500 [50 x 50]	375	2,875
80	4,000 [50 x 80]	60	4,060
100	5,000 [50 x 100]	0	5,000

- **Optimum safety stock level = 20 units**

WN 2: Computation of stockout costs:
Part 1: Analysis of past stockouts:

Demand	No of times	Probability
100	2	0.02
80	5	0.05
50	10	0.10
20	20	0.20
10	30	0.30
0	33	0.33
Total	**100**	

Stockout cost if safety stock is 0 units:

Old Stockout	Probability	Stockout	Expected stockout
100	0.02	100	2
80	0.05	80	4
50	0.10	50	5
20	0.20	20	4
10	0.30	10	3
Total			**18**

- Stockout costs = 18 x 150 = Rs.2,700

Stockout cost if safety stock is 10 units:

Old Stockout	Probability	Stockout	Expected stockout
100	0.02	90	1.80
80	0.05	70	3.50
50	0.10	40	4
20	0.20	10	2
10	0.30	0	0
Total			**11.30**

- Stockout costs = 11.30 x 150 = Rs.1,695

Stockout cost if safety stock is 20 units:

Old Stockout	Probability	Stockout	Expected stockout
100	0.02	80	1.60
80	0.05	60	3.00
50	0.10	30	3
20	0.20	0	0
10	0.30	0	0
Total			**7.60**

- Stockout costs = 7.60 x 150 = Rs.1,140

Stockout cost if safety stock is 50 units:

Old Stockout	Probability	Stockout	Expected stockout

100	0.02	50	1.00
80	0.05	30	1.50
50	0.10	0	0
20	0.20	0	0
10	0.30	0	0
Total			**2.50**

- Stockout costs = 2.50 x 150 = Rs.375

Stockout cost if safety stock is 80 units:

Old Stockout	Probability	Stockout	Expected stockout
100	0.02	20	0.40
80	0.05	0	0
50	0.10	0	0
20	0.20	0	0
10	0.30	0	0
Total			**0.40**

- Stockout costs = 0.40 x 150 = Rs.60

41. Pricing of material receipts

At what price per unit would Part No. A 32 be entered in the Stores Ledger, if the following invoice was received from a supplier:

Invoice	(Rs.)
200 units Part No. A 32 @ Rs. 5	1,000.00
Less : 20% discount	200.00
	800.00
Add : Excise duty @ 15%	120.00
	920.00
Add : Packing charges (5 non-returnable boxes)	50.00
	970.00

Notes:

  (i) A 2 per cent discount will be given for payment in 30 days.
  (ii) Documents substantiating payment of excise duty is enclosed for claiming CENVAT credit

Answer:
WN 1: Computation of total material cost:

Particulars	Calculation	Amount
1. Basic price		1,000
2. Less: Discount		(200)
3. Excise duty	Allowed for credit	0
4. Packing charges		50
5. Total cost		**850**

WN 2: Computation of effective good units:

Particulars	Units
1. Units ordered	200
2. Less: Normal loss	0
3. Effective good units	**200**

WN 3: Computation of cost per unit:

Particulars	Amount
1. Total cost (WN 1)	850
2. Effective good units (WN 2)	200
3. Cost per unit (1/2)	**4.25**

Note: Cash discount is related to interest and finance charges and hence not considered for valuation of material.

42. Priced stores ledger

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. (Rs.)
10-Apr	1,600	5.00
20-Apr	2,400	4.90
5-May	1,000	5.10
17-May	1,100	5.20
25-May	800	5.25
11-Jun	900	5.40
24-Jun	1,400	5.50

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

Issues:

Date	Quantity (kg.)
Apr 4	1,100
Apr 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.

Answer:

Stock Ledger for three months ended June 30, 2014 (Weighted Average Method)

Date	Particulars	Receipts			Issues			Balance		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
April 1	Opening stock							1,500	4.80	7,200
Apr 4	Issue				1,100	4.80	5,280	400	4.80	1,920
Apr 10	Receipt	1,600	5.00	8,000				2,000	4.96	9,920
Apr 20	Receipt	2,400	4.90	11,760				4,400	4.93	21,680
Apr 24	Issue				1,600	4.93	7,888	2,800	4.93	13,792
May 5	Receipt	1,000	5.10	5,100				3,800	4.97	18,892
May 10	Issue				1,500	4.97	7,455	2,300	4.97	11,437
May 17	Receipt	1,100	5.20	5,720				3,300	5.05	17,157
May 25	Receipt	800	5.25	4,200				4,100	5.09	21,357
May 26	Issue				1,700	5.09	8,653	2,500	5.09	12,704
May 31	Shortage				80	-	-	2,420	5.25	12,704
June 11	Purchase	900	5.40	4,860				3,320	5.29	17,564
June 15	Issue				1,500	5.29	7,935	1,820	5.29	9,629
June 21	Issue				1,200	5.29	6,348	620	5.29	3,281
June 24	Receipt	1,400	5.50	7,700				2,020	5.44	10,981
June 30	Shortage				60	-	-	1,960	5.60	10,981

Note: Shortage is treated by inflating the value of existing material. This can be done by reducing the quantity while retaining the overall value. Hence, we have recorded this in quantity column in issues while value of the same is recorded as zero.

43. Priced stores ledger

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

Month	Purchase (units)	Price per unit (Rs.)	Issued units

January	200	25	Nil
February	300	24	250
March	425	26	300
April	475	23	550
May	500	25	800
June	600	20	400

Required

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

Answer:

- The Closing Stock at the end of six months period i.e., on 30th June, 2014 will be 200 units, whereas up to the end of May 2014, total purchases coincide with the total issues i.e., 1,900 units. It means that at the end of May 2014, there was no closing stock.

- In the month of June 2014, 600 units were purchased out of which 400 units were issued. Since there was only one purchase and one issue in the month of June, 2014 and there was no opening stock on 1st June 2014, the Closing Stock of 200 units is to be valued at Rs. 20 per unit.

- In view of this, the argument of the Chief Accountant appears to be correct. Where there is only one purchase and one issue in a month with no opening stock, the method of pricing of material issues becomes irrelevant. Therefore, in the given case one should agree with the argument of the Chief Accountant that the value of Closing Stock remains the same no matter which method of pricing the issue is used. It may, however, be noted that the argument of Chief Accountant would not stand if one finds the value of the Closing Stock at the end of each month

44. Priced stores ledger

'AT' Ltd. furnishes the following store transactions for September, 2011 :

1-9-11	Opening balance	25 units value Rs.162.50
4-9-11	Issues Req. No. 85	8 units
6-9-11	Receipts from B & Co. GRN No. 26 50 units @ Rs.5.75 per unit	
7-9-11	Issues Req. No. 97	12 units
10-9-11	Return to B & Co.	10 units
12-9-11	Issues Req. No. 108	15 units
13-9-11	Issues Req. No. 110	20 units
15-9-11	Receipts from M & Co. GRN. No. 33 25 units @ Rs.6.10 per unit	
17-9-11	Issues Req. No. 121	10 units
19-9-11	Received replacement from B & Co. GRN No. 38	10 units
20-9-11	Returned from department, material of M & Co. MRR No. 4	5 units
22-9-11	Transfer from Job 182 to Job 187 in the dept. MTR 6	5 units
26-9-11	Issues Req. No. 146	10 units
29-9-11	Transfer from Dept. "A" to Dept. "B" MTR 10	5 units
30-9-11	Shortage in stock taking	2 units

Write up the priced stores ledger on FIFO method and discuss how would you treat the shortage in stock taking

Answer:

Stock Ledger of AT Limited for the month of September 2011

Date	Particulars	Receipts			Issues			Balance		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Sep 1	Opening stock							25	6.50	162.50
Sep 4	Issue				8	6.50	52	17	6.50	110.50
Sep 6	Receipt	50	5.75	287.50				17	6.50	110.50
								50	5.75	287.50

Date	Particulars	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Sep 7	Issue				12	6.50	78	5	6.50	32.50
								50	5.75	287.50
Sep 10	Return				10	5.75	57.50	5	6.50	32.50
								40	5.75	230.00
Sep 12	Issue				5	6.50	32.50	30	5.75	172.50
					10	5.75	57.50			
Sep 13	Issue				20	5.75	115.00	10	5.75	57.50
Sep 15	Receipt	25	6.10	152.50				10	5.75	57.50
								25	6.10	152.50
Sep 17	Issue				10	5.75	57.50	25	6.10	152.50
Sep 19	Replacement	10	5.75	57.50				25	6.10	152.50
								10	5.75	57.50
Sep 20	Return from dept	5	5.75	28.75				5	5.75	28.75
								25	6.10	152.50
								10	5.75	57.50
Sep 26	Issues				5	5.75	28.75	20	6.10	122.00
					5	6.10	30.50	10	5.75	57.50
Sep 30	Shortage				2	6.10	12.20	18	6.10	109.80
								10	5.75	57.50

Notes:
- Value of closing stock = 109.80 + 57.50 = Rs.167.30
- Material replacement from vendor is treated as fresh supply and is considered as a new lot
- Return from Sep 20 has been accounted based on latest issue made on Sep 17.
- Issue on Sep 26 is first made out of material returned from department and then the balance is made out of the balance lots
- Entries for transfer of material from one job to another will not be recorded in priced stores ledger. This would be recorded in respective WIP accounts to adjust the respective cost of the job
- Material found short on stock taking has been written off and is transferred to costing profit and loss account

CHAPTER 3: EMPLOYEE COST AND DIRECT EXPENSES

1. What is labour cost and its types? **[Category C]**
   - ❖ Labour cost can be broadly classified as direct labour cost and indirect labour cost
   - ❖ Direct labour cost refers to the wages paid to the employees which can be attributed to a cost object in an economically feasible manner. It is the cost incurred for labourers who are directly engaged in the production process.
   - ❖ Indirect labour cost refers to the wages which cannot be attributed to a particular cost object

2. What is labour cost control and important factors for controlling employee cost? **[Category C]**
   - ❖ Labour cost control focuses on keeping the wages per unit of output as low as possible. This can be achieved by giving workers appropriate compensation to encourage efficiency so that optimum output can be achieved in effective manner.
   - ❖ Factors which need consideration for controlling labour costs are the following:
     - ✓ Assessment of manpower requirements
     - ✓ Control over time-keeping and time-booking
     - ✓ Time & motion study
     - ✓ Control over idle time and overtime
     - ✓ Control over labour turnover
     - ✓ Wage systems
     - ✓ Incentive systems
     - ✓ Systems of wage payment and incentives
     - ✓ Control over casual, contract and other workers
     - ✓ Job evaluation and merit rating
     - ✓ Labour productivity

3. What is the purpose of collection of labour costs? **[Category C]**
   - ❖ Collection of labour costs is the responsibility of the costing department which record separately wages paid to direct and indirect labour
   - ❖ Total wages is required to be analysed as under:
     - o Direct wages - Amount included in direct cost of goods produced or goods completed
     - o Indirect wages – Amount treated as indirect labour and hence considered as overheads
     - o Idle time – Amount treated as idle time and hence loss
     - o Abnormal loss/gain – Any abnormal item and directly recognized in costing profit and loss account

4. What is time-keeping and its objectives? **[Category B]**
   - ❖ Time-keeping refers to correct recording of the employees' attendance time
   - ❖ Correct recording of employees' attendance is of utmost importance where payment to labour is made on the basis of time worked
   - ❖ Following are the objectives of time-keeping:
     - o For preparation of payrolls
     - o For calculating overtime
     - o For ascertaining and controlling cost
     - o For ascertaining idle time
     - o For disciplinary purposes
     - o For overhead distribution

5. What are the methods of time-keeping? **[Category C]**

Method	Description
Manual Methods	
Attendance Register Method	✓ Under this method an attendance register is kept and the time of arrival and departure may be noted by an employee known as time-keeper ✓ Method is simple and inexpensive and can be used in small firms where the number of workers is not large

Metal Disk Method	✓ Under this method, each worker is allotted a metal disk or a token with a hole bearing his identification number
	✓ The workers are required to remove their respective discs or tokens from the box kept in the factory. Immediately after the scheduled time for entering the factory, the box is removed and the late comers will have to personally give the tokens to the time-keeper. The time-keeper can record the exact time of arrival for the late comers
Mechanical Methods	
Punch Card Attendance System	✓ A punch card is a flat and stiff paper with notches cut in and contains digital information
	✓ In punch card attendance system, employees use this punch or proximity card for in and/or out
	✓ Employees need to wave the card near a reader, which then records the time for the entry in/out of the employee
Bio-metric attendance system	✓ Biometrics has unique recognizing features which are based on physical or behavioural traits of an individual
	✓ Recognizing an individual on the basis of physical traits include identification based on his fingerprint, DNA, eyes, iris, palm etc. while behavioural traits identification refers to voice or rhythm recognition
	✓ Some of the popularly used bio-metrics attendance system are fingerprint recognition system and face recognition

6. What are the requisites of a Good Time-Keeping System? **[Category B]**
❖ System of time-keeping should be such that it does not allow proxy for another worker
❖ Provision for recording attendance of piece workers so that regular attendance and discipline may be maintained
❖ Time of arrival as well as time of departure of workers should be recorded
❖ Method of recording should be mechanical so that chances of disputes regarding time may not arise between workers and time-keeper
❖ Simple, smooth and quick. Unnecessary queuing at the factory gate should be avoided
❖ Responsible officer should pay frequent visits at the factory gate so that proper recording of time is being followed

7. What is time-booking and what are its objectives? **[Category B]**
❖ Time-keeping merely records the amount of time spent by a person in the factory and the same is used for calculation of wages
❖ Time-booking helps in analysing how the total time has spent in the factory on various jobs and waiting time. Reasons for waiting time is also recorded such as lack of material, lack of instructions, machine breakdown, power failure etc.
❖ Following are the objectives of time-booking:
  o To ensure that time paid for has been properly utilized on different jobs
  o To ascertain cost of each job or work order
  o To provide a basis for apportionment of overhead expenses
  o To calculate amount of wages and bonus payable under the wage incentive system
  o To ascertain labour hours spent on each job and the idle labour hours

8. What are the procedures involved in payroll processing? **[Category C]**

Procedure	Description
Attendance and time details	✓ Detailed number of days or hours worked by each employee and units or percentage of work as reflected in time keeping records are sent to the payroll department by the time keeping department
List of employees and other details	✓ List of employees on roll and the rate at which they would be paid is sent by the personnel/HR department to the payroll department
Computation of wages and other incentives	✓ Payroll department based on details provided by personnel and time-keeping department calculate wages/salary to be paid to the employees

Payment to the employees	✓ Cost/accounting department deduct all statutory deduction such as employee's contribution to provident fund and employees state insurance (ESI) scheme and then makes the payment to the employees
Deposit of all statutory liabilities	✓ All statutory deduction made from employees along with employer contribution are paid to the respective statutory bodies

9. What are the general deductions from payroll? **[Category A]**

Type of Deduction	Description
Statutory Deductions	
Provident Fund	✓ Employee's contribution to the provident fund is deducted from the salary/wage of the concerned employee
Employee state insurance (ESI)	✓ Employee's contribution to the ESI is to be deducted from wages. The current ESI contribution is 1.75 percent of wages
Tax deducted at source (TDS)	✓ Employer is obliged to deduct tax at source if the payment to the employee is beyond the exemption limit
Professional Tax	✓ Professional tax is imposed at state level and the same is imposed on owners, working individuals, merchants and people carrying out various occupations
Other Deductions	
Voluntary contribution to provident fund	✓ If any employee desires to contribute a higher amount to provident fund, then the employer should deduct the same and deposit in provident fund
Contribution to any benevolent fund	✓ Voluntary contribution to any benevolent fund needs to be deducted from wages
Loan deductions	✓ Instalments of any loan taken by the employee
Other advances and dues	✓ Other advances like festival advance and unadjusted advances taken

10. What is idle time and its accounting treatment? **[Category A]**

Meaning	✓ It is a time during which no production is carried out because the worker remains idle even though they are paid.
Types	✓ Normal idle time and abnormal idle time
Normal idle time	✓ It is the time which cannot be avoided or reduced in the normal course of business ✓ **Causes:** o Time lost between factory gate and place of work o Interval between one job to another o Setting up time for machine o Normal fatigue ✓ **Treatment:** o It is treated as part of cost of production o Direct workers – An allowance for normal idle time is built into the labour cost rates o Indirect workers – Normal idle time is treated as factory overhead and spread over all products/jobs
Abnormal idle time	✓ It is the idle time in addition to normal idle time due to certain abnormal factors ✓ **Causes:** o Lack of coordination o Power failure o Breakdown of machines o Non-availability of raw material, strikes, lockouts ✓ **Treatment:** o Abnormal idle time is not considered as part of production cost and is shown as a separate item in the costing profit and loss account

11. What is overtime and explain its accounting treatment? **[Category A]**
❖ Work beyond normal working hours is known as 'overtime work'

❖ The rate for overtime work is higher than the normal time rate and is usually at double the normal rates
❖ As per Factories Act 1948 "Where a worker works in a factory for more than nine hours in any day or for more than forty-eight hours in any week, he shall, in respect of overtime work, be entitled to wages at the rate of twice his ordinary rate of wages"

Causes of overtime and treatment of overtime premium in cost accounting:

Causes	Treatment
Where overtime is worked regularly as a policy due to labour shortage	Overtime premium is treated as part of labour cost and job is charged at average inflated wage rate
Customer may agree to bear the entire charge of overtime because of urgency	Overtime premium is to be charged to the job directly
Overtime to make up for any shortfall in production due to some unexpected development	Overtime premium should be treated as overhead cost of the particular department or cost centre which works overtime
Overtime may be necessary to make up a shortfall in production due to some fault of management	Overtime is worked in a department due to fault of another department, then overtime premium is charged to the latter department
Overtime due to abnormal conditions such as flood, earthquake	Overtime on account of abnormal conditions should not be charged to cost but to costing profit and loss account

12. What is labour turnover and methods to calculate the same? **[Category A]**
❖ Labour turnover is the rate of change in the composition of labour force during a specified period measured against a suitable index

1. Separation method = No. of employees separated * 100 / Average labour force
2. Replacement method = No. of replacements * 100 / Average labour force
3. New recruitment method = New recruitments (excluding replacements) * 100 / Average labour force
4. Accession method = New recruitments (including replacements) * 100 / average labour force
5. Flux Method = (Separations + New recruitments) * 100 / average labour force

13. What are the Causes of Labour Turnover? **[Category B]**
Causes of labour turnover can be broadly classified under the following three heads:
❖ Personal Causes
   o Change of jobs for betterment
   o Premature retirement
   o Domestic problems and family responsibilities
   o Discontent over the job and working environment
❖ Unavoidable Causes
   o Seasonal nature of business
   o Shortage of raw material, power, slack market for the product
   o Change in the plant location
   o Disability, making a worker unfit for work
   o Disciplinary measures
   o Marriage
❖ Avoidable Causes
   o Dissatisfaction with job, remuneration, hours of work
   o Strained relationship with management, supervisors
   o Lack of training facilities and promotional avenues
   o Lack of recreational and medical facilities
   o Low wages and allowances

14. What are the Effects of Labour Turnover? **[Category C]**
High Labour Turnover increases the cost of production in the following ways:
❖ Even flow of production is disturbed
❖ Efficiency of new workers is low and hence costs go up

❖ Increased cost of training and induction
❖ New workers cause increased breakage of tools and wastage of materials
❖ Cost of recruitment and training increases

15. What are the Costs associated with Labour Turnover? **[Category C]**
❖ **Prevention Costs:** These include costs incurred to keep the labour turnover at a low level. If a company incurs high prevention costs, the rate of labour turnover is usually low
❖ **Replacement Costs:** These are costs which arise due to high labour turnover. The company has to incur additional costs on new workers for recruitment, training, costs of inefficiency and wastage

16. What are the remedial steps to minimize Labour Turnover? **[Category C]**
❖ Exit Interview
❖ Job Analysis and Evaluation
❖ Scientific system of recruitment, placement and promotion
❖ Enlighted attitude of management
❖ Use of committee

17. What are the important factors, principles and characteristics of good incentive System? **[Category C]**

Important factors for an effective incentive system	Principles for sound system of wage incentives	Characteristics of good incentive system
❖ System of quality control ❖ Maximize production ❖ Precision in measuring quantity of work ❖ Role of management in incentive systems ❖ Effort of workers ❖ Standards of performance ❖ No discrimination ❖ Comparative study ❖ Attitude of workers	❖ Just and Fair ❖ Well defined scheme ❖ Worker's expectations ❖ Stability ❖ Charge on employees ❖ Incentive based on quality ❖ Adequate resources ❖ Limited costs ❖ Morale booster ❖ Guaranteed wages ❖ Equality in payment	❖ Should be positive and help in promoting employee confidence ❖ Incentive should be in direct proportion to the employee's efforts ❖ Unrestricted on the amount of earning ❖ Reasonable ❖ Flexible ❖ Assist supervision ❖ Aid team work ❖ Should have employee and managerial support ❖ Correct measurement of the efforts for calculation of incentives

18. What are the different Systems of Wage Payment and Incentives? **[Category A]**
Formulae for various labour plans:
1. **Time rate plan:** Amount of wages = Time taken * rate/hour
2. **Piece rate plan:** Amount of wages = Production * rate/unit
3. **Halsey premium plan-** this system is also known as Split Bonus Plan or 50-50 plan.
   Earnings = (Time Taken X Hourly Rate) + 50% of Time Saved X Hourly Rate.

4. **Halsey-weir premium plan**.
   Earnings = (Time Taken X Hourly Rate) + 30% of Time Saved X Hourly Rate.

5. **Rowan Premium plan**
Earnings = (Time Taken X Hourly Rate) + (Time Taken/Standard Time X Time Saved X Hourly Rate)

19. What is Group Bonus? **[Category A]**
❖ Group bonus refers to the bonus paid for the collective efforts made by a group of workers
❖ The amount of bonus is distributed among the individual members of the group on some agreed basis
❖ Under group bonus scheme, bonus is paid to a team/group of employees working together

20. Explain the accounting treatment of items related to wages?

Wages [Category B]	❖ Wages comprise various components namely basic wages, dearness allowance, overtime allowance, production bonus, PF and ESI contribution among others ❖ Wage cost per hour = Total wages cost / Number of hours
Holiday wages [Category A]	❖ **Option 1:** Payment on account of paid holiday and leave can be treated as departmental overheads ❖ **Option 2:** Consider it as part of normal wages and inflate the wage cost per hour for costing purposes
Night shift allowance [Category B]	❖ To be treated as overheads

21. What is direct expense and explain its accounting treatment? **[Category A]**
   ❖ Expenses other than direct material and direct labour which can be directly traced in an economically feasible manner to a cost object
   ❖ Examples: Royalty, Hire Charges, Cost for product/service specific design or drawing
   ❖ Direct expenses are measured at invoice or agreed price net of rebate or discount but includes duties and taxes, commission and other directly attributable costs
   ❖ **Treatment:** Direct expenses form part of prime cost for the product or service for which it can be directly traceable. In case of lump-sum payment the amount can be amortized over the estimated production volume. Furthermore if the expenses are of insignificant amount then the same can be treated as part of overheads

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Practical Problems

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1. STANDARD PLANS

A company is planning a wage incentive system. It has taken up the study of the output of three workers A, B and C. Each worker produces an identical product, but the output varies. They respectively produce 44, 36 and 24 units in a shift of 8 hours. The daily wages are guaranteed at Rs.30 per hour and the piece rate is based on a standard output of 4 units per hour. The company is considering the wage calculations under:

   • Time rate system
   • Piece rate system
   • Halsey-weir premium plans
   • Halsey system and
   • Rowan System

Calculate under each of the aforesaid four systems for each worker.
   • The total earnings per shift of 8 hours
   • The effective earnings per hour worked
   • The wage cost per unit of output

Answer:

WN 1: Computation of earnings under time rate system:

Earnings under time rate system = (Hours worked x Rate per hour)

Particulars	Worker A	Worker B	Worker C
1. Hours worked	8	8	8
2. Rate per hour	30	30	30
3. Total wages cost/employee earnings (1 x 2)	**240**	**240**	**240**
4. Earnings per hour (3/1)	30	30	30
5. Units produced	44	36	24
6. Wage cost per unit (3/5)	5.45	6.67	10

WN 2: Computation of earnings under piece rate system:

Earnings under piece rate system = (Units produced x Rate per unit)

Rate per unit computation:

1 hour = Rs.30
1 hour = 4 units
4 units = Rs.30
1 unit = Rs.7.50

Particulars	Worker A	Worker B	Worker C
1. Units produced	44	36	24
2. Rate per unit	7.50	7.50	7.50
3. Total wages/earnings (1 x 2)	**330**	**270**	**180**
4. No of hours	8	8	8
5. Earnings per hour (3/4)	41.25	33.75	22.5
6. Wage cost per unit (3/1)	7.50	7.50	7.50

WN 3: Computation of earnings under Halsey-weir premium scheme:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 30% of time saved x Rate per hour

Computation of time saved:

Worker A	Worker B	Worker C
1 hour = 4 units	1 hour = 4 units	1 hour = 4 units
Standard time = Act output	Standard time = Act output	Standard time = Act output
? = 44 units	? = 36 units	? = 24 units
11 hours = 44 units	9 hours = 36 units	6 hours = 24 units
Time saved = 3 hours	**Time saved = 1 hour**	**Time saved = 0**

Time saved = Standard Time – Actual Time

Particulars	Worker A	Worker B	Worker C
1. Hours worked	8	8	8
2. Rate per hour	30	30	30
3. Basic wages (1 x 2)	240	240	240
4. Time saved	3	1	0
5. Bonus (30% x (4) x (2)]	27	9	0
6. Wage cost/earnings [3 + 5]	**267**	**249**	**240**
7. Earnings per hour [6/1]	33.38	31.13	30
8. Units produced	44	36	24
9. Wage cost per unit [6/8]	6.07	6.92	10

WN 4: Computation of earnings under Halsey scheme:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Particulars	Worker A	Worker B	Worker C
1. Hours worked	8	8	8
2. Rate per hour	30	30	30
3. Basic wages (1 x 2)	240	240	240
4. Time saved	3	1	0
5. Bonus (50% x (4) x (2)]	45	15	0
6. Wage cost/earnings [3 + 5]	**285**	**255**	**240**
7. Earnings per hour [6/1]	35.63	31.88	30
8. Units produced	44	36	24
9. Wage cost per unit [6/8]	6.48	7.08	10

WN 5: Computation of earnings under Rowan system:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)

- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Particulars	Worker A	Worker B	Worker C
1. Hours worked	8	8	8
2. Rate per hour	30	30	30
3. Basic wages (1 x 2)	**240**	**240**	**240**
4. Standard Time	11	9	6
5. Time saved	3	1	0
6. Bonus [(1/4) x 5 x 2]	**65.45**	**26.67**	**0**
7. Total wages/earnings	**305.45**	**266.67**	**240**
8. Earnings per hour [7/1]	38.18	33.33	30
9. No of units	44	36	24
10. Wage cost per unit [7/9]	6.94	7.41	10

2. STANDARD PLANS

From the following information you are required to calculate the earnings under Rowan system. The relevant information is as under:

Standard working hours	:	8 hours a day
Standard output per hour in units	:	5
Daily wage rate	:	Rs.50

Actual output in units

Worker A	:	25 units
Worker B	:	40 units
Worker C	:	45 units

Answer:

Computation of earnings under Rowan System:

- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Computation of Standard Time and Time saved:

Worker A	Worker B	Worker C
1 hour = 5 units	1 hour = 5 units	1 hour = 5 units
Standard Time = Act Output	Standard Time = Act Output	Standard Time = Act Output
? = 25 units	? = 40 units	? = 45 units
5 hours = 25 units	8 hours = 40 units	9 hours = 45 units
Time saved = 0 hours	**Time saved = 0 hours**	**Time saved = 1 hour**

Time saved = Standard Time – Actual Time

Particulars	Worker A	Worker B	Worker C
1. Hours worked	8	8	8
2. Rate per hour	6.25	6.25	6.25
3. Basic wages (1 x 2)	**50**	**50**	**50**
4. Standard Time	5	8	9
5. Time saved	0	0	1
6. Bonus [(1/4) x 5 x 2]	**0**	**0**	**5.55**
7. Total wages/earnings	**50**	**50**	**55.55**

Note: Computation of rate per hour:

1 day = Rs.50
1 day = 8 hours
8 hours = Rs.50
1 hour = Rs.6.25

3. Using Halsey system, find the earnings of Amar, Akbar and Ali from the following particulars:

Standard time per piece   :   20 minutes

Normal rate per hour	:	Rs.9.00
In a 8 hour day		
Amar produced	:	23 units
Akbar produced	:	24 units
Ali produced	:	30 units

Answer:
Computation of earnings under Halsey System:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Computation of time saved:

Amar	Akbar	Ali
20 mins = 1 unit	20 mins = 1 unit	20 mins = 1 unit
Standard time = Act output	Standard time = Act output	Standard time = Act output
? = 23 units	? = 24 units	? = 30 units
460 mins = 23 units	480 mins = 24 units	600 mins = 30 units
7.67 hours = 23 units	8 hours = 24 units	10 hours = 30 units
Time saved =0 hours	**Time saved = 0 hours**	**Time saved = 2 hours**

Particulars	Amar	Akbar	Ali
1. Hours worked	8	8	8
2. Rate per hour	9	9	9
3. Basic wages (1 x 2)	72	72	72
4. Time saved	0	0	2
5. Bonus (50% x (4) x (2)]	0	0	9
6. Wage cost/earnings [3 + 5]	**72**	**72**	**81**

4.   Halsey and Rowan
Calculate the earnings of worker from the following information under Halsey system:
Standard time for a product A – 30 seconds plus relaxation allowance of 50%
Standard time for a product B – 20 seconds plus relaxation allowance of 50%
During 8 hour day for

Actual output of product A	:	500 units
Actual output of product B	:	300 units
Wage rate	:	Rs.10 per hour

Also calculate the wages under Rowan plan.
Answer:
WN 1: Calculation of earnings under Halsey Scheme:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Computation of time saved:

Product A	Product B	Total
45 seconds = 1 unit	30 seconds = 1 unit	**Standard Time = 8.75 hours**
Standard time = Act output	Standard time = Act output	**Actual Time = 8 hours**
? = 500 units	? = 300 units	**Time saved = 0.75 hours**
22,500 seconds = 500 units	9,000 seconds = 300 units	
6.25 hours = 500 units	**2.5 hours = 300 units**	

Particulars	Amount
1. Hours worked	8
2. Rate per hour	10
3. Basic wages (1 x 2)	80
4. Time saved	0.75
5. Bonus (50% x (4) x (2)]	3.75

6. Wage cost/earnings [3 + 5]	83.75

WN 2: Computation of earnings under Rowan system:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Particulars	Amount
1. Hours worked	8
2. Rate per hour	10
3. Basic wages (1 x 2)	**80**
4. Standard Time	8.75
5. Time saved	0.75
6. Bonus [(1/4) x 5 x 2]	**6.86**
7. Total wages/earnings	**86.86**

5. Rowan and Halsey plans

In a factory, bonus to workmen is paid according to the Rowan Plan. The allotted time is 40 hours for a job and the normal rate of wages is Rs.12.50 per hour. The factory overhead charges are Rs.5 per hour for the hours taken. The factory cost of a work order, executed by one worker is Rs.1,618.75. The cost of material in each case is Rs.1,000. (i). Calculate the time taken by the worker. (ii) What would have been his earnings if he worked under Halsey Plan?

Answer:

WN 1: Computation of time taken by the worker
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour
- Let us assume Actual Time to be 'Y'

Particulars	Calculation	Amount
Direct Material		1,000
Direct Labour		
Basic wages	(Hours worked x rate per hour)	12.5Y
Bonus	$\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour	$\frac{Y}{40}$ x (40 − Y) x 12.5
Factory OH		5Y
Factory cost		**1,618.75**

Solving Y:

$1{,}000 + 12.5Y + \left(\left(\dfrac{Y}{40}\right) \text{x} \, (40 - Y) \text{x} \, 12.5\right) + 5Y = 1{,}618.75$
$17.5Y + \left(\left(\dfrac{Y}{40}\right) \text{x} \, (500 - 12.5Y)\right) = 618.75$
$17.5Y + \dfrac{500Y - 12.5Y^2}{40} = 618.75$
$\dfrac{700Y + 500Y - 12.5Y^2}{40} = 618.75$
$1{,}200Y - 12.5Y^2 = 24{,}750$
$12.5Y^2 - 1{,}200Y + 24{,}750 = 0$
$Y^2 - 96Y + 1{,}980 = 0$
$Y^2 - 30Y - 66Y + 1{,}980 = 0$
$Y(Y-30) - 66(Y-30) = 0$
$(Y-30)\,(Y-66) = 0$
Y = 30 or 66 hours

- Actual time = 30 hours; Actual time cannot be 66 hours as the same will lead to negative bonus as per the above formula

WN 2: Calculation of earnings under Halsey Scheme:

- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Particulars	Amount
1. Hours worked	30
2. Rate per hour	12.50
3. Basic wages (1 x 2)	375
4. Time saved	10
5. Bonus (50% x (4) x (2)]	62.50
6. Wage cost/earnings [3 + 5]	**437.50**

6. **Rowan and Halsey plans**

Standard time for a job is 90 hours. The hourly rate of guaranteed wages is Rs.50. Because of the saving in time a worker a gets an effective hourly rate of wages of Rs.60 under Rowan premium bonus system. For the same saving in time, calculate the hourly rate of wages a worker B will get under Halsey premium bonus system assuring 40% to worker.

Answer:

WN 1: Computation of time taken by the worker

- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour
- Let us assume Actual Time to be 'Y'

Particulars	Calculation	Amount
Direct Labour		
Basic wages	(Hours worked x rate per hour)	50Y
Bonus	$\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour	$\frac{Y}{90}$ x (90 − Y)x 50
Total wages/earnings	**(Hours worked x earning per hour)**	**60Y**

Solving Y:

$50Y + \left(\left(\frac{Y}{90}\right) \times (90 - Y)\times 50\right) = 60Y$
$\left(\left(\frac{Y}{90}\right) \times (4{,}500 - 50Y)\right) = 10Y$
$\frac{4{,}500Y - 50Y^2}{90} = 10Y$
$4{,}500Y - 50Y^2 = 900Y$
$50Y^2 = 3{,}600Y$
$50Y = 3{,}600$
Y = 72 hours

- Actual time = 72 hours

WN 2: Calculation of earnings under Halsey Scheme:

- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 40% of time saved x Rate per hour

Particulars	Amount
1. Hours worked	72
2. Rate per hour	50
3. Basic wages (1 x 2)	3,600

4.	Time saved	18
5.	Bonus (40% x (4) x (2)]	360
6.	**Wage cost/earnings [3 + 5]**	**3,960**
7.	**Earnings per hour [6/1]**	**55**

Note:
- Bonus under Halsey plan is normally 50% of time saved x rate per hour. However, the question assures only 40% bonus and hence the same is taken as 40% of time saved x rate per hour

7. Halsey and Rowan Plan

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 Rs.5 per person-hour actually worked. The factory cost of product manufactured by 'A' is Rs.3,490 and for product manufactured by 'B' is Rs.3,600.

Required:
- (i)   Compute the normal rate of wages.
- (ii)   Compute the material cost.
- (iii) Prepare a statement comparing the factory cost of the product as made by two workers.

Answer:

WN 1: Computation of normal rate of wages and material cost:
- Let us assume normal rate of wages to be A and material cost to be B

Rowan scheme (Worker A):
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Halsey Scheme (Worker B):
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Particulars	Worker A	Worker B
Direct Material	B	B
Direct Labour		
Basic wages	30A	40A
Bonus	$\frac{30}{50}$ x20 x A = 12A	50% x 10 x A = 5A
Factory OH	150	200
Factory cost	**3,490**	**3,600**

Worker A: B + 42A = 3,340 …………. Equation 1
Worker B: B + 45A = 3,400……………Equation 2
Equation 2 – Equation 1
3A = 60; A = 20
Substituting A in equation 1
B + 42(20) = 3,340; B = 2,500
Material cost = 2,500; Normal rate of wages = Rs.20

WN 2: Statement comparing the factory cost of two workers:

Particulars	Worker A	Worker B
Direct Material	2,500	2,500
Direct Labour		
Basic wages	600	800
Bonus	240	100
Factory OH	150	200
Factory cost	**3,490**	**3,600**

8. **Computation of labour cost:**

M/s Zeba Private Limited allotted a standard time of 40 hours for a job and the rate per hour is Rs.75. The actual time taken by a worker is 30 hours. You are required to calculate the total earnings under the following plans:

   (i)   Halsey Premium Plan (Rate 50%)
   (ii)   Rowan Plan
   (iii)   Time wage system
   (iv)   Piece Rate system

Answer:

WN 1: Computation of earnings under time rate system:

Earnings under time rate system = (Hours worked x Rate per hour)

Particulars	Amount
1. Hours worked	30
2. Rate per hour	75
3. **Total wages cost/employee earnings (1 x 2)**	**2,250**

WN 2: Computation of earnings under piece rate system:

* Earnings under piece rate system = (Units produced x Rate per unit)
* Let us assume one unit takes one hour. This would mean that rate per hour as well as rate per unit will be Rs.75

Units produced calculation:

1 hour = 1 unit
Standard Time = Actual output
40 hours = ?
40 hours = 40 units

Particulars	Amount
1. Units produced	40
2. Rate per unit	75
3. **Total wages/earnings (1 x 2)**	**3,000**

WN 3: Computation of earnings under Halsey scheme:

* Earnings = Basic wages + Bonus
* Basic wages = (Hours worked x Rate per hour)
* Bonus = 50% of time saved x Rate per hour

Particulars	Amount
1. Hours worked	30
2. Rate per hour	75
3. Basic wages (1 x 2)	2,250
4. Time saved	10
5. Bonus (50% x (4) x (2)]	375
6. **Wage cost/earnings [3 + 5]**	**2,625**

WN 4: Computation of earnings under Rowan system:

* Earnings = Basic wages + Bonus
* Basic wages = (Hours worked x Rate per hour)
* Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Particulars	Amount
1. Hours worked	30
2. Rate per hour	75
3. **Basic wages (1 x 2)**	**2,250**
4. Standard Time	40
5. Time saved	10

6.	Bonus [(1/4) x 5 x 2]	562.50
7.	Total wages/earnings [3+6]	2812.50

9. Computation of labour cost:

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

I. Earnings for the day and
II. Effective rate of earnings per under (a) Straight piece-rate, (b) Halsey Premium Bonus and (c) Rowan Premium Bonus

Answer:

WN 1: Computation of earnings under piece rate system:

Earnings under piece rate system = (Units produced x Rate per unit)

Rate per unit computation:

1 hour = Rs.4
1 hour = 10 units
10 units = Rs.4
1 unit = Rs.0.40

Particulars	Govind	Ram	Shyam
1. Units produced	80	100	120
2. Rate per unit	0.40	0.40	0.40
3. Total wages/earnings (1 x 2)	**32**	**40**	**48**
4. No of hours (1 day assumed as 8 hours)	8	8	8
5. Earnings per hour (3/4)	4	5	6

WN 2: Computation of earnings under Halsey premium scheme:

- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Computation of time saved:

Worker A	Worker B	Worker C
1 hour = 10 units	1 hour = 10 units	1 hour = 10 units
Standard time = Act output	Standard time = Act output	Standard time = Act output
? = 80 units	? = 100 units	? = 120 units
8 hours = 80 units	10 hours = 100 units	12 hours = 120 units
Time saved = 0 hours	**Time saved = 2 hours**	**Time saved = 4 hours**

Time saved = Standard Time – Actual Time

Particulars	Worker A	Worker B	Worker C
1. Hours worked	8	8	8
2. Rate per hour	4	4	4
3. Basic wages (1 x 2)	32	32	32
4. Time saved	0	2	4
5. Bonus (50% x (4) x (2)]	0	4	8
6. Wage cost/earnings [3 + 5]	**32**	**36**	**40**
7. Earnings per hour [6/1]	4.00	4.50	5.00

WN 3: Computation of earnings under Rowan system:

- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Particulars	Worker A	Worker B	Worker C
1. Hours worked	8	8	8

2.	Rate per hour	4	4	4
3.	**Basic wages (1 x 2)**	**32**	**32**	**32**
4.	Standard Time	8	10	12
5.	Time saved	0	2	4
6.	**Bonus [(1/4) x 5 x 2]**	**0**	**6.40**	**10.67**
7.	**Total wages/earnings**	**32**	**38.40**	**42.67**
8.	Earnings per hour [7/1]	4	4.80	5.33

10. Introduction of incentive scheme

ZED Limited is working by employing 50 skilled workers it is considered 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, 2004.

Hourly rate of wages (guaranteed)	Rs. 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.

Answer:

WN 1: Computation of earnings under Halsey and Rowan Scheme:

Halsey Plan:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Rowan Plan:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Computation of time saved:

Standard Time:
1.975 hours = 1 unit
Standard time = Act output
? = 6,120 units
12,087 hours = 6,120 units
Actual Time:
Actual Time = 24 x 8 x 50
Actual Time = 9,600 hours
Time saved = 12,087 – 9,600 = 2,487

Particulars	Halsey Plan	Rowan Plan
1. Hours worked	9,600	9,600
2. Rate per hour	30	30
3. Basic wages (1 x 2)	**2,88,000**	**2,88,000**
4. Standard Time	12,087	12,087
5. Time saved	2,487	2,487
6. Bonus	37,305 [50% x 2,487 x 30]	59,258

		$\left(\dfrac{9,600}{12,087}\right)$ x 2,487 x 30
7. Total wages/earnings [3+6]	3,25,305	3,47,258
8. Actual Time	9,600	9,600
9. Earnings per hour (7/8)	33.89	36.17
10. Units produced	6,120	6,120
11. Labour cost per unit (7/10)	53.15	56.74
12. Old labour cost per unit (1.975 x 30)	59.25	59.25
13. Savings in Labour cost (12 – 11)	6.10	2.51

Conclusion:
- The employee needs an increase of 20%. This would mean that earning per hour has to increase from Rs.30 to Rs.36. This is possible only under Rowan Plan.
- The company should go ahead with Rowan Plan as there is overall saving of Rs.2.51 per unit and company fulfills its assurance

11. Comprehensive incentive plans

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: Rs. 160 per hour Late shift: Rs. 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)	:	Rs. 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:
- Prepare a statement showing hours worked, weekly earnings, number of articles produced and labour cost per article for one operator under the following systems:
    - Existing time-rate
    - Straight piece-work
    - Rowan system
    - 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

Answer:
Computation of earnings under time rate, piece rate, Halsey system and Rowan System:
- Earnings under time rate system = Hours worked x Rate per hour
- Earnings under piece rate system = Units produced x Rate per unit

Halsey Plan:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Rowan Plan:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\dfrac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Computation of time saved:

Standard Time:
15 hours = 5 Units

Standard time = Act output
? = 135 units
45 hours = 135 units
Standard Time = 45 hours + 50% = 67.50 hours
Time saved = 67.50 – 40 = 27.50 hours

Calculation of rate per unit:

15 units = 5 hours
1 hour = Rs.160
15 units = Rs.800
1 unit = Rs.53.33
1 unit = 53.33 + 20%
1 unit = Rs.64 per unit

Particulars	Time Rate	Piece Rate	Halsey	Rowan
1. **Hours worked**	**49**	**40**	**40**	**40**
2. Rate per hour	160 for NS 225 for LS	NA	160	160
3. **Units produced**	**120**	**135**	**135**	**135**
4. Rate per unit	NA	64	NA	NA
5. Basic wages	8,425 [160 x 40 + 225 x 9]	8,640 [135 x 64]	6,400 [160 x 40]	6,400 [160 x 40]
6. Bonus	NA	NA	2,200 [50% x 27.5 x 160]	2,607 $\left(\dfrac{40}{67.5}\right)$ x 27.5 x 160
7. **Total wages/ earnings (5+6)**	**8,425**	**8,640**	**8,600**	**9,007**
8. **Labour cost per article (7/3)**	**70.21**	**64**	**63.70**	**66.72**

12. **Best case/worst case/optimal case scenario:**

Arnav Limited manufactures and sales plastic chairs. It pays wages under piece rate system with a standard piece rate of Rs.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 in factory.

The Plant and Machinery used to manufacture the chairs was purchased long back and does not match the efficiency of the workers. Workers appraised their concerns to the management and demanded wages on time rate basis and incentive under Halsey Premium Plan.

The following production estimates has bene 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 each scenario when
      a. Current system of wages and incentive payment system is followed
      b. 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)

Answer:
WN 1: Computation of earnings under piece rate system:
   • Earnings under piece rate system = Units produced x Rate Per Unit

Particulars	Worst case	Optimal Case	Best case
1. Units Produced	42,400	84,960	1,27,400
2. Rate per unit	12.50	12.50	12.50

3.	Total wages (1 x 2)	5,30,000	10,62,000	15,92,500
4.	No of employees	118	118	118
5.	Average wage per person (3/4)	4,492	9,000	13,496

WN 2: Computation of earnings under Halsey System:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Time saved:

Worst Case	Optimal Case	Best Case
1 hour = 4 units	1 hour = 4 units	1 hour = 4 units
Std Time = Act Output	Std Time = Act Output	Std Time = Act Output
? = 42,400 units	? = 84,960 units	? = 1,27,400 units
10,600 hours = 42,400 units	**21,240 hours = 84,960 units**	**31,850 hours = 1,27,400 units**
Actual Time:		
Act time = 118 x 45 hours x 4 weeks = 21,240 hours		
Time saved = 0 hours	Time saved = 0 hours	Time saved = 10,610 hours

Particulars	Worst case	Optimal case	Best case
1. Hours worked	21,240	21,240	21,240
2. Rate per hour	50	50	50
3. Basic wages (1 x 2)	10,62,000	10,62,000	10,62,000
4. Time saved	0	0	10,610
5. Bonus (50% x (4) x (2)]	0	0	2,65,250
6. Wage cost/earnings [3 + 5]	**10,62,000**	**10,62,000**	**13,27,250**
7. Number of employees	118	118	118
8. Average Wage per employee (6/7)	**9,000**	**9,000**	**11,248**

WN 2: Computation of earnings of Mr.K and impact of new system on his earnings:
Piece rate system:

Particulars	Amount
1. Units Produced	1,050
2. Rate per unit	12.50
3. Total wages (1 x 2)	**13,125**

Halsey System:
Computation of Time Saved:

1 hour = 4 units
Std Time = Act Output
? = 1,050 units
262.50 hours = 1,050 units
Actual Time = 180 hours
Time saved = 262.50 – 180 = 82.50 hours

Particulars	Amount
1. Hours worked	180
2. Rate per hour	50
3. Basic wages (1 x 2)	9,000
4. Time saved	82.50
5. Bonus (50% x (4) x (2)]	2,062.50
6. Wage cost/earnings [3 + 5]	**11,062.50**
7. Earnings under old method	13,125
8. Impact of new system (6 – 7)	**(2,062.50)**

- Mr.K should not support worker's demand as his overall earnings will decline with new system

13. Non Standard Plan

The present output details of a manufacturing department are:

Average output per week	48,000 units from 160 employees
Saleable value of output	Rs.6,00,000
Contribution	Rs.2,40,000

The Board of Directors plans to introduce more mechanization into the department at a capital cost of Rs.1,60,000. The effect of this will be to reduce the number of employees to 120, and increasing the output per individual employee by 60%. To provide the necessary incentive to achieve the increased output, the Board intends to offer a 1% increase on the piece work rate of Rs.1 per unit for every 2% increase in average individual output achieved. To sell the increased output, it will be necessary to decrease the selling price by 4%. Calculate the extra weekly contribution resulting from the proposed change.

Answer:

Computation of extra contribution from proposed change:

Particulars	Current system	Proposed System
1. Total Production	48,000	57,600 [480 x 120]
2. No of employees	160	120
3. Output per employee	300 [48,000/160]	480 [300 + 60%]
4. Selling Price	12.50	12 [12.50 – 4%]
5. Variable cost per unit	7.50 [12.50 – 5.00]	7.80
6. Contribution per unit	5.00 [2,40,000/48,000]	4.20 [12 – 7.80]
7. **Variable cost per unit:** Labour cost per unit Other VC per unit	7.50 1.00 6.50	7.80 1.30 6.50
8. Total Contribution (1 x 6)	2,40,000	2,41,920
9. **Extra weekly contribution**		**1,920**

14. Production bonus:

Calculate total monthly remuneration of three workers Ram, Shyam and Mohan from the following data:

- ❖ Standard production per month per worker 2,000 units. Actual production during the month – Ram 1700 units, Shyam 1500 units and Mohan 1,900 units
- ❖ Piece-work rate is Rs.2 per unit (actual production)
- ❖ Additional production bonus is Rs.100 for each percentage of actual production exceeding 80 percent actual production over standard
- ❖ Dearness allowance fixed at Rs.300 per month

Answer:

Particulars	Ram	Shyam	Mohan
1. Standard Production	2,000	2,000	2,000
2. Actual Production	1,700	1,500	1,900
3. Efficiency (Actual production/Standard Production)	85%	75%	95%
4. Efficiency exceeding 80%	5%	0%	15%
5. Bonus (Rs.100 for 1% efficiency exceeding 80%)	500	0	1,500
6. Basic wages (units produced x 2)	3,400	3,000	3,800
7. Dearness allowance	300	300	300
8. **Total earnings**	**4,200**	**3,300**	**5,600**

15. Earnings of workers:

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	Rs.100	Rs.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.

Answer:

WN 1: Computation of Labour cost:

Particulars	Worker A	Worker B
1. Basic wages	100	160
2. Dearness allowance	50	80
3. Employer contribution to PF	8	12.80
4. Employer contribution to ESI	2	3.20
5. Normal labour cost	**160**	**256**
6. Overtime cost	15	-
	[10 x (150/200) x 2]	
7. Total labour cost	**175**	**256**

WN 2: Computation of employee earnings:

Particulars	Worker A	Worker B
1. Basic wages	100	160
2. Dearness allowance	50	80
3. Overtime	15	0
4. Less: Employee contribution to PF	(8)	(12.80)
5. Less: Employee contribution to ESI	(2)	(3.20)
6. Employee's earnings	**155**	**224**

WN 3: Allocation of labour cost:

Particulars	Job X	Job Y	Job Z
1. Normal wages of Worker A	64	48	48
	[160 x 40%]	[160 x 30%]	[160 x 30%]
2. Overtime cost of worker A	-	15	-
3. Normal wages of Worker B	128	51.20	76.80
	[256 x 50%]	[256 x 20%]	[256 x 30%]
4. Total labour cost	**192.00**	**114.20**	**124.80**

16.   Annual cost of employee:

Following data have been extracted from the books of M/s. ABC Private Limited:

Salary (each employee, per month)	Rs.30,000
Bonus	25% of salary
Employer's contribution to PF, ESI etc.	15% of salary
Total cost at employees' welfare activities	Rs.6,61,500 per annum
Total leave permitted during the year	30 days
No of employees	175
Normal idle time	70 hours per annum
Abnormal idle time (due to failure of power supply)	50 hours
Working days per annum	310 days of 8 hours

You are required to calculate:
   a. Annual cost of each employee
   b. Employee cost per hour
   c. Cost of abnormal idle time, per employee

Answer:
WN 1: Computation of Annual Cost of each employee:

Particulars	Calculation	Amount
1. Salary	30,000 x 12	3,60,000
2. Bonus	25% x 3,60,000	90,000
3. Employer contribution to PF and ESI	15% x 3,60,000	54,000
4. Employee welfare activities	$\dfrac{6,61,500}{175}$	3,780
5. Annual cost of each employee		**5,07,780**

WN 2: Computation of effective working hours:

Particulars	Calculation	Amount
1. Working hours per annum	310 x 8	2,480
2. **Less:** Hours lost due to leave	30 x 8	(240)
3. **Less:** Normal idle time		(70)
4. Effective working hours		**2,170**

WN 3: Computation of employee cost per hour and cost of abnormal idle time:

Particulars	Calculation	Amount
1. Annual cost of each employee	WN 1	5,07,780
2. Effective working hours	WN 2	2,170
3. Employee cost per hour (1/2)		**234**
4. Cost of abnormal idle time (per employee)	50 x 234	**11,700**

17. Labour cost per man-day:

Assuming a man-day of 8 hours, you are required to calculate the labour cost per man-day. The following data has been provided.

Basic Salary	Rs.80 per day
Dearness allowance	80 paise per every point over 100 cost of living index for working class. Current cost of living index is 785 points
Leave salary	10% of basic salary and dearness allowance
Employer's contribution to PF	10% of basic salary, DA and Leave Salary
Employer's contribution to ESI	2.5% of basic salary, DA and Leave Salary
Expenditure on amenities to labour	Rs.30 per head per mensem
Number of working days in a month	25 days of 8 hours each

Answer:
Statement of Labour cost:

Particulars	Calculation	Amount
Basic salary		80
Dearness allowance (per day)	$(785 - 100) \times 0.80 \times \left(\dfrac{1}{25}\right)$	21.92
Leave salary	10% x (80 + 21.92)	10.19
Employer's contribution to PF	10% (80+21.92+10.19)	11.21
Employer's contribution to ESI	2.5% (80+21.92+10.19)	2.80
Expenditure on amenities	$\left(\dfrac{30}{25}\right)$	1.20
Labour cost per man-day		**127.32**

18. Group bonus

In a unit, 10 men work as a group. When the production exceeds the standard output of 200 pieces per hour, each man is paid an incentive for the excess production in addition to his wages at hourly rates. The incentive is at half the percentage, the excess production over the standard bears to the standard production. Each man is paid an incentive at the rate of this percentage on a wage rate of Rs.2 per hour.

There is no relation between the individual workman's rate and the bonus rate. In a week the hours worked are 500 hours and the total production is 1,20,000 pieces.

- Compute the total amount of bonus for the week
- Calculate the total earnings of two workers A and B of the group
    - A worked 44 hours and his basic rate is Rs.2.20
    - B worked 48 hours and his basic rate is Rs.1.90

Answer:

WN 1: Computation of group bonus:

Particulars	Calculation	Amount
1. Hours worked		500
2. Standard production	500 x 200	1,00,000
3. Actual production		1,20,000
4. Excess Production (2 – 3)		20,000
5. Excess Production as % of Std production	$\dfrac{20,000}{1,00,000}$ x 100	20%
6. Bonus % (Half of above %)		10%
7. Basic wages	500 x 2	1,000
8. Group Bonus	**1,000 x 10%**	**100**

WN 2: Computation of earnings of Worker A and Worker B:

Particulars	Worker A	Worker B
1. Basic wages	96.80	91.20
2. Bonus	8.80	9.60
	[10% x 44 x 2]	[10% x 48 x 2]
3. Total earnings	**105.60**	**100.80**

19. Computation of award payable

The company has a suggestion of box scheme and an award equivalent to one and a half months saving in labour cost is passed on to the employee whose suggestion is accepted. Suggestion of an employee to use a jig for a manufacturing operation of a component is accepted. The cost of the jig which has a useful life of one year is Rs.1,000 and the use of the jig will reduce the standard time by 8 minutes.

Compute from the following data the amount of award payable to the employee who has given the suggestion.

Number of pieces to be produced in a year	:	15,000	
Standard time per piece before use of jig	:	80 minutes	
Average wage rate of workmen Rs.160 per day for 8 hours			
Average efficiency of workmen	:	80%	

Answer:

Computation of amount of award:

Particulars	Existing	Revised
1. Standard Time	80 Mins	72 Mins
2. Efficiency %	80%	80%
3. Actual Time (1/2)	100 Mins	90 Mins
4. Units produced	15,000	15,000
5. Time Taken for 15,000 units (4 x 2)	25,000 hrs	22,500 hrs
6. Rate per hour (160/8)	20	20
7. Total labour cost (5 x 6)	5,00,000	4,50,000
8. Savings in Labour cost		50,000
9. Amount of award (50,000 x 1.5/12)		**6,250**

Note:

- Cost of Jig is not considered for computing savings. This is because award is equivalent to 1.5 months savings in Labour cost

20. Labour Turnover

From the following data provided by the Personnel department, calculate the labour turnover ratio by applying

- Separation method
- Replacement method
- Flux method

No of workers on payroll at the beginning is 450 and at the end of the month is 500.

During the month 5 persons left, 20 workers were discharged and 75 workers were recruited. Of these 15 workers are recruited in the vacancies of those leaving, while the rest were engaged for an expansion scheme.

Answer:

WN 1: Reconciliation of work force:

Particulars	Amount
1. Opening work force	450
2. Less: Separations	(25)
3. Add: Replacements	15
4. Add: New recruitments	60
5. Closing work force	**500**
6. Average work force (450+500)/2	**475**

WN 2: Computation of labour turnover rate under different methods:

Particulars	Formula	Calculation	Amount
1. Separation method	$\dfrac{\text{No of separations}}{\text{Average work force}} \times 100$	$\dfrac{25}{475} \times 100$	5.26%
2. Replacement Method	$\dfrac{\text{No of replacements}}{\text{Average work force}} \times 100$	$\dfrac{15}{475} \times 100$	3.16%
3. New Recruitment Method	$\dfrac{\text{No of new recruitments}}{\text{Average work force}} \times 100$	$\dfrac{60}{475} \times 100$	12.63%
4. Accession Method	$\dfrac{\text{Replacements + NR}}{\text{Average work force}} \times 100$	$\dfrac{75}{475} \times 100$	15.79%
5. Flux Method	$\dfrac{\text{Separations + Rep + NR}}{\text{Average work force}} \times 100$	$\dfrac{25 + 15 + 60}{475} \times 100$	21.05%

21. **Labour turnover**

The cost accountant of Y Limited has computed labour turnover rates for the quarter ended 31st March 2011 as 10%, 5% and 3% respectively under Flux Method, Replacement Method and Separation Method respectively. If the number of workers replaced during that quarter is 30, find the number of:

- Workers recruited and joined
- Workers left and discharged

Answer:

WN 1: Computation of Average Work Force:

$$\text{Labour Turnover under replacement method} = \frac{\text{No of replacements}}{\text{Average Work Force}} \times 100$$

$$5 = \frac{30}{\text{Average Work Force}} \times 100; \; 5 = \frac{3{,}000}{\text{Average Work Force}}$$

$$\textbf{Average Work Force} = \frac{\textbf{3,000}}{\textbf{5}} = \textbf{600 employees}$$

WN 2: Computation of workers left and discharged (Separations):

$$\text{Labour Turnover under separation method} = \frac{\text{No of separations}}{\text{Average Work Force}} \times 100$$

$$3 = \frac{\text{No of separations}}{600} \times 100; \; \text{No of separations} = \frac{3 \times 600}{100} = 18$$

Workers left and discharged = 18

WN 3: Computation of workers recruited and joined:

$$\text{Labour Turnover under Flux method} = \frac{\text{Separations + NR + Replacements}}{\text{Average Work Force}} \times 100$$

$$10 = \frac{18 + NR + 30}{600} \times 100$$

$18 + NR + 30 = \dfrac{10 \times 600}{100} = 60;$ **NR = 12**

- **Workers recruited and Joined = 12 + 30 = 42**

WN 4: Computation of Opening and Closing Work Force:

Particulars	Amount
1. Opening work force	X
2. Less: Separations	(18)
3. Add: Replacements	30
4. Add: New recruitments	12
5. Closing work force	X + 24
6. **Average work force**	$\dfrac{X + X + 24}{2} = 600$
7. **Opening Work force (X)**	**588**
8. **Closing Work Force (X + 24)**	**612**

22. Impact of labour turnover

The management of Sunshine Ltd. wants to have an idea of the profit lost/foregone as a result of labour turnover last year. Last year sales accounted to Rs. 66,00,000 and the P/V Ratio was 20%. The total number of actual hours worked by the direct labour force was 3.45 lakhs. As a result of the delays by the Personnel Department in filling vacancies due to labour turnover, 75,000 potential productive hours were lost. The actual direct labour hours included 30,000 hours attributable to training new recruits, out of which half of the hours were unproductive. The costs incurred consequent on labour turnover revealed on analysis the following:

Settlement cost due to leaving	27,420
Recruitment costs	18,725
Selection costs	12,750
Training costs	16,105

Assuming that the potential production lost due to labour turnover could have been sold at prevailing prices, ascertain the profit foregone/lost last year on account of labour turnover.

Answer:

WN 1: Computation of cost of labour turnover:

Particulars	Amount
1. Settlement cost	27,420
2. Recruitment cost	18,725
3. Selection cost	12,750
4. Training cost	16,105
5. Opportunity cost (WN 2)	3,00,000
Total cost	**3,75,000**

WN 2: Computation of opportunity cost:

Particulars	Amount
1. Sales	66,00,000
2. PVR	20%
3. Contribution (1 x 2)	13,20,000
4. No. of productive hours (3,45,000 – 15,000)	3,30,000
5. Contribution per productive hour (13,20,000/3,30,000)	4
6. No of hours lost (Note 1)	75,000
7. **Opportunity cost (4 x 75,000)**	**3,00,000**

Note 1:
- It is assumed that loss of 15,000 hours on training new recruits is unavoidable and hence not considered in hours lost

23. Overtime payment:

Jigyasa Ltd. pays a basic wage of Rs. 125 per hour to its production workers. The company works 6 days a week in a single shift of 8:00 AM. to 4:30 PM. The company also pays overtime to its workers apart from basic wages for work beyond its normal working hours. The overtime rule is as under:

(i)   No over-time is paid for any work upto 5:30 PM.

(ii)   Rs. 62.50 per hour for any work done after 5:30 PM.

(iii)   The Maximum over-time payment is restricted to Rs. 375 for a day, However, workers are paid Rs. 80 as diet allowance for work done beyond 8:30 PM.

(iv)   On Sunday or any holiday, workers are paid Rs. 375 provided they work atleast for 4 hours.

The extract of attendance of three workers is as follows:

Particulars	Worker – A	Worker – B	Worker – C
Monday	8:00 AM to 6:30 PM	8:00 AM to 7:30 PM	8:00 AM to 9:30 PM
Tuesday (Holiday)	8:00 AM to 5:30 PM	8:00 AM to 12:30 PM	Absent
Wednesday	8:00 AM to 10:30 PM	8:00 AM to 5:30 PM	8:00 AM to 11:30 PM
Thursday	8:00 AM to 4:30 PM	8:00 AM to 4:30 PM	8:00 AM to 4:30 PM
Friday	8:00 AM to 11:00 PM	8:00 AM to 4:30 PM	8:00 AM to 4:30 PM
Saturday	Absent	8:00 AM to 5:30 PM	8:00 AM to 7:30 PM
Sunday	Absent	8:00 AM to 1:30 PM	8:00 AM to 4:30 PM

Required:

(i) Calculate the amount of overtime and diet allowance payable to each worker.

(ii) Calculate the amount and accounting treatment of overtime and diet allowance in each case:

     a.   Worker A and C were involved in a specific job work assigned to them.

     b.   Overtime was due to under-estimation of sales demand provided by the sales department.

     c.   Overtime was due to make up a shortfall in production due to sudden demand.

Answer:

WN 1: Computation of overtime and Diet Allowance payable to each worker:

Part 1: Computation of eligible overtime hours and diet allowance

Particulars	Worker A		Worker B		Worker C	
	Overtime hours	Diet Allowance	Overtime hours	Diet Allowance	Overtime hours	Diet Allowance
Monday	1.0	No	2.0	No	4.0	Yes
Tuesday	6.0#	No	6.0	No	-	No
Wednesday	5.0	Yes	0.0	No	6.0	Yes
Thursday	0.0	No	4.0	Yes	3.0	No
Friday	5.5	Yes	0.0	No	0.0	No
Saturday	0.0	No	0.0	No	2.0	No
Sunday	0.0	No	6.0	No	6.0	No
Total	**17.50**	**2 times**	**18.0**	**1 time**	**21.0**	**2 Times**

Workers are paid Rs.375 in case workers work more than 4 hours. Worker A has worked for 9.5 hours on Tuesday and hence he would be eligible for Rs.375. 1 overtime hour is paid at Rs.62.50 and hence Rs.375 would translate into 6 hours of overtime

Part 2: Calculation of overtime and diet allowance amount:

Particulars	Overtime allowance	Diet Allowance	Total
Worker A	1,093.75 [62.50 x 17.50]	160.00 [80.00 x 2]	1,253.75
Worker B	1,125.00 [62.50 x 18]	80.00 [80.00 x 1]	1,205.00
Worker C	1,312.50 [62.50 x 21]	160.00 [80.00 x 2]	1,472.50
Total	**3,531.25**	**400.00**	**3,931.25**

WN 2: Accounting treatment of overtime and diet allowance:

Situation	Treatment
Worker A & C were involved in specific job assigned to them	• Overtime and diet allowance of Rs.2,726.25 payable to worker A and C shall be charged to the specific job and are treated as cost for the job • Overtime and diet allowance of Rs.1,205 to worker B can be charged as: • Cost of production as part of labour if it is due to labour shortage (or)

	• Cost of production as part of factory overhead, if it is irregular and to meet production requirement, which arises due to some uncontrollable developments (or) • Responsibility centre in fault or costing profit and loss account, if it is irregular and to meet production requirement, which arises due to some controllable developments
Overtime was due to over-estimation of sales demand provided by the sales department	• Overtime and diet allowance of Rs.3,931.25 shall be charged to sales department
Overtime was due to shortfall in production due to sudden demand	• Overtime and diet allowance of Rs.3,931.25 shall be charged to cost of production as factory overhead

Additional Problems for Practice

24. **Computation of earnings and hourly rate of wages:**

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 Rs.24 per hour. The total earnings of both the workers are same. Calculate normal hourly rate of wages of workman Baker.

Answer:

WN 1: Computation of normal hourly rate of wages of workman Baker:

Earnings under Halsey Plan:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Earnings under Rowan Plan:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour
- Let us assume rate per hour for Baker to be 'A'

Particulars	Andrew	Baker
1. Hours worked	60	80
2. Rate per hour	24	A
3. Basic wages (1 x 2)	1,440	80A
4. Standard Time	100	100
5. Time saved	40	20
6. Bonus	480	16A
7. **Wage cost/earnings [3 + 6]**	**1,920**	**96A**

Note:
- Total earnings are expected to remain same and hence we can equate same to calculate normal hourly rate of Baker
- Total earnings for Andrew = Total earnings for Baker
- 1,920 = 96A; A = 20
- Hence normal rate per hour for Baker is Rs.20 per hour

25. **Computation of earnings under Halsey and Rowan Plan:**

You are given the following information of a worker:
1. Name of worker   : Mr. Roger
2. Ticket No.   : 002
3. Work started   : 1-4-14 at 8 a.m.

4. Work finished : 5-4-14 at 12 noon
5. Work allotted : Production of 2,160 units
6. Work done and approved : 2,000 units
7. Time and units allowed : 40 units per hour
8. Wage rate : Rs.25 per hour
9. 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

Answer:
WN 1: Computation of earnings under Halsey and Rowan Plan:
Earnings under Halsey Plan:
  • Earnings = Basic wages + Bonus
  • Basic wages = (Hours worked x Rate per hour)
  • Bonus = 50% of time saved x Rate per hour

Earnings under Rowan Plan:
  • Earnings = Basic wages + Bonus
  • Basic wages = (Hours worked x Rate per hour)
  • Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Particulars	Halsey	Rowan
1. Hours worked (Note 1)	40	40
2. Rate per hour	25	25
3. Basic wages (1 x 2)	1,000	1,000
4. Standard Time (Note 2)	50	50
5. Time saved	10	10
6. Bonus	125	200
7. Wage cost/earnings [3 + 6]	1,125	1,200

Note:
  1. The normal working time is 9 hours per day. Hours worked = (4 days x 9 hours) + 4 hours = 40 hours
  2. **Computation of standard Time:**

Worker A
1 hour = 40 units
Standard time = Act output
? = 2,000 units
50 hours = 2,000 units

26. Computation of earnings under Rowan Plan:
Mr. Michael executes a piece of work in 120 hours as against 150 hours allowed to him. His hourly rate is Rs.10 and he gets a dearness allowance @ Rs.30 per day of 8 hours worked in addition to his wages.
You are required to calculate total wages received by Mr. Michael under Rowan Premium Plan
Computation of total wages of Mr. Michael:
Earnings under Rowan Plan:
  • Earnings = Basic wages + Bonus
  • Basic wages = (Hours worked x Rate per hour)
  • Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Particulars	Amount
1. Hours worked	120
2. Rate per hour	10
3. **Basic wages (1 x 2)**	1,200
4. Standard Time	150
5. Time saved	30
6. **Bonus [(1/4) x 5 x 2]**	240
7. **Dearness allowance [30 x (120/8)**	450

8. Total wages/earnings	1,890

27. Earnings under Halsey and Rowan Plan

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 Rs.10

Weekly working hours 40

Hourly wages rate Rs.40 (guaranteed)

Standard/normal time per unit 15 minutes.

Actual output for a week:

      Worker A: 176 pieces

      Worker B: 140 pieces

Under Halsey scheme, worker gets a bonus equal to 50% of Wages of time saved.

Calculate Earning of workers under Halsey's and Rowan's premium scheme.

Answer:

WN 1: Computation of earnings under Halsey Plan:

- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Computation of time saved:

Worker A	Worker B
15 mins = 1 unit	15 mins = 1 unit
Standard time = Act output	Standard time = Act output
? = 176 units	? = 140 units
2,640 mins = 176 units	2,100 mins = 140 units
44 hours = 176 units	35 hours = 140 units
Time saved = 4 hours	**Time saved = 0 hours**

Time saved = Standard Time – Actual Time

Particulars	Worker A	Worker B
1. Hours worked	40	40
2. Rate per hour	40	40
3. Basic wages (1 x 2)	1,600	1,600
4. Time saved	4	0
5. Bonus (50% x (4) x (2)]	80	0
6. Wage cost/earnings [3 + 5]	**1,680**	**1,600**

WN 2: Computation of earnings under Rowan system:

- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Particulars	Worker A	Worker B
1. Hours worked	40	40
2. Rate per hour	40	40
3. Basic wages (1 x 2)	**1,600**	**1,600**
4. Standard Time	44	35
5. Time saved	4	0
6. Bonus [(1/4) x 5 x 2]	**145.45**	**0**
7. Total wages/earnings	1,745.45	1,600

28. Computation of earnings under time rate, piece rate and Rowan:

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	Rs. 6	Rs. 5	Rs. 7.20
Production in units			
Product- P	21	-	60
Product- Q	36	-	135
Product -R	46	25	-
Standard time allowed per unit of each product is:			
	P	**Q**	**R**
Minutes	12	18	30

For the purpose of piece rate, each minute is valued at Rs.0.10
You are required to calculate the wages of each worker under:

      a. Guaranteed hourly rates basis
      b. Piece work earnings basis, but guaranteed at 75% of basic pay (guaranteed hourly rate) if his earnings are less than 50% of basic pay.
      c. Premium bonus basis where the worker receives bonus based on Rowan scheme.

Answer:
WN 1: Computation of earnings under time rate system:
Earnings under time rate system = (Hours worked x Rate per hour)

Particulars	Worker A	Worker B	Worker C
1. Hours worked	38	40	34
2. Rate per hour	6	5	7.20
3. **Total wages cost/employee earnings (1 x 2)**	**228**	**200**	**244.80**

WN 2: Computation of earnings under piece rate system:
Earnings under piece rate system = (Units produced x Rate per unit)

Rate per unit computation:

Product P	Product Q	Product R
1 minute = 0.10	1 minute = 0.10	1 minute = 0.10
12 minutes = 1.20	18 minutes = 1.80	30 minutes = 3.00

Particulars	Worker A	Worker B	Worker C
Product P			
1. Units produced	21		60
2. Rate per unit	1.20		1.20
3. **Earnings (1 x 2)**	**25.20**	**-**	**72.00**
Product Q			
4. Units produced	36	-	135
5. Rate per unit	1.80	-	1.80
6. **Earnings [4 x 5]**	**64.80**		**243.00**
Product R			
7. Units produced	46	25	-
8. Rate per unit	3.00	3.00	-
9. Earnings (7 x 8)	**138.00**	**75.00**	
10. **Total earnings [3+6+9]**	**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, earnings of the workers will be as follows:

- Worker A and C will be paid wages as Rs.228.00 and Rs.315.00 respectively
- Worker B has been paid less than 50% of basic pay (Rs.100) and therefore he would be paid Rs.150 (75% x Rs.200)

WN 3: Computation of earnings under Rowan Plan:

- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Computation of time saved:

Worker A	Worker B	Worker C
Product P:		**Product A:**
12 mins = 1 unit		12 mins = 1 unit
Standard time = Act output		Standard time = Act output
? = 21 units		? = 60 units
252 mins = 21 units		720 mins = 60 units
4.2 hours = 21 units		12 hours = 60 units
Product Q:		**Product B:**
18 mins = 1 unit		18 mins = 1 unit
Standard time = Act output		Standard time = Act output
? = 36 units		? = 135 units
648 mins = 36 units		2,430 mins = 135 units
10.80 hours = 36 units		40.50 hours = 135 units
Product R:	**Product R:**	
30 mins = 1 unit	30 mins = 1 unit	
Standard time = Act output	Standard time = Act output	
? = 46 units	? = 25 units	
1,380 mins = 46 units	750 mins = 25 units	
23 hours = 46 units	12.50 hours = 25 units	
Total ST = 38 hours	**Total ST = 12.50 hours**	**Total ST = 52.50 hours**
Time saved = 0 hours	**Time saved = 0 hours**	**Time saved = 18.50 hours**

Time saved = Standard Time – Actual Time

Particulars	Worker A	Worker B	Worker C
1. Hours worked	38	40	34
2. Rate per hour	6	5	7.20
3. Basic wages (1 x 2)	**228**	**200**	**244.80**
4. Standard Time	38	12.50	52.50
5. Time saved	0	0	18.50
6. Bonus [(1/4) x 5 x 2]	**0**	**0**	**86.26**
7. Total wages/earnings	**228**	**200**	**331.06**

29. Earnings under time rate, piece rate, Halsey and Rowan Plan:

Wage negotiations are going on with the recognised Labour Union and the Management wants you as the Cost Accountant of the Company to formulate an incentive scheme with a view to increase productivity. The case of three typical workers A,B and C who produce respectively 180, 120 and 100 units of the company's product in a normal day of 8 hours is taken up for study. Assuming that day wages would be guaranteed at 75 paise per hour and the piece rate would be based on a standard hourly output of 10 units, calculate the earnings of each of the three workers and the labour cost per 100 pieces under (i) Day wages, (ii) Piece rate, (iii) Halsey scheme, and (iv) The Rowan scheme.

Also calculate under the above schemes the average cost of labour for the company to produce100 pieces.

WN 1: Computation of earnings under time rate system:

Earnings under time rate system = (Hours worked x Rate per hour)

Particulars	Worker A	Worker B	Worker C	Total
1. Hours worked	8	8	8	
2. Rate per hour	0.75	0.75	0.75	
3. Total wages cost/employee earnings (1 x 2)	**6**	**6**	**6**	**18**
4. Units produced	180	120	100	400
5. Wage cost per unit (3/4)	**0.0333**	**0.05**	**0.06**	**0.045**
6. Wage cost per 100 units (5) x 100	**3.33**	**5.00**	**6.00**	**4.50**

WN 2: Computation of earnings under piece rate system:

Earnings under piece rate system = (Units produced x Rate per unit)

Rate per unit computation:

1 hour = 10 units
1 hour = 0.75

10 units = 0.75
1 unit = 0.075

Particulars	Worker A	Worker B	Worker C	Total
1. Units produced	180	120	100	400.00
2. Rate per unit	0.075	0.075	0.075	
3. **Total wages/earnings (1 x 2)**	**13.50**	**9.00**	**7.50**	**30.00**
4. **Wage cost per unit (3/1)**	**0.075**	**0.075**	**0.075**	**0.075**
5. **Wage cost per 100 units (4) x 100**	**7.50**	**7.50**	**7.50**	**7.50**

WN 3: Computation of earnings under Halsey scheme:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Computation of time saved:

Worker A	Worker B	Worker C
1 hour = 10 units	1 hour = 10 units	1 hour = 10 units
Standard time = Act output	Standard time = Act output	Standard time = Act output
? = 180 units	? = 120 units	? = 100 units
18 hours = 180 units	12 hours = 120 units	10 hours = 100 units
Time saved = 10 hours	**Time saved = 4 hours**	**Time saved = 2 hours**

Time saved = Standard Time – Actual Time

Particulars	Worker A	Worker B	Worker C	Total
1. Hours worked	8	8	8	
2. Rate per hour	0.75	0.75	0.75	
3. Basic wages (1 x 2)	6	6	6	
4. Time saved	10	4	2	
5. Bonus (50% x (4) x (2)]	3.75	1.50	0.75	
6. **Wage cost/earnings [3 + 5]**	**9.75**	**7.50**	**6.75**	**24.00**
7. Units produced	180	120	100	400.00
8. **Wage cost per unit [6/7]**	**0.0542**	**0.0625**	**0.0675**	**0.06**
9. **Wage cost per 100 units (8) x 100**	**5.42**	**6.25**	**6.75**	**6.00**

WN 4: Computation of earnings under Rowan system:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Particulars	Worker A	Worker B	Worker C	Total
1. Hours worked	8	8	8	
2. Rate per hour	0.75	0.75	0.75	
3. **Basic wages (1 x 2)**	**6.00**	**6.00**	**6.00**	
4. Standard Time	18	12	10	
5. Time saved	10	4	2	
6. **Bonus [(1/4) x 5 x 2]**	**3.33**	**2.00**	**1.20**	
7. **Total wages/earnings**	**9.33**	**8.00**	**7.20**	**24.53**
8. No of units	180	120	100	400
9. Wage cost per unit [7/8]	0.0518	0.0667	0.072	0.0613
10. **Wage cost per 100 units (9) x 100**	**5.18**	**6.67**	**7.20**	**6.13**

30. **Earnings under Halsey and Rowan Plan:**

The finishing shop of a company employs 60 direct workers. Each worker is paid Rs. 400 as wages per week of 40 hours. When necessary, overtime is worked 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 Rs.11 per unit and the direct material cost is Rs.8 per unit. The variable overheads amount to Rs.0.50 per direct labour hour and the fixed overhead is Rs.9,000 per week.

Prepare a statement to show the effect on the company's weekly profit of the proposal to introduce
  i.   Halsey Scheme, and
  ii. Rowan Scheme.

Answer:
WN 1: Computation of earnings under Halsey scheme:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Computation of time saved:

Standard Time:
1 hour = 6 units
Standard time = Act output
? = 19,200 units
3,200 hours = 19,200 units
Actual Time:
1 hour = 8 units
? = 19,200 units
2,400 hours = 19,200 units
Time saved = 3,200 – 2,400 = 800 hours

Particulars	Amount
1. Hours worked	2,400
2. Rate per hour (400/40)	10
3. Basic wages (1 x 2)	24,000
4. Time saved	800
5. Bonus (50% x (4) x (2)]	4,000
6. Wage cost/earnings [3 + 5]	**28,000**

WN 2: Computation of earnings under Rowan system:
- Earnings = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Particulars	Amount
1. Hours worked	2,400
2. Rate per hour	10
3. Basic wages (1 x 2)	**24,000**
4. Standard Time	3,200
5. Time saved	800
6. Bonus [(1/4) x 5 x 2]	**6,000**
7. Total wages/earnings	**30,000**

WN 3: Computation of profit of company:

Particulars	Existing	Halsey	Rowan
Sales revenues (19,200 x 11)	2,11,200	2,11,200	2,11,200
Material cost (19,200 x 8)	1,53,600	1,53,600	1,53,600
Direct wages (Note 1)	36,000	28,000	30,000
Variable overheads (Hours x 0.50)	1,600	1,200	1,200
Fixed Overheads	9,000	9,000	9,000

Profit	11,000	19,400	17,400

Note 1: Computation of direct wages:
- Total normal hours available = 2,400 hours (60 workers x 40 hours)
- Hours required under existing system = 3,200 hours
- Wages under existing system = (3,200 x 10) + (800 x 5) = 36,000 [Extra Rs.5 for overtime hours)
- No overtime wages needed under Halsey and Rowan Plan

31. Halsey Versus Rowan Scheme:

Jigyasa Boutiques LLP (JBL) takes contract on job work 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 two hours is allowed 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 pieces	42 pieces
Time taken	28 hours	40 hours

Workers are paid bonus according to Halsey scheme. The existing rate of wages is Rs.50 per hour. As per new wages agreement the workers will be paid Rs.55 per hour w.e.f 1st April 2014. At the end of March 2014 accountant of the company has calculated wages to these two workers taking Rs.55 per hour.

- From the following information calculate the amount of loss that the company has incurred due to incorrect rate selection
- What would have been the loss incurred by JBL due to incorrect rate selection if it had followed Rowan scheme
- Amount that could have been saved if Rowan scheme was followed
- Do you think Rowan scheme of bonus payment is suitable for JBL

Answer:

WN 1: Computation of loss made due to incorrect rate selection:
- Earnings under Halsey Scheme = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = 50% of time saved x Rate per hour

Computation of time saved:

Margaret	Jeniffer
2 hour = 1 unit	2 hour = 1 unit
Standard time = Act output	Standard time = Act output
? = 30 units	? = 42 units
60 hours = 30 units	**84 hours = 42 units**
Time saved = 60 hours – 28 hours = 32 hours	Time saved = 84 hours – 40 hours = 44 hours

Incorrect rate of Rs.55 per hour:

Particulars	Margaret	Jeniffer
1. Hours worked	28	40
2. Rate per hour (400/40)	55	55
3. Basic wages (1 x 2)	1,540	2,200
4. Time saved	32	44
5. Bonus (50% x (4) x (2)]	880	1,210
6. Wage cost/earnings [3 + 5]	**2,420**	**3,410**

Correct rate of Rs.50 per hour:

Particulars	Margaret	Jeniffer
1. Hours worked	28	40
2. Rate per hour (400/40)	50	50
3. Basic wages (1 x 2)	1,400	2,000
4. Time saved	32	44
5. Bonus (50% x (4) x (2)]	800	1,100

6.	Wage cost/earnings [3 + 5]	2,200	3,100
7.	Loss due to incorrect rate	220	310

WN 2: Computation of loss if Rowan Scheme was followed:
- Earnings under Rowan Plan = Basic wages + Bonus
- Basic wages = (Hours worked x Rate per hour)
- Bonus = $\frac{\text{Actual Time}}{\text{Standard Time}}$ x Time saved x Rate per hour

Incorrect rate of Rs.55:

Particulars	Margaret	Jeniffer
1. Hours worked	28	40
2. Rate per hour	55	55
3. Basic wages (1 x 2)	**1,540**	**2,200**
4. Standard Time	60	84
5. Time saved	32	44
6. Bonus [(1/4) x 5 x 2]	**821.33**	**1,152.38**
7. Total wages/earnings	**2,361.33**	**3,352.38**

Correct rate of Rs.50:

Particulars	Margaret	Jeniffer
1. Hours worked	28	40
2. Rate per hour	50	50
3. Basic wages (1 x 2)	**1,400**	**2,000**
4. Standard Time	60	84
5. Time saved	32	44
6. Bonus [(1/4) x 5 x 2]	**746.67**	**1,047.62**
7. Total wages/earnings	**2,146.67**	**3,047.62**
8. Loss due to incorrect rate	**214.66**	**304.76**

WN 3: Calculation of amount that could have been saved if Rowan Scheme were followed:
Savings using the rate which company has paid (Rs.55 per hour):

Particulars	Margaret	Jeniffer
1. Earnings under Halsey Plan	2,420	3,410
2. Earnings under Rowan Plan	2,361.33	3,352.38
3. Savings (2) –(1)	**58.67**	**57.62**

Savings using the rate which company should have paid:

Particulars	Margaret	Jeniffer
1. Earnings under Halsey Plan	2,200	3,100
2. Earnings under Rowan Plan	2,146.67	3,047.62
3. Savings (2) –(1)	**53.33**	**52.38**

Suitability of Rowan Scheme for Jigyasa Boutiques:
Rowan scheme has the following benefits and it most suitable for Jigyasa Boutiques LLP:
- 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 the worker is half of time allowed. As this fact is known to the workers, they work at a speed which helps them to maintain quality of output too
- 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

32. Computation of earnings
X' an employee of ABC Co. gets the following emoluments and benefits:
- a. Basic pay Rs.1,000 p.m.
- b. Dearness allowance Rs.200 p.m.
- c. Bonus 20% of salary and D.A.
- d. Other allowances Rs.250 p.m.

e. Employer's contribution to P.F. 10% of salary and D.A.

'X' works for 2,400 hours per annum, out of which 400 hours are non-productive and treated as normal idle time. You are required to find out the effective hourly cost of employee 'X'.

Computation of effective hourly cost:

Particulars	Calculation	Amount
1. Basic wages	1,000 x 12	12,000
2. Dearness allowance	200 x 12	2,400
3. Bonus	20% x (12,000 + 2,400)	2,880
4. Other allowances	250 x 12	3,000
5. Employer's contribution	10% x (12,000 + 2,400)	1,440
6. Total employee cost		**21,720**
7. Effective working hours		2,000
8. Effective hourly cost (6)/ (7)		**10.86**

33. Group bonus

A, B and C were engaged on a group task for which a payment of Rs.725 was to be made. A's time basis wages are Rs.8 per day, B's Rs.6 per day and C's Rs. 5 per day. A worked for 25 days; B worked for 30 days; and C for 40 days. Distribute the amount of Rs. 725 among the three workers.

Computation and distribution of bonus:

Particulars	Worker A	Worker B	Worker C	Total
1. Days worked	25	30	40	
2. Rate per day	8	6	5	
3. Basic wages	200	180	200	580
4. Total amount paid				725
5. Bonus (4)-(3)				145

- Group has earned bonus of Rs.145. The same would translate into 25 percent of basic wages
- Bonus of A = 200 x 25% = Rs.50
- Bonus of B = 180 x 25% = Rs.45
- Bonus of C = 200 x 25% = Rs.50

34. Group bonus

Both direct and indirect labours of a department in a factory are entitled to production bonus in accordance with a group incentive scheme, the outline of which is as follows:

A. For any production in excess of the standard rate fixed at 16,800 tonnes per month (of 28 days) a general incentive of Rs.15 per tonne is paid in aggregate. The total amount payable to each separate group is determined on the basis of an assumed percentage of such excess production being contributed by it, namely @ 65% by direct labour, @ 15% by inspection staff, @ 12% by maintenance staff and @ 8% by supervisory staff.

B. Moreover, if the excess production is more than 20% above the standard, direct labour also get a special bonus @ Rs.5 per tonne for all production in excess of 120% of standard.

C. Inspection staff are penalized @ Rs.20 per tonne for rejection by customer in excess of 2% of production.

D. Maintenance staff are also penalized @ Rs. 20 per hour for breakdown.

From the following particulars for a month, work out production bonus earned by each group:

A. Actual working days   : 25
B. Production   : 21,000 tonnes
C. Rejection by customer   : 500 tonnes
D. Machine breakdown   : 40 hours

Answer:

WN 1: Computation of general bonus:

Particulars	Amount
1. Actual Production	21,000
2. No of days worked	25
3. Standard production per day (16,800/28)	600
4. Standard production for 25 days (25 x 600)	15,000
5. Excess production (1) – (4)	6,000

6. Incentive for excess production (6,000 x 15)		90,000
7. 120 percent of standard production (15,000 x 120%)		18,000
8. Excess production over 120% of standard production		3,000
9. Incentives for excess production over 120% of standard production (3,000 x 5)		15,000

WN 2: Distribution of incentive and computation of bonus for different groups:

Particulars	Direct Labour	Inspection staff	Maintenance staff	Supervisory staff
1. General incentive (90,000 split as 65%,15%,12% and 8%)	58,500	13,500	10,800	7,200
2. Incentive for production above 120% of standard production	15,000			
3. Penalty for rejections (Note 1)		(1,600)		
4. Penalty for maintenance (Note 2)			(800)	-
5. Total bonus	73,500	11,900	10,000	7,200

Note 1: Computation of Penalty for Rejections:
- Normal rejections = 2% of 21,000 = 420 tonnes
- Actual rejections = 500 tonnes
- Excess rejections = 80 tonnes
- Penalty for excess rejections = 80 x 20 = Rs.1,600

Note 2: Computation of Penalty for maintenance:
- Breakdown hours = 40
- Penalty = 40 hours x 20 = Rs.800

35. Computation of overtime:

It is seen from the job card for repair of the customer's equipment that a total of 154 labour hours have been put in as detailed below: In terms of an award in a labour conciliation, the workers are to be paid dearness allowance on the basis of cost of living index figures relating to each month which works out @ Rs.968 for the relevant month. The dearness allowance is payable to all workers irrespective of wages rate if they are present or are on leave with wages on all working days.

	Worker 'A' paid at Rs. 200 per day of 8 hours	Worker 'B' paid at Rs. 100 per day of 8 hours	Worker 'C' paid at Rs. 300 per day of 8 hours
Monday (hours)	10.5	8.0	10.5
Tuesday (hours)	8.0	8.0	8.0
Wednesday (hours)	10.5	8.0	10.5
Thursday (hours)	9.5	8.0	9.5
Friday (hours)	10.5	8.0	10.5
Saturday (hours)	--	8.0	8.0
Total (hours)	49.0	48.0	57.0

Sunday is a weekly holiday and each worker has to work for 8 hours on all week days and 4 hours on Saturdays; the workers are however paid full wages for Saturday (8 hours for 4 hours worked).

Workers are paid overtime according to the Factories Act, 1948. Excluding holidays the total number of hours works out to 176 in the relevant month. The company's contribution to Provident Fund and Employees State Insurance Premium are absorbed into overheads. Work out the wages payable to each worker

WN 1: Computation of normal hours and overtime hours for worker A, B and C:
- A worker is entitled to overtime when he works for more than 9 hours a day or more than 48 hours in a week.
- Overtime will be paid at double the rate of normal time

Worker A:

Particulars	Normal Time	Overtime
Monday	9.00	1.50
Tuesday	8.00	0.00

Wednesday	9.00	1.50
Thursday	9.00	0.50
Friday	9.00	1.50
Total	**44.00**	**5.00**

Total hours payable = Normal time + (overtime x 2) = 44 hours + (5 hours x 2) = 54 hours

Worker B:

Particulars	Normal Time	Overtime
Monday	8.00	0.00
Tuesday	8.00	0.00
Wednesday	8.00	0.00
Thursday	8.00	0.00
Friday	8.00	0.00
Saturday	8.00	0.00
Total	**48.00**	**0.00**

Total hours payable = Normal time + (overtime x 2) = 48 hours + (0 hours x 2) = 48 hours

Worker C:

Particulars	Normal Time	Overtime
Monday	9.00	1.50
Tuesday	8.00	0.00
Wednesday	9.00	1.50
Thursday	9.00	0.50
Friday	9.00	1.50
Saturday	4.00	4.00
Total	**48.00**	**9.00**

Total hours payable = Normal time + (overtime x 2) = 48 hours + (9 hours x 2) = 66 hours

WN 2: Computation of wages payable:

Particulars	Worker A	Worker B	Worker C
1. Basic wages per hour (200/8); (100/8); (300/8)	25.00	12.50	37.50
2. Dearness allowance per hour (968/176)	5.50	5.50	5.50
3. Hourly rate	30.50	18.00	43.00
4. Number of hours	54.00	48.00	66.00
5. Total wages payable	**1,647.00**	**864.00**	**2,838.00**

36. Treatment of Overtime Premium:

In a factory, the basic wage rate is Rs.10 per hour and overtime rates are as follows :

Before and after normal working hours	: 175% of basic wage rate
Sundays and holidays	: 225% of basic wage rate

During the previous year, the following hours were worked :

Normal time	: 1,00,000 hours
Overtime before and after working hours	: 20,000 hours
Overtime on Sundays and holidays	: 5,000 hours
Total	: 1,25,000 hours
The following hours have been worked on job 'Z'	:
Normal	: 1000 hours.
Overtime before and after working hrs.	: 100 hours.
Sundays and holidays	: 25 hours.
Total	: 1125 hours.

You are required to calculate the labour cost chargeable to job 'Z' and overhead in each of the following instances:

        a. Where overtime is worked regularly throughout the year as a policy due to the labour shortage.

        b. Where overtime is worked irregularly to meet the requirements of production.

        c. Where overtime is worked at the request of the customer to expedite the job

Answer:

Treatment of overtime premium:
- If overtime is worked as a policy = Calculate average inflated wage rate including overtime premium and consider the same on number of hours
- If overtime is irregular to meet the production requirement = Consider overtime as a factory overhead and charge the same to the job
- If overtime is to meet the request of the customer = Charge the actual amount paid as wages to the customer

WN 1: Computation of average inflated wage rate:

Particulars	Normal Time	Overtime on weekdays	Overtime on Sundays and holiday	Total
Hrs worked	1,00,000	20,000	5,000	1,25,000
Rate per hour	10	17.50	22.50	11.70#
Total cost	10,00,000	3,50,000	1,12,500	14,62,500

Average inflated wage rate = 14,62,500/1,25,000 = 11.70

WN 2: Treatment of overtime:
Situation 1: When overtime is worked regularly as a policy due to labour shortage:
- Overtime premium is considered as part of cost of labour cost and job is charged at an inflated wage rate
- **Labour cost = 1,125 hours x 11.70 = 13,162.50**

Situation 2: When overtime is worked irregularly to meet requirements of production:
- Basic wage rate is chargeable to job and overtime premium is treated as factory overheads

Particulars	Amount
Labour cost of job (1,125 hours x 10)	11,250
Factory overheads: 100 hours x (17.50 – 10) = 750 25 hours x (22.50 – 10) = 312.50	1,062.50

Situation 3: When overtime is worked at the request of customer:
- Overtime premium is charged to job as wages

Particulars	Amount
Basic wages cost of job (1,125 hours x 10)	11,250
Overtime premium (treated as part of wages) 100 hours x (17.50 – 10) = 750 25 hours x (22.50 – 10) = 312.50	1,062.50
Total wages cost	**12,312.50**

37. **Computation of effective wage rate per hour:**

A worker is paid Rs.1000 per month and a dearness allowance of Rs. 200 p.m. Worker contribution to provident fund is @ 10% and employer also contributes the same amount as the employee. The Employees State Insurance Corporation premium is 6.5% of wages of which 1.75% is paid by the employees. It is the firm's practice to pay 2 months' wages as bonus each year.

The number of working days in a year are 300 of 8 hours each. Out of these the worker is entitled to 15 days leave on full pay. Calculate the wage rate per hour for costing purposes.

Answer:
Computation of wage rate per hour:

Particulars	Calculation	Amount
1. Basic wages	1,000 x 12	12,000
2. Dearness allowance	200 x 12	2,400
3. PF contribution (Note 1)	10% of 14,400	1,440
4. ESI contribution (Note 1)	4.75% of 14,400	684
5. Bonus (Note 1)	2/12 x 14,400	2,400
6. Total employee cost		**18,924**
7. Effective working hours	285 x 8	2,280
8. Effective hourly cost (6)/ (7)		**8.30**

Note:
1. It is assumed that PF contribution, ESI contribution and bonus is based on basic wages + Dearness allowance

38. Allocation of wages

In a factory working six days in a week and eight hours each day, a worker is paid at the rate of Rs. 100 per day basic plus D.A. @ 120% of basic. He is allowed to take 30 minutes off during his hours shift for meals-break and a 10 minutes recess for rest. During a week, his card showed that his time was chargeable to :

Job X	15 hrs.
Job Y	12 hrs.
Job Z	13 hrs.

The time not booked was wasted while waiting for a job. In Cost Accounting, how would you allocate the wages of the workers for the week?

Answer:

WN 1: Computation of time wasted:

Particulars	Amount
1. Working time per day	8 hours
2. Time lost per day	40 mins
3. Effective working time per day	440 mins
4. Effective working time per week (440 mins x 6)	2,640 mins (or) 44 hours
5. Time booked (15+12+13)	40 hours
6. Time wasted (44 hours – 40 hours)	**4 hours**
7. Wages paid (48 hours x 30)	**1,440**

WN 2: Allocation of wages paid:

Particulars	Amount
1. Allocated to Job X [1,440/44 x 15]	490.91
2. Allocated to Job Y [1,440/44 x 12]	392.73
3. Allocated to Job Z [1,440/44 x 13]	425.45
4. Allocated to costing P&L [1,440/44 x 4]	130.91
5. Total wages paid	**1,440**

i.   What is overheads cost? **[Category B]**
❖   Overheads are the expenditure which cannot be conveniently traced to or identified with any particular cost unit.
❖   Overheads are incurred for output generally and not for any particular work order
❖   Overheads also represent expenses that have been incurred in providing certain ancillary facilities or services which facilitate the production process

ii. What are the various classification of overheads?

Classification by Function: [Category B]		
Factory overheads: ❖ Factory overheads is the indirect cost incurred for manufacturing activity ❖ It includes all indirect expenses incurred from procurement of material to completion of production ❖ **Example:** Stock-keeping expenses, Repairs & maintenance of plant	**Administrative overheads:** ❖ Expenditure incurred on all activities relating to general management and administration ❖ It will include all expenses which is not related directly to production, selling, distribution, research or development activity ❖ **Example:** Salary paid to office staff, Depreciation of office building	**Selling & Distribution Overheads:** ❖ Expenses related to sale of products and include all indirect expenses in sales management ❖ Distribution cost which include all expenses for making the product available for sale in market ❖ **Example:** Salesman Commission, Advertisement cost, Delivery van expenses
Classification by Nature: [Category A]		
Fixed Overheads: ❖ Fixed overheads are those expenses that remain unaffected by fluctuations in the levels of production ❖ **Example:** Depreciation, Insurance	**Variable Overheads:** ❖ These costs tend to vary with the volume of production ❖ **Example:** Power, tools and spares	**Semi-variable Overheads:** ❖ These costs contain both fixed and variable components and hence are partly affected by fluctuations in the level of activity ❖ **Example:** Electricity cost, Repairs & Maintenance
Classification by Element: [Category B]		
Indirect Material: ❖ Material which do not normally form part of the finished product ❖ **Example:** Stores used for machines, consumables for machines	**Indirect Labour:** ❖ Labour costs which cannot be directly allocated to cost units ❖ **Example:** Salary paid to foreman, salary for administrative staff	**Indirect expenses:** ❖ Expenses which cannot be directly allocated to cost centre ❖ **Example:** Rent & rates, Insurance, Depreciation
Classification by Controllability [Category A]		
Controllable costs: ❖ Costs which can be controlled by the implementation of appropriate managerial influence and policies ❖ **Example:** Material costs, Wages & Salaries	**Uncontrollable costs:** ❖ Costs which cannot be controlled even after implementation of appropriate managerial influence and policies ❖ **Example:** Rent & rates, Depreciation	

iii. What are the advantages of classifying overheads into fixed and variable? **[Category B]**
❖   **Controlling expenses:** Classification of expenses into fixed and variable helps in controlling expenses. Fixed costs are generally unavoidable and hence cannot be controlled whereas variable costs are generally avoidable and hence can be controlled
❖   **Preparation of budget:** Fixed and variable cost classification is required for preparation of flexible budget. Cost classification can help in identifying the cost at various levels of activity
❖   **Decision making:** Decision like price to be charged, shut-down of factory, introduction of new product, acceptance of new contract can be done with accurate cost classification.

iv.   What is allocation, apportionment and absorption of overheads? **[Category B]**

Term	Meaning
Cost Centre	Location, Machinery, Individual or department with reference to which costs are collected
Apportionment	Distribution of costs to various cost centres and profits centres (production department) on suitable basis
Allocation	Allotting whole item of cost to a cost centre or a profit centre
Primary overhead distribution	The overheads of the company are distributed to the production departments and service department either by a process of allocation or apportionment
Secondary overhead distribution	The total cost of the service department including its direct cost are transferred to the production department
Profit centre	Centre that generates revenues or profits
Cost driver	It is the factor which drives or causes a cost to take place
Absorption	It is a process by which the overheads of the company are charged to the jobs on the basis of the resources consumed

v.   How to compute cost of a job? **[Category B]**
   ❖ **Step 1:** Prepare primary overhead distribution statement
   ❖ **Step 2:** Prepare secondary overhead distribution statement
   ❖ **Step 3:** Compute overhead absorption rate using the formula
      o   OAR = Budgeted overheads/Budgeted suitable base
   ❖ **Step 4:** Compute cost of the job using the following format:

Particulars	Amount
Direct Material	XXX
Direct Labour	XXX
Overheads (OAR * Actual suitable base)	XXX
Total cost	**XXX**
Profit	XXX
Selling Price	**XXX**

vi.   What is the basis of absorbing different overheads? **[Category A]**

Overhead cost	Bases of apportionment
❖ Rent and Building expenses ❖ Lighting and heating ❖ Fire precaution service ❖ Air-conditioning	Floor area, or volume of department
❖ Perquisites ❖ Labour welfare expenses ❖ Time-keeping ❖ Personnel office ❖ Supervision	Number of workers
❖ Compensation to workers ❖ Holiday pay ❖ ESI and PF contribution ❖ Perquisites	Direct wages
❖ General overhead	Direct labour hour or Direct wages or Machine hours
❖ Depreciation of plant and machinery ❖ Repairs and maintenance of plant and machinery ❖ Insurance of stock	Capital values
❖ Power/steam consumption ❖ Internal transport ❖ Management salaries	Technical estimates
❖ Lighting expenses (light)	No of light points or Area of Metered units

❖ Electric Power (Machine Operation)	HP of machines * Machine hours or Horse value of machines or Number of machine hour or value of machines or units consumed
❖ Material handling ❖ Stores overhead	Weight of materials or volume of materials or value of materials or unit of materials

vii. What is the basis of Re-apportionment of service department expenses over production department? **[Category A]**

Service Department	Basis
❖ Maintenance and repair shop ❖ Planning and progress ❖ Tool room	Direct labour hours, machine hours, Direct wages, Asset value * hours worked
❖ Canteen and welfare ❖ Hospital and dispensary ❖ Personnel department	No of employees
❖ Time-keeping	No of cards punched, No of employees
❖ Computer section	Computer hours
❖ Power house (lighting)	No of light points or floor area
❖ Power house (Power)	Horse Power * Machine hours, Horse Power, KWH
❖ Stores department	No of requisitions, weight or value of materials used
❖ Transport department	Crane hours, truck hours
❖ Fire protection	Capital values
❖ Inspection	Inspection hours

viii. What are the methods for re-apportionment of overheads (Secondary overhead distribution)? **[Category A]**
- ❖ Direct re-distribution method
- ❖ Step method or non-reciprocal method
- ❖ Reciprocal service method
  - o Simultaneous equations method
  - o Trial and error method
  - o Repeated distribution method

ix. How does direct re-distribution method work? **[Category B]**
- ❖ This method is used when one service department does not serve another service department
- ❖ The cost of service department (including direct cost of service department) is distributed to the various production departments
- ❖ The sequence in which the cost of the service department is taken up for distribution is not relevant

x. Explain Step method or non-reciprocal method? **[Category B]**
- ❖ This is used when one service department serves another service department but in turn is not served by the other service department
- ❖ The sequence of service department taken up for distribution is important
- ❖ The service department which has served the maximum number of service departments is taken up first for distribution. In case there is a tie in the number of departments served then the ranking is done on the basis of the percentage of service offered
- ❖ Once the cost of service department has been served out, there will be no service back to the department

xi. Explain Simultaneous equations method in detail? **[Category B]**
- ❖ This method is used when one service department serves the other department and is in turn served by the other department
- ❖ Following steps are to be used in this method:
  - o **Step 1:** Let the total cost of S1 after all transfers be X and the total cost of S2 after all transfers be Y
  - o **Step 2:** Following equations are made:

- X = Primary overhead of S1 + Direct cost of S1 + % transfer from S2
- Y = Primary overhead of S2 + Direct cost of S2 + % transfer from S1
  - o **Step 3:** Solve the two equations and get X and Y
  - o **Step 4:** Distribute the amount of X and Y to the other departments in the specified ratio

xii.   How does repeated distribution method work? **[Category B]**
- ❖ This method is used when one service department serves the other department and is in turn served by the other department
- ❖ Following steps are to be used in this method:
  - o **Step 1:** Distribute the total cost of S1 to all production departments and to the other department which it serves. This reduces the value of S1 to Zero
  - o **Step 2:** Distribute the revised total cost of S2 to all departments and to the other service department it serves. This reduced the value of S2 to Zero
  - o **Step 3a:** While the cost of S1 was reduced to zero in step 1 it has now attained a value on account of distribution from S2. This cost must be redistributed to all production and other service department which it serves
  - o **Step 3b:** While the cost of S2 was reduced to zero in step 2 it has now attained a value on account of distribution from S1. This cost must be redistributed to all production and other service department which it serves
  - o **Step 4:** Repeat step 3 a number of times until the values of S1 and S2 become insignificant

xiii.   Explain the working of Trial and error method? **[Category C]**
- ❖ This method is used when one service department serves the other department and is in turn served by the other department
- ❖ **Step 1:** Distribute the cost of S1 department to the other service department to the extent of its share
- ❖ **Step 2:** Distribute the revised cost of S2 department to the other department to the extent of its share
- ❖ **Step 3:** Redistribute the cost between S1 and S2 until the values of both department become insignificant
- ❖ **Step4:** Compute the sum of distributed amount. This amount will be same as X and Y of simultaneous equations method
- ❖ **Step 5:** Distribute the amount of X and Y to the other departments in the specified ratio

xiv.   What are the various methods of absorbing overheads to various products? **[Category A]**
- ❖ The method selected for charging overheads should ensure the following:
  - ✓ Overheads charged (or recovered) in a period does not differ materially from the actual expenses incurred in the period
  - ✓ Amount charged to individual jobs or products is equitable
- ❖ Following are the commonly used method for absorbing overheads:
  - ✓ Percentage of direct materials
  - ✓ Percentage of prime cost
  - ✓ Percentage of direct labour cost
  - ✓ Labour hour rate
  - ✓ Machine hour rate and
  - ✓ Rate per unit of output

Formula for overhead absorption rate = Budgeted overheads
$$\text{Formula for overhead absorption rate} = \frac{\text{Budgeted overheads}}{\text{Budgeted suitable base}}$$

xv.   Explain machine hour rate method in detail? **[Category B]**
- ❖ Machine hour rate method is the most popular method of absorbing overheads and the same is calculated with the following formula
- ❖ OAR = Budgeted overheads / Effective machine hours

Steps for computation of machine hour rate:
- ❖ **Step 1:** Compute budgeted overheads relatable to the machine
- ❖ **Step 2:** Compute effective machine hours.

❖ **Step 3:** Compute machine hour rate. MHR = Step 1/Step 2

xvi. How is multiple machine hour rate calculated? **[Category B]**
   ❖ Comprehensive machine hour rate includes the cost of wages attributable to the working of the machine
   ❖ When a machine performs two different operations in respect of which costs are consumed differently, each operation of the machine will have different machine hour rate
   ❖ **Example:** A printer can do either colour or black & white printing. The charges for colour printing will be different while the charges for black & white printing will be different as the resourced consumed are different

Steps in computation of multiple machine hour rate:
   ❖ **Step 1:** Compute common cost – Common costs are those cost which are commonly and jointly incurred across various operations
   ❖ **Step 2:** Compute specified cost – Specific cost refers to those cost which is specifically incurred for one operation or one in respect of which the cost per hour is different for two activities
   ❖ **Step 3:** Compute specific hours – Specific hours refer to total number of hours spent on each operation
   ❖ **Step 4:** Compute common hours – Common hours means the number of hours across which the common cost is to be distributed. It is the total of specific hours

> **MHR = Common cost/hour + Specific cost/hour**
> **Common cost/hour = Common costs/common hours**
> **Specific cost/hour = Specific costs/specific hours**

xvii. What are the different types of overhead rates? **[Category B]**

Normal rate	This rate is calculated by dividing the actual overheads by actual base Normal OH rate = Actual OH / Actual base
Pre-determined overhead rate	This rate is determined in advance by estimating the amount of OH for the period in which it is used. Pre-determined rate = Budgeted OH / Budgeted base
Blanket overhead rate	This refers to the computation of one single overhead rate for the whole factory Blanket rate = Total OH / Total base
Department overhead rate	It refers to the computation of one single overhead rate for a particular production unit or department Departmental rate = Departmental OH / Departmental base

xviii. Explain the treatment of under/over absorption of overheads? **[Category A]**
   ❖ Overhead expenses are usually applied to production on the basis of pre-determined rates. However the actual rate is determined at the end of the year and there can be variation between the actual rate and pre-determined rate
   ❖ Variation between actual rate and pre-determined rate will lead to under/over absorption of overheads at the end of the year
   ❖ Treatment of under/over absorption is presented below:

When under/over absorption is very small	Transfer the entire amount to costing profit & loss account
Large under/over absorption due to abnormal reasons	Transfer the entire amount to costing profit & loss account
Large under/over absorption due to normal reasons	Calculate supplementary recovery rate (SRR) and charge the amount to units sold, units unsold and units in process SRR = **Amount of normal under-absorption** **Units produced (including WIP)**

Note: Under/over absorption overheads can also be carried forward to the next year and recovered in the next year

xix. Explain the accounting treatment of administrative overheads? **[Category B]**
   ❖ Administrative overhead constitutes the expenses incurred in connection with activities which cannot be directly related to production, marketing, research or development

❖ Following are the three methods of accounting for administrative overheads:

Apportioning between production and sales	✓ Apportion the admin OH to the production and sales departments as these two departments are benefitted out of administration department ✓ Under this method admin OH loses its identity and gets merged with production and selling overheads
Charging to costing P&L account	✓ Under this method the entire amount of admin OH is transferred to costing P&L. This is because admin OH is not directly linked to sales and production activity and hence difficult to find suitable basis for distributing the overheads
Treating admin OH as a separate addition to cost of production/sales	✓ Under this method the admin OH are shown as a separate cost item while preparing the cost sheet and the amount is not merged with production/sales activity

xx.   What are the ways to Control Administrative Overheads? **[Category C]**
✓ Admin OH are generally fixed in nature and hence are non-controllable. However we cannot allow admin OH to increase disproportionately and hence some degree of control is to be exercised on them
✓ Admin OH can be controlled through following ways
  o Classification and analysis of overheads by administrative departments according to their functions and a comparison with accomplished results
  o Control through budgets
  o Control through standard

xxi.   Explain the accounting treatment of selling and distribution overheads? **[Category B]**
❖ Selling expenses are those expenses which are incurred for the purpose of promoting the marketing and sales of different products. Distribution expenses are those expenses that are related to delivery and dispatch of goods
❖ Selling overheads are to be apportioned to various products/services on appropriate basis such as units sold, value of sales, no of salesman among others

xxii.   What are the ways to Control selling and distribution OH? **[Category C]**
✓ Controlling selling and distribution OH is a difficult task as these expenses are normally incurred based on external factors
✓ Selling and distribution OH can be controlled through following ways
  o Comparison with past performance
  o Budgetary control
  o Standard costing

xxiii.   What are the different forms of capacity? [Category A]

Installed/rated capacity	✓ Maximum capacity of producing goods or providing services ✓ It is also known as theoretical capacity as the same cannot be achieved in normal operating circumstances
Practical capacity	✓ Practical capacity takes into account loss of time due to repairs, maintenance, minor breakdown among others ✓ It is also called as net capacity or available capacity
Normal capacity	✓ Normal capacity is the volume of production or services achieved or achievable on an average over a period under normal circumstances. This is calculated based on expected sales
Actual capacity	✓ It is the capacity actually achieved during a given period
Idle capacity	✓ It is that part of the capacity of a plant which cannot be effectively utilized in production
Normal idle capacity	✓ Difference between installed capacity and normal capacity
Abnormal idle capacity	✓ Difference between normal capacity and actual capacity

xxiv.   What is the accounting Treatment of idle capacity cost? **[Category A]**

Idle capacity cost due to unavoidable reasons such as Repairs & maintenance, changeover of job	Use supplementary overhead rate to recover the idle capacity cost
Idle capacity cost due to unavoidable reasons such as faulty planning, power failure	Charge to costing profit & loss account
Idle capacity cost due to seasonal factors	Charge to cost of production by inflating overhead rates

xxv.   Explain the accounting treatment of certain special items?

Depreciation **[Category B]**	✓ Depreciation is the diminution in the value of asset due to use/lapse of time ✓ Depreciation is to be treated as indirect cost and traced to the appropriate function
Packing expenses **[Category B]**	✓ Primary packing is to be treated as part of cost of production and the secondary packing is to be treated as selling overhead
Fringe benefits **[Category A]**	✓ Fringe benefits are extra benefits given to employees apart from their salary and allowances ✓ If the value of fringe benefits is very large then the same to be treated as part of direct wages ✓ If the benefits are not large then the same can be treated as part of production overheads
Bad debts **[Category B]**	✓ Bad debt can be treated in two different ways ✓ One view is that it is related to sales activity and hence to be treated as selling overhead ✓ Another view is that it is related to financial loss and hence therefore should not be included in the cost of a particular job or product
Training expenses **[Category B]**	✓ Training expenses are necessary to provide the requisite skills to the employees ✓ Training expense should be traced to the appropriate function and can be treated as factory/administrative/selling overhead
Canteen expenses **[Category B]**	✓ Canteen expense should be traced to the appropriate function and can be treated as factory/administrative/selling overhead
Carriage and cartage expenses **[Category B]**	✓ Expenses relating to transportation of direct material (incoming) be treated as part of direct material cost ✓ Expenses relating to transportation of indirect material (incoming) be treated as part of factory overhead ✓ Expenses relating to transportation of finished goods (outgoing) be treated as part of selling overhead
Expenses for welfare activities **[Category B]**	✓ Expenses incurred on welfare activities are part of general overheads and should be distributed between factory, office and selling function on the basis of number of employees
Night shift allowance **[Category A]**	✓ Workers in the factories which operate during night time are paid some extra amount known as night shift allowance ✓ If this is due to normal reasons then it can be treated as part of direct wages ✓ If this is incurred due to some specific customer then the same is to be charged to the concerned customer ✓ If night shifts are due to abnormal reasons then the same is to be charged to costing profit & loss account
Research and Development expenses **[Category A]**	✓ Research refers to the expenses incurred for searching a new or improved product, new application of materials or new or improved methods ✓ Research is treated either as production/administration/selling OH depending on the function for which research is undertaken ✓ Development expense are incurred in connection with a particular product and should be charged directly to the product. It will be treated as a deferred revenue expenditure and recovered as a cost per unit of the product when production is fully established

| Practical Problems |

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1. **Segregation of costs into fixed and variable**

Following information is available for the first and second quarter of the year 2008-09 of ABC Limited

	Production (in units)	Semi-variable cost (Rs)
Quarter 1	36,000	2,80,000
Quarter 2	42,000	3,10,000

You are required to segregate the semi-variable cost and calculate:

- Variable cost per unit and
- Total fixed cost

Answer:

$$\text{Variable cost per unit} = \frac{\text{Change in Total Cost}}{\text{Change in units}} = \frac{3,10,000 - 2,80,000}{42,000 - 36,000} = \frac{30,000}{6,000} = \text{Rs. 5 per unit}$$

Total cost for 36,000 units = Total Variable cost for 36,000 units + Total Fixed cost
$2,80,000 = (36,000 \times 5) + \text{Total Fixed cost}$; Total Fixed cost $= 2,80,000 - 1,80,000 = \text{Rs. 1,00,000}$

Final Solution:

- Variable cost per unit = Rs.5 per unit
- Total Fixed Cost = Rs.1,00,000

2. **Direct distribution method**

A company has three production departments (M1, M2 and A1) and three service department, one of which Engineering service department, servicing the M1 and M2 only. The hours required to produce one unit are as follows:

Product	Product X	Product Y
M1	10 Machine hours	6 Machine hours
M2	4 Machine hours	14 Machine hours
A1	14 Direct Labour hours	18 Direct Labour hours

The annual budgeted overhead cost for the year is:

Product	Direct Wages	Indirect Wages	Consumable Supplies
M1	1,00,000	46,520	12,600
M2	20,000	41,340	18,200
A1	45,000	16,220	4,200
Stores	60,000	8,200	2,800
Engineering service	10,000	5,340	4,200
General Service	15,000	7,520	3,200

The other overhead costs are as follows:

Particulars	Amount	Remarks
Depreciation on Machinery	39,600	
Insurance of Machinery	7,200	
Insurance of Building	3,240	Total building insurance cost for M1 is one-third of annual premium
Power	6,480	
Light	5,400	
Rent	12,675	The general service department is located in a building owned by the company. It is valued at Rs.6,000 and is charged at a notional value of 8% per annum. The 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 of Machinery (Rs.)	Area (Sq ft.)	Effective H.P hours %	Production Direct Labour Hour	Capacity Machine Hour
M1	1,20,000	5,000	50	2,00,000	40,000
M2	90,000	6,000	35	1,50,000	50,000
A1	30,000	8,000	05	3,00,000	
Stores	12,000	2,000			
Engg. Service	36,000	2,500	10		
General Service	12,000	1,500			

Required:
- Prepare an overhead analysis sheet, showing the bases of apportionment of overhead to departments.
- Allocate service department overheads to production department ignoring the apportionment of service department costs among service departments.
- Calculate suitable overhead absorption rate for the production departments.
- Calculate the overheads to be absorbed by two products, X and Y.

Answer:

Department	Book Value of Machinery (Rs.)	Area (Sq ft.)	Effective H.P hours %	Production Direct Labour Hour	Capacity Machine Hour

WN 1: Primary Overhead Distribution:

Particulars	Amount	Basis	M1	M2	A1	Stores	Eng service	Gen Service
Indirect wages	1,25,140	Given	46,520	41,340	16,220	8,200	5,340	7,520
Consumable supplies	45,200	Given	12,600	18,200	4,200	2,800	4,200	3,200
Depreciation on machinery	39,600	BV of machinery	15,840	11,880	3,960	1,584	4,752	1,584
Insurance of machinery	7,200	BV of machinery	2,880	2,160	720	288	864	288
Insurance of building(M1)	1,080	Given	1,080					
Insurance of building (others)	2,160	Area square feet		648	864	216	270	162
Power	6,480	HP Hours	3,240	2,268	324		648	
Light	5,400	Area square feet	1,080	1,296	1,728	432	540	324
Rent (General service)	480	Given						480
Rent (others)	12,675	Area square feet	2,697	3,236	4,315	1,079	1,348	
Overheads post Primary Distribution	**2,45,415**		**85,937**	**81,028**	**32,331**	**14,599**	**17,962**	**13,558**

Note:
- Depreciation of machinery = 39,600. Appropriate basis to distribute the cost is Book value of machinery. Total book value of machinery for 6 departments is Rs.3,00,000.
- Depreciation for M1 = 39,600 x (1,20,000/3,00,000) = 15,840
- Depreciation of M2 = 39,600 x (90,000/3,00,000) = 11,880. Cost is allocated in similar manner to other departments
- Other costs given in the question are distributed using the basis given in column 3

WN 2: Secondary Overhead Distribution:

Particulars	Amount	Basis	M1	M2	A1	Stores	Eng service	Gen Service
Overhead as per Primary Distribution	2,45,415		85,937	81,028	32,331	14,599	17,962	13,558
Add: Direct costs of Service Departments	85,000		NA	NA	NA	60,000	10,000	15,000
Overheads to be distributed	**3,30,415**		**85,937**	**81,028**	**32,331**	**74,599**	**27,962**	**28,558**
Re-distribution of stores		Consumable supplies	26,856	38,791	8,952	-74,599		
Re-distribution of engineering service		Machine hours	12,428	15,534			-27,962	
Re-distribution of General service		Direct Labour Hours	8,787	6,590	13,181			-28,558
Overheads post secondary distribution	**3,30,415**		**1,34,008**	**1,41,943**	**54,464**	**-**	**-**	**-**

Note:
- Direct cost of service department is considered as Overhead and hence the same is added in the above working note. Production departments cost will be directly added in cost sheet and hence not considered as overhead
- In this question we are following direct distribution method for secondary overhead distribution. Cost of service department is distributed only to production departments using appropriate basis under this method.

WN 3: Computation of Overhead Absorption Rate:

Particulars	M1	M2	A1
1. Budgeted Overheads (WN 2)	1,34,008	1,41,943	54,464
2. Suitable base	Machine hours	Machine hours	Labour hours
3. Budgeted Suitable base	40,000	50,000	3,00,000
4. OAR (1/3)	**3.3502/MH**	**2.8389/MH**	**0.1815/DLH**

WN 4: Computation of Overheads of Product X and Product Y:

Particulars	Product X	Product Y
1. Overheads of M1	33.50 [10 x 3.3502]	20.10 [6 x 3.3502]
2. Overheads of M2	11.36 [4 x 2.8389]	39.74 [14 x 2.8389]
3. Overheads of A1	2.54 [14 x 0.1815]	3.27 [18 x 0.1815]
Total Overheads	**47.40**	**63.11**

3. **Step ladder method**

Deccan Manufacturing Ltd., have three departments which are regarded as production departments. Service departments' costs are distributed to these production departments using the "Step Ladder Method" of distribution. Estimates of factory overhead costs to be incurred by each department in the forthcoming year are as follows. Data required for distribution is also shown against each department:

Department	Factory Overhead (Rs.)	Direct Labour Hours	No. of Employees	Area is Sq metres
Production				
X	1,93,000	4,000	100	3,000
Y	64,000	3,000	125	1,500
Z	83,000	4,000	85	1,500
Service				
P	45,000	1,000	10	500
Q	75,000	5,000	50	1,500
R	1,05,000	6,000	40	1,000
S	30,000	3,000	50	1,000

The overhead costs of the four service departments are distributed in the same order, viz., P,Q,R and S respectively on the following basis.

Department	Basis
P	Number of employees
Q	Direct labour hours
R	Area in square metres
S	Direct labour hours

You are required to :

(a) Prepare a schedule showing the distribution of overhead costs of the four service departments to the three production departments; and

(b) Calculate the overhead recovery rate per direct labour hour for each of the production departments

(c) Find the cost of the job that involves Rs.25,000 material cost, Rs.30,000 of direct labour cost and which is gone through department X,Y and Z for 15, 20 and 30 hours respectively.

Answer:

WN 1: Secondary Overhead Distribution under Step-Ladder Method:

Particulars	Amount	Basis	X	Y	Z	P	Q	R	S
Overhead as per Primary Distribution	5,95,000		1,93,000	64,000	83,000	45,000	75,000	1,05,000	30,000
Add: Direct costs of Service Departments	-		NA	NA	NA	-	-	-	-
Overhead to be distributed	**5,95,000**		**1,93,000**	**64,000**	**83,000**	**45,000**	**75,000**	**1,05,000**	**30,000**
Distribution of P		No of employees	10,000	12,500	8,500	-45,000	5,000	4,000	5,000
Distribution of Q		DLH	16,000	12,000	16,000	NA	-80,000	24,000	12,000
Distribution of R		Area sq metres	57,000	28,500	28,500	NA	NA	-1,33,000	19,000
Distribution of S		DLH	24,000	18,000	24,000	NA	NA	NA	-66,000
Overheads post Secondary Distribution	**5,95,000**		**3,00,000**	**1,35,000**	**1,60,000**	**-**	**-**	**-**	**-**

Note:
- Secondary Overhead Distribution needs to be under Step-ladder method. Under Step-ladder method the sequence of distribution is very important
- Sequence of distribution is given in the question and the same would be P, Q, R and S
- Under Step-ladder method once the cost of service department is transferred there would no transfer back to that service department. For instance, we have transferred cost of Department P using Number of employees
- Next department taken up for distribution is Q. Cost of Q will be distributed on the basis of Direct Labour hours. However, this cost should be transferred only to X, Y, Z, R and S. There would be no transfer back to Department P.
  - Total cost of Department Q taken up for distribution = 75,000 + 5,000 = 80,000
  - Total of Direct Labour hours of X, Y, Z, R and S = 4,000 + 3,000 + 4,000 + 6,000 + 3,000 = 20,000
  - Cost allocated to Department X = 80,000 x (4,000/20,000) = 16,000. Cost is allocated in similar manner to other departments

WN 2: Computation of Overhead Absorption Rate:

Particulars	X	Y	Z
1. Budgeted Overheads (WN 1)	3,00,000	1,35,000	1,60,000
2. Suitable base	DLH	DLH	DLH
3. Budgeted Suitable base	4,000	3,000	4,000
4. OAR (1/3)	**75/DLH**	**45/DLH**	**40/DLH**

WN 3: Computation of cost of Job:

Particulars	Calculation	Amount
1. Direct Material	Given	25,000
2. Direct Labour	Given	30,000
3. Overheads		
Department X	15 x 75	1,125
Department Y	20 x 45	900
Department Z	30 x 40	1,200
Cost of Job		**58,225**

4. **Step ladder method – identification of cost driver percentage**

An engine manufacturing company has two production departments: (i) Snow mobile engine and (ii) Boat engine and two service departments: (i) Maintenance and (ii) Factory office. Budgeted cost data and relevant cost drivers are as follows:

Departmental costs:	Rs.
Snow mobile engine	6,00,000
Boat engine	17,00,000
Factory office	3,00,000
Maintenance	2,40,000
Cost drivers:	
Factory office department:	No. of employees
Snow mobile engine department	1,080 employees
Boat engine department	270 employees
Maintenance department	150 employees
	1,500 employees
Maintenance department:	No. of work orders
Snow mobile engine department	570 orders
Boat engine department	190 orders
Factory office department	40 orders
	800 orders

Required:

(i) Compute the cost driver allocation percentage and then use these percentage to allocate the service department costs by using direct method.

(ii) Compute the cost driver allocation percentage and then use these percentage to allocate the service department costs by using non-reciprocal method/step method.

Answer:

WN 1: Computation of cost driver allocation percentage under Direct Method:

Particulars	Snow Mobile	Boat Engine
Factory office:		
Cost Driver	No of employees	No of employees
No of employees	1,080	270
Cost Driver %	80%	20%
Maintenance:		
Cost Driver	No of work orders	No of work orders
No of work orders	570	190
Cost Driver %	75%	25%

WN 2: Secondary Overhead Distribution under Direct Method:

Particulars	Amount	Basis	SM	BE	FO	Maintenance
Overhead as per PD	28,40,000	Given	6,00,000	17,00,000	3,00,000	2,40,000
Distribution of FO		80:20	2,40,000	60,000	-3,00,000	-
Distribution of Maintenance		75:25	1,80,000	60,000	-	-2,40,000
Overhead post SD	**28,40,000**		**10,20,000**	**18,20,000**	**-**	**-**

WN 3: Cost Driver Allocation percentage under step ladder method:
Identification of sequence:

- Factory office provides service to maintenance and in turn maintenance provides service to factory office. There is a tie in the number of service departments served
- We should compute percentage of service provided to decide the sequence
- % of factory office service to maintenance = (150/1,500) x 100 = 10%
- % of maintenance service to factory office = (40/800) x 100 = 5%
- **Sequence of distribution:**
  - Factory office
  - Maintenance

Cost driver allocation percentage:

Particulars	Snow Mobile	Boat Engine	Factory Office	Maintenance
Factory office:				
Cost Driver	No of employees	No of employees	NA	No of employees
No of employees	1,080	270	NA	150
Cost driver %	72%	18%	NA	10%
Maintenance				
Cost Driver	No of work orders	No of work orders	**NA**	NA
No of work orders	570	190	**NA**	NA
Cost driver %	75%	25%	**NA**	NA

WN 4: Secondary Overhead Distribution under Step Ladder Method:

Particulars	Amount	Basis	SM	BE	FO	Maint.
Overhead as per PD	28,40,000	Given	6,00,000	17,00,000	3,00,000	2,40,000
Distribution of FO		72:18:10	2,16,000	54,000	-3,00,000	30,000
Distribution of Maint.		75:25	2,02,500	67,500	-	-2,70,000
Overhead post SD	**28,40,000**		**10,18,500**	**18,21,500**		

5. **Simultaneous equations, Repeated distribution method and Trial & error method:**

A company has three production departments and two service departments. The overhead analysis sheet provides the following totals of the overheads analysed to production and service departments:

Particulars	Amount
Production department X	48,000
Y	42,000
Z	30,000
Service department 1	14,040
2	18,000
	1,52,040

The expenses of the service department are apportioned as follows:

Particulars	X	Y	Z	1	2
SD 1	20%	40%	30%	-	10%
SD 2	40%	20%	20%	20%	

Direct labour hour of X, Y and Z are 1000 hours, 3000 hours and 2000 hours respectively. Find the cost of the job with material cost Rs.5,000, Labour cost Rs.3,000 and overhead which is gone through for X, Y and Z for 100 hours, 150 hours and 200 hours

Answer:
Method 1: Repeated Distribution Method:
Secondary Overhead Distribution:

Particulars	Amount	X	Y	Z	SD1	SD2
Overheads as per PD	1,52,040	48,000	42,000	30,000	14,040	18,000
Add: Direct cost of SD		NA	NA	NA	-	-
Overheads to be distributed	**1,52,040**	**48,000**	**42,000**	**30,000**	**14,040**	**18,000**
Distribution of SD1		2,808	5,616	4,212	-14,040	1,404
Distribution of SD2		7,762	3,881	3,881	3,881	-19,404
Distribution of SD1		776	1,552	1,164	-3,881	388
Distribution of SD2		155	78	78	78	-388

Distribution of SD1			16	31	23	-78	8
Distribution of SD2			4	2	2	-	-8
Overheads post SD	**1,52,041**	**59,521**	**53,160**	**39,360**	**-**	**-**

Computation of OAR:

Particulars	X	Y	Z
1. Budgeted Overheads (WN 1)	59,521	53,160	39,360
2. Suitable base	DLH	DLH	DLH
3. Budgeted Suitable base	1,000	3,000	2,000
4. OAR (1/3)	**59.52**	**17.72**	**19.68**

Computation of Cost of Job:

Particulars	Calculation	Amount
1. Direct Material		5,000
2. Direct Labour		3,000
3. Overheads		
Department X	100 x 59.52	5,952
Department Y	150 x 17.72	2,658
Department Z	200 x 19.68	3,936
Cost of Job		**20,546**

Method 2: Simultaneous equations method:

Let us assume X and Y to be the distributable amount of SD1 and SD2

X = Overheads of SD1 + Direct cost of SD1 + Proportionate transfer from SD2 X = 14,040 + 0 + 0.2Y ……………………….. Equation 1
Y = Overheads of SD2 + Direct cost of SD2 + Proportionate transfer from SD1 Y = 18,000 + 0 + 0.1X ………………………... Equation 2
Substituting Y in equation 1 X = 14,040 + 0.2 (18,000 + 0.1X) X = 14,040 + 3,600 + 0.02X $0.98X = 17,640; X = \dfrac{17,640}{0.98} = 18,000$
Substituting X in equation 2 Y = 18,000 + 0.1(18,000) = 19,800

Secondary Overhead Distribution:

Particulars	Amount	X	Y	Z	SD1	SD2
Overheads to be distributed	1,52,040	48,000	42,000	30,000	14,040	18,000
Distribution of SD1		3,600	7,200	5,400	-18,000	1,800
Distribution of SD2		7,920	3,960	3,960	3,960	-19,800
Overheads post distribution	**1,52,040**	**59,520**	**53,160**	**39,360**	**-**	**-**

Note: OAR and cost of Job computation would remain same as that of method 1. All methods will give same overheads post-secondary overhead distribution

Secondary overhead distribution under Trial and Error Method:
Computation of distributable amount:

Particulars	SD1	SD2
Overheads to be distributed	14,040	18,000
SD1 transfer to SD2 (10%)		1,404
SD2 transfer to SD1 (20%)	3,881	
SD1 transfer to SD2 (10%)		388
SD2 transfer to SD1 (20%)	78	
SD1 transfer to SD2 (10%)		8
SD2 transfer to SD1 (20%)	2	
Distributable amount	**18,001**	**19,800**

Secondary Overhead Distribution:

Particulars	Amount	X	Y	Z	SD1	SD2
Overheads to be distributed	1,52,040	48,000	42,000	30,000	14,040	18,000
Distribution of SD1		3,600	7,200	5,400	-18,000	1,800
Distribution of SD2		7,920	3,960	3,960	3,960	-19,800
Overheads post distribution	**1,52,040**	**59,520**	**53,160**	**39,360**	**-**	**-**

Note: OAR and cost of Job computation would remain same as that of method 1. All methods will give same overheads post-secondary overhead distribution

6. **Primary overhead distribution**

Arnav Limited 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:

Particulars	Amount
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 PF contribution	58,000

Following 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	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	1,240	1,600	1,200	1,440	1,440

The expenses of service department are to be allocated in the following manner:

Particulars	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 three production departments.

Answer:

WN 1: Primary Overhead Distribution:

Particulars	Amount	Basis	M	N	O	P	Q
Lease rental	35,000	Floor Space	8,400	7,000	11,200	2,800	5,600
Power & fuel	4,20,000	HP Hours	1,26,408	1,95,728	97,864		
Wages to fac supervisor	6,400	Work hours only to Prod dept	1,964	2,535	1,901		
Electricity	5,600	Light Points	1,470	1,820	1,120	630	560
Depn on machinery	16,100	Cost of machine	4,200	3,500	4,900	1,400	2,100
Depn on building	18,000	Floor Space	4,320	3,600	5,760	1,440	2,880
Payroll expenses	21,000	No of employees	5,449	5,903	5,108	1,703	2,838
Canteen expenses	28,000	No of employees	7,265	7,871	6,811	2,271	3,784
ESI and PF contribution	58,000	Direct Wages	17,244	16,606	15,268	3,593	5,289
Overheads post PD	**6,08,100**		**1,76,720**	**2,44,563**	**1,49,932**	**13,837**	**23,051**
Direct Cost of SD	89,000		NA	NA	NA	36,000	53,000
Overheads to be distributed	**6,97,100**		**1,76,720**	**2,44,563**	**1,49,932**	**49,837**	**76,051**

WN 2: Calculation of distributable amount as per simultaneous equations method

Let us assume X and Y to be the distributable amount of P and Q

X = Overheads of P + Direct cost of P + Proportionate transfer from Q X = 13,837 + 36,000 + 0.15Y
Y = Overheads of Q + Direct cost of Q + Proportionate transfer from P Y = 23,051 + 53,000 + 0.10X
Substituting Y in equation 1 X = 49,837 + 0.15(76,051 + 0.10X) X = 49,837 + 11,408 + 0.015X
$0.985X = 61,245; X = \dfrac{61,245}{0.985} = 62,178$
Substituting X in equation 2 Y = 76,051 + 0.1(62,178) = 82,269

WN 3: Secondary Overhead Distribution:

Particulars	Amount	M	N	O	P	Q
Overheads post SD	6,97,100	1,76,720	2,44,563	1,49,932	49,837	76,051
Distribution of P		18,653	21,762	15,545	-62,178	6,218
Distribution of Q		32,908	20,567	16,454	12,340	-82,269
Overheads post SD	6,97,100	2,28,281	2,86,892	1,81,931	-	-

7. **Step-Ladder Method:**

RST Limited has two production departments: Machining and Finishing. There are three service departments: Human Resource (HR), Maintenance and Design. The budgeted costs in these service departments are as follows:

Particulars	HR	Maintenance	Design
Variable	1,00,000	1,60,000	1,00,000
Fixed	4,00,000	3,00,000	6,00,000
Total	5,00,000	4,60,000	7,00,000

The usage of these service departments' output during the year just completed is as follows:
Provision of service output (in hours of service)

Users of service	Providers of Service		
	HR	Maintenance	Design
HR	-	-	-
Maintenance	500	-	-
Design	500	500	-
Machining	4,000	3,500	4,500
Finishing	5,000	4,000	1,500
Total	10,000	8,000	6,000

Required:
  i.   Use the direct method to re-apportion RST Limited's service department cost to its production departments
  ii. Determine the proper sequence to use in re-apportioning the firm's service department cost by step-down method
  iii. Use the step-down method to reapportion the firm's service department cost

Answer:

WN 1: Secondary Overhead distribution under Direct Method:

Particulars	Basis	Machining	Finishing	HR	Maint	Design
Overheads as per PD				5,00,000	4,60,000	7,00,000
Distribution of HR	4,000:5,000	2,22,222	2,77,778	- 5,00,000	-	-
Distribution of Maint	3,500:4,000	2,14,667	2,45,333	-	- 4,60,000	-
Distribution of Design	4,500:1,500	5,25,000	1,75,000	-	-	- 7,00,000
Overheads post distribution		**9,61,889**	**6,98,111**	**0**	**0**	**0**

WN 2: Secondary Overhead distribution under Step-ladder Method:

- Sequence of distribution would be based on number of service department served. From users/providers of service table we can find the number of service departments served
- HR department is providing service to Maintenance and Design (2 service departments). Maintenance is providing service to Design (1 service department). Design is not providing service to other service departments
- Sequence for distribution would be as under:
  - o HR department
  - o Maintenance department
  - o Design department

Particulars	Basis	Machining	Finishing	HR	Maint	Design
Overheads as per PD				5,00,000	4,60,000	7,00,000

Distribution of HR	40:50:-:5:5	2,00,000	2,50,000	- 5,00,000	25,000	25,000
Distribution of Maintenance	7:8:-:-:1	2,12,188	2,42,500	-	- 4,85,000	30,312
Distribution of Design	3:1:-:-;-	5,66,484	1,88,828	-	-	- 7,55,312
Overheads post distribution		**9,78,672**	**6,81,328**	**0**	**0**	**0**

8. **Absorption of overheads:**

The monthly budget of a department is as under:

Direct Materials (Rs.)	2,00,000
Direct Wages (Rs.)	2,50,000
Overheads (Rs.)	3,00,000
Direct Labour Hours	25,000
Machine hours	1,00,000
Production (No. of units)	1,25,000
Direct Material (kgs.)	25,000

The details of Job X are as under:

Direct Material (Rs.)	30
Direct Wages (Rs.)	25
Direct labour hours	15
Machine hours	10
Production (no. of units)	16
Direct material (kgs.)	10

- Calculate the total cost of Job X using the different methods of recovery of overheads.
- State which method you would advise the company to follow and why?

Answer:

WN 1: Computation of OAR:

Particulars	Method 1	Method 2	Method 3	Method 4	Method 5	Method 6	Method 7
Budgeted OH	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Suitable base	DMC	DLC	PC	Input qty	Output qty	MH	DLH
Budgeted SB	2,00,000	2,50,000	4,50,000	25,000	1,25,000	1,00,000	25,000
OAR (1/3)	**150% of DMC**	**120% of DLC**	**66.67% of PC**	**12/Input**	**2.40/unit**	**3/MH**	**12/DLH**

WN 2: Computation of cost of job using different recovery methods:

Particulars	Method 1	Method 2	Method 3	Method 4	Method 5	Method 6	Method 7
Direct Material	30	30	30	30	30	30	30
Direct Labour	25	25	25	25	25	25	25
Overheads	45 [150% x 30]	30 [120% x 25]	36.67 [55 x 66.67%]	120 [12 x 10]	38.40 [16 x 2.40]	30 [3 x 10]	180 [12 x 15]
Total Cost	**100**	**85**	**91.67**	**175**	**93.40**	**85**	**235**

Method to be selected:
- Volume methods are preferred to value methods since overheads are generally driven by volume and not value
- The appropriate volume method to be selected will depend on nature of industry

Nature of industry	Method to be selected
Labour intensive	Direct Labour Hours Method
Machine intensive	Machine hours Method
RM intensive	Input quantity Method
Output intensive	Output quantity Method

9. Different bases for overhead recovery

The budgeted production overheads and other budget data of Eiffel Limited are as follows:

Budget	Production Department X
Overhead cost	36,000
Direct Materials cost	32,000
Direct Labour cost	40,000
Machine hours	10,000
Direct Labour hours	18,000

What would be the absorption rate for Department X using the various bases of apportionment?

a) % of direct material cost
b) % of direct labour cost
c) % of total direct cost
d) Rate per machine hour
e) Rate per direct labour hour

Answer:

Particulars	Method 1	Method 2	Method 3	Method 4	Method 5
1. Budgeted Overheads	36,000	36,000	36,000	36,000	36,000
2. Suitable base	DMC	DLC	Prime cost	MH	DLH
3. Budgeted Suitable base	32,000	40,000	72,000	10,000	18,000
4. OAR (1/3)	**112.50% of DMC**	**90% of DLC**	**50% of PC**	**3.6/MH**	**2/DLH**

10. Performance comparison with budgets

A Ltd., manufactures two products A and B. The manufacturing division consists of two production departments P1 and P2 and two service departments S1 and S2.

Budgeted overhead rates are used in the production departments to absorb factory overheads to the products. The rate of Department P1 is based on direct machine hours, while the rate of Department P2 is based on direct labour hours. In applying overheads, the pre-determined rates are multiplied by actual hours.

For allocating the service department costs to production departments, the basis adopted is as follows:

- Cost of Department S1 to Department P1 and P2 equally, and
- Cost of Department S2 to Department P1 and P2 in the ratio of 2:1 respectively.

The following budgeted and actual data are available:
Annual profit plan data:
Factory overheads budgeted for the year:

Department P1	25,50,000	Department S1	6,00,000
Department P2	21,75,000	Department S2	4,50,000

Budgeted output in units:

Product A	50,000	Product B	30,000

Budgeted raw-material cost per unit:

Product A	Rs.120	Product B	Rs.150

Budgeted time required for production per unit:

Particulars	Department P1	Department P2
Product A	1.50 machine hours	2.00 Direct Labour hours
Product B	1.00 machine hours	2.50 Direct Labour hours

Average wage rates budgeted in Department P2 are:

Product A	Rs.72 per hour	Product B	Rs.75 per hour

All materials are used in Department P1 only.
Actual data: (for the month of July, 2005)

Particulars	Product A	Product B
Units actually produced	4,000	3,000
Actual Machine hours	6,100	4,150

Actual Direct Labour hours	8,200	7,400
Raw material cost	4,89,000	4,56,000
Direct wages	5,91,900	5,52,000
Overheads: P1 = 2,31,000; P2 = 2,04,000 S1 = 60,000; S2 = 48,000		

Required:
- Compute the pre-determined overhead rate for each production department.
- Prepare a performance report for July, 2005 that will reflect the budgeted costs and actual costs.

Answer:

WN 1: Computation of pre-determined overhead rate:

Part 1: Secondary overhead distribution:

Particulars	Amount	Basis	P1	P2	S1	S2
Budgeted overheads	57,75,000		25,50,000	21,75,000	6,00,000	4,50,000
Distribution of S1		1:1	3,00,000	3,00,000	-6,00,000	-
Distribution of S2		2:1	3,00,000	1,50,000	-	-4,50,000
Overheads post SD			**31,50,000**	**26,25,000**	**-**	**-**

Part 2: Computation of OAR:

Particulars	P1	P2
1. Budgeted Overheads (Part 1)	31,50,000	26,25,000
2. Suitable base	MH	DLH
3. Budgeted Suitable base (Note 1 and 2)	1,05,000	1,75,000
4. OAR (1/3)	**30/MH**	**15/DLH**

Note:
1. Budgeted Machine hours in P1 = 50,000 x 1.5 + 30,000 x 1 = 1,05,000
2. Budgeted Direct Labour hours in P2 = 50,000 x 2 + 30,000 x 2.50 = 1,75,000

WN 2: Performance report for the month of July 2015:

Particulars	Budget	Actual	Variance
Raw material cost (Dept P1)			
Product P1	4,80,000 (4,000 x 120)	4,89,000	9,000A
Product P2	4,50,000 (3,000 x 150)	4,56,000	6,000A
Direct Labour cost (Dept P2)			
Product A	5,76,000 (4,000 x 2 hr x 72)	5,91,900	15,900A
Product B	5,62,500 (3,000 x 2.5 hours x 75)	5,52,000	10,500F
Overhead cost (Dept P1)			
Product A	1,80,000 (4,000 x 1.5 hours x 30)	1,74,371 (Note 3)	5,629F
Product B	90,000 (3,000 x 1 hour x 30)	1,18,629 (Note 3)	28,629A
Overhead cost (Dept P2)			
Product A	1,20,000 (4,000 x 2 hours x 15)	1,31,410 (Note 3)	11,410A
Product B	1,12,500 (3,000 units x 2.5 hours x 15)	1,18,590 (Note 3)	6,090A

Note 3: Computation of Actual Overheads of Product A and B:

Particulars	Amount	Basis	P1	P2	S1	S2
Actual overheads	5,43,000		2,31,000	2,04,000	60,000	48,000
Distribution of S1		1:1	30,000	30,000	-60,000	-
Distribution of S2		2:1	32,000	16,000	-	-48,000
Overheads post SD			**2,93,000**	**2,50,000**	**-**	**-**

Product wise distribution of overheads of P1:

Overheads to Product A $= 2,93,000 \times \dfrac{6,100}{10,250} = 1,74,371$

Overheads to Product B $= 2,93,000 \times \dfrac{4,150}{10,250} = 118,629$

Product wise distribution of overheads of P2:

Overheads to Product A $= 2,50,000 \times \dfrac{8,200}{15,600} = 1,31,410$

Overheads to Product B $= 2,50,000 \times \dfrac{7,400}{15,600} = 118,590$

11. **Distribution of overheads:**

M/s NOP Limited has its own power plant and generates its own power. Information regarding power requirements and power used are as follows:

	Production Department		Service Department	
	A	**B**	**X**	**Y**
	(Horse power hours)			
Needed capacity production	20,000	25,000	15,000	10,000
Used during the quarter ended Sep 2018	16,000	20,000	12,000	8,000

During the quarter ended September 2018, costs for generating power amounted to Rs.12.60 lacs out of which Rs.4.20 lacs was considered as fixed cost. Service Department X renders services to departments A, B and Y in the ratio of 6:4:2 whereas department Y renders services to department A and B in the ratio of 4:1. The direct labour hours of department A and B are 67500 hours and 48750 hours respectively.

Required:
1. Prepare overheads distribution sheet
2. Calculate factory overheads per labour hour for the department A and department B

Answer:

WN 1: Primary Overhead distribution

Particulars	Amount	Basis	Dept A	Dept B	Dept X	Dept Y
Fixed power cost	4,20,000	Capacity	1,20,000	1,50,000	90,000	60,000
Variable power cost	8,40,000	Capacity used	2,40,000	3,00,000	1,80,000	1,20,000
Overheads post PD	**12,60,000**		**3,60,000**	**4,50,000**	**2,70,000**	**1,80,000**

Note:
- Fixed costs are dependent on power capacity whereas variable costs are dependent on capacity utilized

WN 2: Secondary Overhead distribution
- Department X provides service to Department Y whereas Department Y does not provide service to Department X. This is a situation of one-way service and hence we should go for step-ladder method of distribution
- Sequence of distribution:
  - Department X
  - Department Y

Particulars	Amount	Basis	Dept A	Dept B	Dept X	Dept Y
Overheads as per PD	12,60,000	WN 1	3,60,000	4,50,000	2,70,000	1,80,000
Distribution of X		6:4:2	1,35,000	90,000	-2,70,000	45,000
Distribution of Y		4:1	1,80,000	45,000		-2,25,000
Overheads post SD	**12,60,000**		**6,75,000**	**5,85,000**	**-**	**-**

WN 3: Computation of OAR:

Particulars	Department A	Department B
1. Budgeted Overheads	6,75,000	5,85,000
2. Suitable base	DLH	DLH
3. Budgeted Suitable base	67,500	48,750
4. OAR (1/3)	**10/DLH**	**12/DLH**

12. Identifying capacity

A machine was purchased from a manufacturer who claimed that his machine could produce 36.5 tonnes in a year comprising of 365 days. Holidays, break-down etc., were normally allowed in the factory for 65 days. Sales were expected to be 25 tonnes during the year and the plant actually produced 25.2 tonnes during the year. You are required to state the following figures:
- Rated capacity
- Practical capacity
- Normal capacity
- Actual capacity

Answer:

Computation of different forms of capacity:

Particulars	Calculation	Amount
Rated Capacity	Given	36.5 tonnes
Practical capacity	365 days = 36.50 300 days =?	30.0 tonnes
Normal capacity	Based on expected sales	25 tonnes
Actual capacity	Actual Production	25.2 tonnes

13. OAR and capacity production

S Limited manufactures product A at the rate of 80 pieces per hour. The company has been producing and selling 160,000 units annually. However during the year 2011 the company was able to produce 146,000 units only. The company annual fixed overhead for 2011 amounted to Rs.584,000. The company worked on single shift only at 8 hours per day and 6 days a week. The company has declared 13 holidays during the year 2011. The quarterly preventive maintenance and repairs work involved 77 hours. Calculate:
- Maximum capacity, practical capacity, normal capacity and actual capacity in terms of hour
- Hourly rate of recovery of overhead for each of the above calculated capacity

Answer:

WN 1: Computation of different forms of capacity:

Particulars	Calculation	Amount
Maximum capacity	365 days x 8 hours/day	2,920
Practical capacity		
Working hours per week	6 days x 8 hours/day	48
Working hours per year	(48 hours x 52 weeks) + (8 hours x 1 day)	2,504
Less: Holidays	(13 days x 8 hours)	(104)
Less: Maintenance	(77 hours x 4 quarters)	(308)
Practical Capacity		**2,092**
Normal Capacity	$\frac{1,60,000}{80}$	2,000
Actual Capacity	$\frac{1,46,000}{80}$	1,825

WN 2: Computation of recovery rates for different forms of capacity:

Particulars	Maximum	Practical	Normal	Actual
Budgeted OH	5,84,000	5,84,000	5,84,000	5,84,000
Suitable base	Hours	Hours	Hours	Hours
Budgeted SB	2,920	2,092	2,000	1,825
OAR	**200/hr**	**279.16/hr**	**292/hr**	**320/hr**

14. Under/over absorption of overheads

The total overhead expense of a factory are Rs.446,380. Taking into account the normal working of the factory, overhead were recovered in production at Rs.1.25 per hour. The actual hours worked were 293,104. How would you proceed to close the books of accounts assuming that besides, 7800 units produced of which 7,000 were sold, there were 200 equivalents units of work-in-progress.

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

Answer:
WN 1: Computation of under-over absorption:

Particulars	Calculation	Amount
Overheads incurred		4,46,380
Overheads absorbed	1.25 x 2,93,104	3,66,380
Under-absorbed OH		**80,000**

WN 2: Treatment of under-absorption:

Normal Reasons – Increase in cost – 50% x 80,000 = Rs.40,000
• Under-absorption due to normal reasons will be recovered through supplementary recovery rates (SRR)
$SRR = \dfrac{\text{Amount of normal under} - \text{asbsorption}}{\text{Units Produced (including WIP)}} = \dfrac{40,000}{7,800 + 200} = \text{Rs. 5 per unit}$
Journal Entry:
FG Control A/c   Dr   4,000 (800 units x 5)
WIP Control A/c   Dr   1,000 (200 units x 5)
Cost of Sales A/c   Dr   35,000 (7,000 units x 5)
To Overheads Control A/c   40,000
Abnormal Reasons – Factory inefficiency – 50% x 80,000 = Rs.40,000
• Under-absorption due to abnormal reasons will be transferred to Costing Profit and Loss Account
Journal Entry:
Costing Profit and Loss Account Dr   40,000
To Overheads Control Account   40,000
• **Impact on profit = Rs.75,000** (Rs.40,000 of abnormal under-absorption + Rs.35,000 of normal under-absorption debited to Cost of Sales A/c)

15. Disposal of under/over absorption of overheads

In a factory, overheads of a particular department are recovered on the basis of Rs. 5 per machine hour. The total expenses incurred and the actual machine hours for the department for the month of August were Rs. 80,000 and 10,000 hours respectively. Of the amount of Rs. 80,000, Rs. 15,000 became payable due to an award of the Labour Court and Rs. 5,000 was in respect of expenses of the previous year booked in the current month (August). Actual production was 40,000 units, of which 30,000 units were sold. On analysing the reasons, it was found that 60% of the under-absorbed overhead was due to defective planning and the rest was attributed to normal cost increase. How would you treat the under-absorbed overhead in the cost accounts?

Answer:
WN 1: Computation of under/over absorption:

Particulars	Calculation	Amount
Overheads incurred		80,000
Less: Award of labour court (abnormal)		(15,000)
Less: Prior period expenses (abnormal)		(5,000)
Adjusted overheads incurred		60,000
Overheads absorbed	5 x 10,000	50,000
Under-absorbed Overheads		**10,000**

WN 2: Treatment of under-absorption:

Normal Reasons – Increase in cost – 40% x 10,000 = Rs.4,000
• Under-absorption due to normal reasons will be recovered through supplementary recovery rates (SRR)
$SRR = \dfrac{\text{Amount of normal under} - \text{asbsorption}}{\text{Units Produced (including WIP)}} = \dfrac{4,000}{40,000} = \text{Rs. 0.10 per unit}$
Journal Entry:
FG Control A/c   Dr   1,000 (10,000 units x 0.10)
Cost of Sales A/c   Dr   3,000 (30,000 units x 0.10)
To Overheads Control A/c   4,000
Abnormal Reasons – Defective planning – 60% x 10,000 = Rs.6,000

- Under-absorption due to abnormal reasons will be transferred to Costing Profit and Loss Account

Journal Entry:
Costing Profit and Loss Account Dr   6,000
   To Overheads Control Account   6,000

- **Impact on profit = Rs.29,000** (20,000 of abnormal items + 6,000 of abnormal under-absorption + 3,000 of normal under-absorption debited to cost of sales)

16. Disposal of under/over absorption of overheads

Your company uses a historical cost system and applies overheads on the basis of "predetermined" rates. The following are the figure from the Trial Balance as at 30-9-83:-

Manufacturing overheads	Rs. 3,65,904 Dr.
Manufacturing overheads applied	Rs. 4,26,544 Cr.
Work-in-progress	Rs. 1,41,480 Dr.
Finished goods stocks	Rs. 2,30,732 Dr.
Cost of goods sold	Rs. 8,40,588 Dr.

Give two methods for the disposal of the unabsorbed overheads and show the profit implications of each method.

Answer:

WN 1: Computation of under/over absorption:

Particulars	Calculation	Amount
Overheads incurred	Given	3,65,904
Overheads absorbed	Given	4,26,544
Over-absorbed OH		**60,640**

WN 2: Treatment of Over-absorption:

Method 1 – Over-absorption is due to normal reasons

- Over-absorption due to normal reasons will be recovered through supplementary recovery rates (SRR)

$$SRR = \frac{Amount\ of\ normal\ over - absorption}{Value\ of\ Units\ Produced\ (including\ WIP)} = \frac{60,640}{12,12,800} = Rs.\,0.05\ per\ rupee$$

Journal Entry:
Overheads Control A/c   Dr   60,640
   To FG Control A/c   11,537 (2,30,732 x 0.05)
   To WIP Control A/c   7,074 (1,41,480 x 0.05)
   To Cost of Sales A/c   42,029 (8,40,588 x 0.05)
(Impact on profit = Profit will increase by Rs.42,029)

Method 2 – Over-absorption is due to abnormal reasons

- Over-absorption due to abnormal reasons will be transferred to Costing Profit and Loss Account

Journal Entry:
Overheads Control Ac/c   Dr   60,640
   To Costing Profit and Loss Account   60,640
(Impact on Profit = Profit will increase by Rs.60,640)

17. Under/over absorption of overheads

A cost centre in a factory furnishes the following working conditions:

Normal working week	40 hours
Number of machines	15
Normal weekly loss of hours on maintenance etc	4 hours per machine
Estimated annual overhead	Rs.1,55,520
Estimated direct wage rate	Rs.3 per hour
Number of weeks worked per year	48
Actual results in respect of a 4-week period are	
Overhead incurred	Rs.15,000
Wages incurred	Rs.7,000
Machine hours produced	2,200

You are required to:
- a) Calculate the overhead rate per machine-hour and
- b) Calculate the amount of under or over-absorption of both wages and overhead

Answer:

WN 1: Computation of overhead rate per machine hour:

Particulars	Calculation	Amount
1. Budgeted overheads	Given	1,55,520
2. Budgeted machine hours	36 hours x 52 weeks x 15 machines	25,920
3. OAR (1/2)		6/MH

WN 2: Computation of under/over absorption of overheads:

Particulars	Calculation	Amount
1. Overhead incurred	Given	15,000
2. Overhead recovered/absorbed	2,200 x 6	13,200
3. Under-absorbed overheads		1,800

WN 3: Computation of under/over absorption of wages:

Particulars	Calculation	Amount
1. Wages incurred	Given	7,000
2. Hours worked	40 hours x 4 weeks x 15 machines	2,400
3. Wages absorbed	2,400 x 3	7,200
4. Over-absorbed wages		200

Note: Company will continue to incur wages cost even for time lost during maintenance.

18. Under/over absorption

Department L production overheads are absorbed using a direct labour hour rate. Budgeted production overheads for the department were Rs.4,80,000 and the actual labour hours were 1,00,000. Actual production overheads amounted to Rs.5,16,000. Based on the above data, and assuming that the production overheads were over absorbed by Rs.24,000, what was the overhead absorption rate per labour hour?

Answer:

Computation of Overhead Absorption Rate:

Particulars	Calculation	Amount
1. Overheads incurred	Given	5,16,000
2. Over-absorbed overheads	Given	24,000
3. Overheads absorbed	5,16,000 + 24,000	5,40,000
4. Actual Direct Labour Hours		1,00,000
5. OAR (Overhead absorbed/Act DLH)		5.40/DLH

19. Under/over absorption

RSJ produces a single product and absorbs production overheads at a pre-determined rate. Information relating to a period is as under:

Production overheads actually incurred	Rs.4,84,250
Overhead recovery rate at production	Rs.1.45 per hour
Actual hours worked	2,65,000 hours
Production:	
Finished goods	17,500 units
Works-in-progress (50% complete in all respect)	5,000 units
Sales of finished goods	12,500 units

At the end of the period, it was discovered that the actual production overheads incurred included Rs.40,000 on account of 'written off obsolete stores' and wages paid for the strike under an award. It was also found that 30% of the under-absorption of production overheads was due to factory inefficiency and the rest was attributable to normal increase in costs.

Required:
- a) The amount of under absorbed production overheads during the period
- b) Show the accounting treatment of under absorption of production overheads and pass journal entry

Answer:

WN 1: Computation of under-absorbed production overheads:

Particulars	Calculation	Amount
1. Overheads absorbed	2,65,000 x 1.45	3,84,250
2. Overheads incurred	Note 1	4,44,250
3. Under-absorbed overheads		**60,000**

Note:

1. Overheads incurred has been adjusted for abnormal items such as written off obsolete stores and wages paid under strike

WN 2: Treatment of under-absorption of overheads:

> **Abnormal reasons:**
> - 30% of under-absorption is due to abnormal reasons (Factory inefficiency). This would amount to Rs.18,000 and would be charged to Costing Profit and Loss Account
>
> **Journal Entry:**
> Costing Profit and Loss Account   Dr   18,000
>   To Overheads Control Account   18,000
>
> **Normal Reasons:**
> - 70% of under-absorption is due to normal reasons such as increase in costs. This would be adjusted using supplementary recovery rate
>
> $$\text{Supplementary Recovery Rate} = \frac{\text{Amount of normal underabsorption}}{\text{Units produced (including WIP)}} = \frac{42,000}{20,000} = 2.10 \text{ per unit}$$
>
> - Units produced = 17,500 of FG + 2,500 of WIP (5,000 x 50%) = 20,000
>
> **Journal Entry:**
> FG Control Account   Dr   10,500 [5,000 x 2.10]
> WIP Control Account   Dr   5,250 [2,500 x 2.10]
> Cost of Sales Account   Dr   26,250 [12,500 x 2.10]
>   To Overheads Control Account   42,000

20. Under/over absorption

Madhu Limited has calculate a predetermined overhead rate of Rs.22 per machine hour for its quality check (QC) department. This rate has been calculated for the budgeted level of activity and is considered as appropriate for absorbing overheads. The following overhead expenditures at various activity levels had been estimated

Total overheads	Number of machine hours
3,38,875	14,500
3,47,625	15,500
3,56,375	16,500

You are required to:

a) Calculate the variable overhead absorption rate per machine hour
b) Calculate the estimated total fixed overheads
c) Calculate the budgeted level of activity in machine hours
d) Calculate the amount of under/over absorption of overheads if the actual machine hours were 14,970 and actual overheads were Rs.3,22,000
e) Analyze the arguments for and against using department absorption rate as opposed to a single or blanket factory wide rate

Answer:

WN 1: Computation of variable overhead absorption rate per machine hour:

$$\text{Variable rate} = \frac{\text{Change in Total Cost}}{\text{Change in machine hours}} = \frac{3,47,625 - 3,38,875}{15,500 - 14,500} = \textbf{8.75 per machine hour}$$

WN 2: Computation of total fixed overheads:

Total cost at 14,500 hours = Total variable overhead at 14,500 hours + Total fixed overheads
3,38,875 = (14,500 x 8.75) + Total Fixed Overheads
Total Fixed Overheads = 3,38,875 – 1,26,875 = Rs.2,12,000

WN 3: Computation of budgeted level of activity in machine hours:

Particulars	Calculation	Amount
1. Overhead rate per hour		22
2. Variable overhead rate per hour		8.75
3. Fixed overhead rate per hour	22 – 8.75	13.25
4. Total Fixed Overheads		2,12,000
5. Budgeted machine hours	**2,12,000/13.25**	**16,000**

WN 4: Computation of Under/over absorption of overheads:

Particulars	Calculation	Amount
1. Overheads absorbed	14,970 x 22	3,29,340
2. Overheads incurred	Given	3,22,000
3. Over-absorbed overheads		**7,340**

WN 5: Benefits of using department absorption rate as compared to single factory wide rate:
Departmental absorption rates provide costs which are more precise than those provided by the use of blanket absorption rates. Departmental absorption rates facilitate variance analysis and cost control. The application of these rates makes the task of FG and WIP valuation easier and more precise. However, the setting up and monitoring of these rates can be time consuming and expensive.

21. **Machine hour rate**

From the following data of a textile factory machine room, compute the hourly machine rate assuming that the machine room will work on 90% capacity throughout the year and a break down allowance of 10% is reasonable. There are 2 holidays for Diwali, 3 holidays for Holi and 1 holiday for Christmas apart from Sundays. The factory works 8 hours a day on 5 days and 4 hours on Saturdays. The number of machines of the same type is 50. The overhead per annum is Rs.455,220.

Answer:

WN 1: Computation of Machine hours:

Particulars	Calculation	Amount
Working hours per week	(5 x 8) + (1 x 4)	44
No of weeks		52 weeks and 1 day
Possible working hours per year	(44 x 52) + (1 x 8)	2,296
Less: Holidays	(6 x 8)	(48)
Revised working hours		2,248
Working hours utilized	90% x 2,248	2,023.20
Less: Break-down allowance (10%)	10% x 2,023.20	(202.32)
Effective machine hours per machine		**1,820.88**
No of machines		50
Effective machine hours	**1,820.88 x 50**	**91,044**

WN 2: Computation of MHR:

Particulars	Amount
Budgeted costs	4,55,220
Effective machine hours (WN 1)	91,044
MHR (Costs/Hours)	**5**

22. **Machine hour rate**

A manufacturing unit has purchased and installed a new machine of Rs. 12,70,000 to its fleet of 7 existing machines. The new machine has an estimated life of 12 years and is expected to realise Rs. 70,000 as scrap at the end of its working life. Other relevant data are as follows:

(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 Rs. 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 Rs. 400 each time.

(iv)Four operators control operation of 8 machines and the average wages per person amounts to Rs. 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 Rs.3 per unit. No current is taken during maintenance and setting up.

(vi)Departmental and general works overhead allocated to the operation during last year was Rs. 50,000. During the current year it is estimated to increase 10% of this amount.

Calculate machine hour rate, if (a) setting up time is unproductive; (b) setting up time is productive.

Answer:

Different types of time in relation to machine:

Running time	Form part of MH	Electricity is incurred
Maintenance time	Does not form part of MH	Electricity is not incurred
Setting up time	May form part of MH (assumption based)	Electricity is incurred if forms part of MH and not incurred if it does not form part of MH

WN 1: Computation of costs relating to machine:

Particulars	Calculation	Amount
Depreciation	$\dfrac{12,70,000 - 70,000}{12}$	1,00,000
Maintenance	Given	25,000
Chemical solution	$400 \times \left(\dfrac{324}{6}\right)$	21,600
Wages cost	$(420 + 15\%) \times \left(\dfrac{324}{6}\right) \times \left(\dfrac{4}{8}\right)$	13,041
Electricity	16 units x Rs.3 x 2,200 hours	1,05,600
General overheads	$\dfrac{50,000 + 10\%}{8 \text{ machines}}$	6,875
Total cost of machine		**2,72,116**

WN 2: Computation of machine hours:

Particulars	Setting up time is unproductive	Setting up time is productive
Running hours	2,200	2,200
Maintenance hours	0	0
Setting up hours	0	92
Effective machine hours	**2,200**	**2,292**

WN 3: Computation of MHR:

Particulars	Setting up time is unproductive	Setting up time is productive
Budgeted cost (WN 1)	2,72,116	2,72,116
Machine hours (WN 2)	2,200	2,292
MHR (Cost/Hours)	**123.69**	**118.72**

23. Machine hour rate

A machine shop cost centre contains three machines of equal capacities. Three operators are employed on each machine, payable Rs. 20 per hour each. The factory works for forty eight hours in a week which includes 4 hours set up time. The work is jointly done by operators. The operators are paid fully for the 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 Rs. 52,000.
- Maintenance and repairs per week per machine is Rs. 60.
- Consumable stores per week per machine are Rs. 75.
- Power: 20 units per hour per machine at the rate of 80 paise per unit.
- Apportionment to the cost centre : Rent per annum Rs. 5,400, Heat and Light per annum Rs. 9,720, and foreman's salary per annum Rs. 12,960.

Required:

- Calculate the cost of running one machine for a four week period.

- Calculate machine hour rate.

Answer:

WN 1: Calculation of cost of running one machine for four-week period:

Particulars	Calculation	Amount
Operator wages	$20 \text{ x } 48 \text{ hours x } 4 \text{ weeks x } \frac{3}{3}$	3,840
Operator bonus	$10\% \text{ x } 20 \text{ x } 44 \text{ hours x } 4 \text{ weeks x } \frac{3}{3}$	352
Depreciation	$52,000 \text{ x } 10\% \text{ x } \frac{4}{52}$	400
Repairs and maintenance	60 x 4	240
Consumables	75 x 4	300
Power	20 units x 0.80 x 44 x 4	2,816
Apportioned costs	$(5,400 + 9,720 + 12,960) \text{ x } \frac{1}{3} \text{ x } \frac{4}{52}$	720
Total Costs		**8,668**

Note:

- It is assumed that setting up time is unproductive. Power expense will not be incurred during setting up

WN 2: Computation of Machine Hours:

Particulars	Amount
Running Time	176
Setting up time	0
Total	**176**

WN 3: Computation of MHR:

Particulars	Amount
Budgeted cost (WN 1)	8,668
Machine hours (WN 2)	176
MHR (Cost/Hours)	**49.25**

24. Machine hour rate

Gemini Enterprises undertakes three different jobs A, B and C. All of them require the use of a special machine and also the use of a computer. The computer is hired and the hire charges work out to Rs. 4,20,000 per annum. The expenses regarding the machine are estimated as follows :

	Rs.
Rent for the quarter	17,500
Depreciation per annum	2,00,000
Indirect charges per annum	1,50,000

During the first month of operation the following details were taken from the job register:

	Job		
	A	B	C
Number of hours the machine was used:			
(a) Without the use of the computer	600	900	—
(b) With the use of the computer	400	600	1,000

You are required to compute the machine hour rate :

- (a) For the firm as a whole for the month when the computer was used and when the computer was not used.
- (b) For the individual jobs A, B and C.

Answer:

WN 1: Computation of MHR for special machine and computer:

Particulars	Calculation	Special Machine	Computer
Hire charges	$\frac{4,20,000}{12}$		35,000
Rent	$\frac{17,500}{3}$	5,833	
Depreciation	$\frac{2,00,000}{12}$	16,667	

Indirect charges	1,50,000 / 12	12,500	
Total costs per month		**35,000**	**35,000**
No of hours		3,500	2,000
MHR (Cost/Hours)		**10.00**	**17.50**

- MHR when computer is not used = Rs.10.00
- MHR when computer is used = Rs.27.50 (10 + 17.50)

WN 2: Computation of MHR for Jobs A, B and C:

Particulars	Job A	Job B	Job C
Costs of jobs:			
When computer is not used	6,000	9,000	-
When computer is used	11,000	16,500	27,500
Total cost	**17,000**	**25,500**	**27,500**
No of hours	1,000	1,500	1,000
MHR (Cost/Hours)	**17.00**	**17.00**	**27.50**

25. Multiple machine hour rates

An engineering company having 25 different types of automatic machines furnishes you with the following data for a year in respect of machine 'B'.

- Cost of machine Rs.5,00,000; Life 10 years and scrap value is nil
- Overhead expenses per annum are:

Factory rent	Rs.5,00,000 p.a
Heating lighting	Rs.4,00,000 p.a
Supervision	Rs.15,00,000 p.a
Reserve equipment for 'B'	Rs.50,000 p.a.
Area of the factory	80,000 sq.feet
Area occupied by machine 'B'	3,000 sq. feet
Power costs Rs.5 per hour while in operation	

- Wages of operator is Rs.240 per day of 8 hours including fringe benefits. He attends to one machine while it is under set-up and two machines while under operation.
- Estimated production hours = 3,600 p.a. and estimated set up time = 400 p.a

Compute the machine hour rate and find the cost of the following jobs:

	Job A	Job B
Set up time (hours)	80	40
Operation time (hours)	130	160

Answer:

WN 1: Computation of costs of machine:

Particulars	Common costs	Setting up costs	Operation costs
Depreciation	50,000 [5,00,000/10]		
Factory Rent	18,750 $\left(5,00,000 \times \dfrac{3,000}{80,000}\right)$		
Heating Lighting	15,000 $\left(4,00,000 \times \dfrac{3,000}{80,000}\right)$		
Supervision	60,000 (15,00,000/25)		
Reserve equipment	50,000		
Power			18,000 (3,600 x 5)
Operator wages		12,000 $\left(400 \times \dfrac{240}{8} \times \dfrac{1}{1}\right)$	54,000 $\left(3,600 \times \dfrac{240}{8} \times \dfrac{1}{2}\right)$
Total Cost	**1,93,750**	**12,000**	**72,000**
No of hours	4,000	400	3,600

| MHR | 48.4375 | 30 | 20 |

- MHR for set-up time = 48.4375 + 30 = Rs.78.4375 per hour
- MHR for operation time = 48.4375 + 20 = Rs.68.4375 per hour

WN 2: Computation of cost of job:

Particulars	Job A	Job B
Set-up time	6,275 [80 x 78.4375]	3,138 [40 x 78.4375]
Operation time	8,897 [130 x 68.4375]	10,950 [160 x 68.4375]
Total Cost	15,172	14,088

26. Machine hour rate

You are given the following information of the three machines of a manufacturing department of X Ltd:

	Preliminary estimates of expenses (per annum)			
				Machines
	Total (Rs.)	A (Rs.)	B (Rs.)	C (Rs.)
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 maintenace expenses	20,000			
Annual interest on capital outlay	50,000	20,000	20,000	10,000
Monthly charges for rent and rates	10,000			
Salary of foreman (per month)	20,000			
Salary of Attendent (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:
- a. An increase of 15% in the price of spare parts.
- b. An increase of 25% in the consumption of spare parts for machine 'B' & 'C' only.
- c. 20% general increase in wages rates.

Answer:
WN 1: Computation of costs relating to machine:

Particulars	Amount	Basis	Machine A	Machine B	Machine C
Depreciation	20,000	Given	7,500	7,500	5,000

Spare Parts		Note 1	4,600	5,750	2,875
Power	40,000	Ratio of KW Rating	15,000	10,000	15,000
Consumables	8,000	Given	3,000	2,500	2,500
Insurance	8,000	Depreciation	3,000	3,000	2,000
Indirect Labour	24,000	DLH	6,000	9,000	9,000
Building maintenance	20,000	Floor Space	8,000	8,000	4,000
Interest	Ignored	Given	Ignored	Ignored	Ignored
Rent and rates	1,20,000	Floor Space	48,000	48,000	24,000
Foreman salary	2,40,000	Equal	80,000	80,000	80,000
Attendant salary	60,000	Equal	20,000	20,000	20,000
Total			**1,95,100**	**1,93,750**	**1,64,375**

Note:
- It is assumed that 20 percent increase in wages is applicable only to indirect labour and not applicable to salaries

Note 1: Computation of spare parts expenditure:

Particulars	Machine A	Machine B	Machine C
Initial estimate	4,000	4,000	2,000
Add: 25% increase in quantity	-	1,000	500
Revised estimate	4,000	5,000	2,500
Add: 15% increase in price	600	750	375
Final estimate	**4,600**	**5,750**	**2,875**

WN 2: Computation of machine hours:

Particulars	Calculation	Amount
Working hours per week	(5 x 8) + (1 x 4)	44
No of weeks		52 weeks and 1 day
Possible working hours per year	(44 x 52) + (1 x 8)	2,296
Less: Holidays	(10 x 8) + (2 x 4)	(88)
Revised working hours		2,208
Working hours utilized	2,208 x 90%	1,987.20
Less: Break-down allowance	1,987.20 x 2%	(39.74)
Effective machine hours		**1,948**

Note:
- It is assumed that extra one day in year will be weekday

WN 3: Computation of MHR:

Particulars	Machine A	Machine B	Machine C
Budgeted costs (WN 1)	1,95,100	1,93,750	1,64,375
Effective machine hours (WN 2)	1,948	1,948	1,948
MHR (Costs/Hours)	**100.15**	**99.46**	**84.38**

Additional Problems for Practice

27. Direct Distribution Method and Step Ladder Method:

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	Revenue	Number of employees	Processing time used (in minutes)
Corporate sales	16,67,750	42	2400
Consumer sales	8,33,875	28	2000
Administrative	-	14	400
Information system	-	21	1400

Cost incurred in each of four departments for October, 2013 are as follows:

Corporate sales	12,97,751
Consumer sales	6,36,818
Administrative	94,510
Information system	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

Answer:
WN 1: Secondary Overhead distribution under Direct Method:

Particulars	Amount	Basis	Corp Sales	Cons Sales	Admin	Info Sys
Overheads as per PD	23,33,799		12,97,751	6,36,818	94,510	3,04,720
Distribution of Admin		Employees	56,706	37,804	-94,510	
Distribution of Info Sys		Processing Time	1,66,211	1,38,509	-	-3,04,720
Overheads post SD			**15,20,668**	**8,13,131**	**-**	**-**

WN 2: Secondary Overhead distribution under Step-ladder method:
Identification of sequence:
   • Administrative department provides service to Information System and Information system provides service to Administrative Department. There is a tie in the number of service department served
   • We need to find the sequence based on percentage of service provided and the same is calculated below:

% of administrative service to Information system $= \dfrac{21}{48 + 28 + 21} \times 100 = 23.08\%$

% of Information Systems service to adminstrative $= \dfrac{400}{2,400 + 2,000 + 400} \times 100 = 8.33\%$

   • Administrative department provides more service to information systems and hence we will follow below sequence for distribution:
      o Administrative Department
      o Information Systems

Particulars	Amount	Basis	Corp Sales	Cons Sales	Admin	Info Sys
Overheads as per PD	23,33,799		12,97,751	6,36,818	94,510	3,04,720
Distribution of Admin		Employees	43,620	29,080	-94,510	21,810
Distribution of Info Sys		Processing Time	1,78,107	1,48,423	NA	-3,26,530
Overheads post SD			**15,19,478**	**8,14,321**	**-**	**-**

WN 3: Alternative way of sequence identification under Step-ladder method:
   • An alternative ranking is based on the amount of service provided to other service department. Amount of service provided is computed below:

Amount of service by admin to Information Systems = 23.08% x 94,510 = 21,810
Amount of service by Information Systems to Admin = 8.33% x 3,04,720 = 25,383
   • Based on the amount of service provided, the sequence will change and the same is provided below:
      o Information Systems

o Administrative Service

WN 4: Secondary Overhead Distribution under Reciprocal Allocation Method:

Below solution has been presented under repeated distribution method

Particulars	Amount	Corp Sales	Cons Sales	Admin	Info Sys
Overheads as per PD	23,33,799	12,97,751	6,36,818	94,510	3,04,720
Distribution of Admin		43,620	29,080	-94,510	21,810
Distribution of Info Sys		1,63,265	1,36,054	27211	-3,26,530
Distribution of Admin		12,559	8,373	-27,211	6,279
Distribution of Info Sys		3,140	2,616	523	-6,279
Distribution of Admin		241	161	-523	121
Distribution of Info Sys		61	50	10	-121
Distribution of Admin		6	4	-10	0
Overheads Post SD		**15,20,643**	**8,13,156**	**-**	**-**

- Administrative department expenses have been distributed on the basis of number of employees whereas Information systems department expenses have been distributed on the basis of processing time

28. Primary Overhead Distribution

Sanz Ltd., is a manufacturing company having three production departments, 'A', 'B' and 'C' and two service departments 'X' and 'Y'. The following is the budget for December 2013:

Particulars	Total (Rs.)	A (Rs.)	B (Rs.)	C (Rs.)	X (Rs.)	Y (Rs.)
Direct Material		1,000	2,000	4,000	2,000	1,000
Direct Wages		5,000	2,000	8,000	1,000	2,000
Factory Rent	4,000					
Power	2,500					
Depreciation	1,000					
Other overheads	9,000					
Additional information:						
Area (sq ft)		500	250	500	250	500
Capital value of assets		20	40	20	10	10
Machine Hours		1000	2000	4000	1000	1000
Horse power of machines		50	40	20	15	25

A technical assessment of the apportionment of expenses of service departments is as under:

	A	B	C	X	Y
Service Dept 'X' (%)	45	15	30	-	10
Service Dept 'Y' (%)	60	35	-	5	-

Required:
  I. A statement showing distribution of overheads to various departments.
 II. A statement showing re-distribution of service departments expenses to production departments using Trial and error method.

Answer:

WN 1: Primary Overhead Distribution:

Particulars	Amount	Basis	A	B	C	X	Y
Factory Rent	4,000	Area	1,000	500	1,000	500	1,000
Power	2,500	HP x MH	500	800	800	150	250
Depreciation	1,000	Capital value	200	400	200	100	100
Other Overheads	9,000	MH	1,000	2,000	4,000	1,000	1,000
Overheads post PD	**16,500**		**2,700**	**3,700**	**6,000**	**1,750**	**2,350**

Direct material of SD	3,000	Given	NA	NA	NA	2,000	1,000
Direct wages of SD	3,000	Given	NA	NA	NA	1,000	2,000
Overheads to be distributed	**22,500**		**2,700**	**3,700**	**6,000**	**4,750**	**5,350**

Note:
- It is assumed that other overheads are driven by volume base of machine hours. Alternatively, other overheads can be distributed on the basis of Direct Wages

WN 2: Computation of distributable amount as per trial and error method:

Particulars	Dept X	Dept Y
Overheads as per WN 1	4,750	5,350
Dept X to Dept Y (10% x 4,750)	-	475
Dept Y to Dept X (5% x 5,825)	291	-
Dept X to Dept Y (10% x 291)	-	29
Dept Y to Dept X (5% x 29)	2	-
Distributable amount	**5,043**	**5,854**

WN 3: Secondary Overhead distribution:

Particulars	Amount	Basis	A	B	C	X	Y
Overhead to be distributed	22,500	WN 1	2,700	3,700	6,000	4,750	5,350
Distribution of X	5,043	45:15:30:-:10	2,269	756	1,513	-5,043	504
Distribution of Y	5,854	60:35:-:5:-	3,513	2,049	-	293	-5,854
Overheads post SD	**22,500**		**8,482**	**6,505**	**7,513**	**-**	**-**

29. Repeated Distribution Method

The ABC Company has the following account balances and distribution of direct charges on 31st March, 2011.

	Total	Production Departments		Service Departments	
		Machine shop	Pac-king	Gen. plant	Store & Maintenace
Allocated Overheads:	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
Indirect Labour	14,650	4,000	3,000	2,000	5,650
Maintenace material	5,020	1,800	700	1,020	1,500
Misc. supplies	1,750	400	1,000	150	200
Superitendent's salary	4,000	-	-	4,000	-
Cost & Payroll salary	10,000	-	-	10,000	-
Overheads to be apportioned:					
Power	8,000				
Rent	12,000				
Fuel and heat	6,000				
Insurance	1,000				
Taxes	2,000				
Depreciation	1,00,000				
	1,64,420	6,200	4,700	17,170	7,350

The following data were compiled by means of the factory survey made in the previous year:

	Floor space	Radiator Sections	No. of employees	Investment (Rs.)	H.P hours
Machine shop	2000 Sq.ft.	45	20	6,40,000	3,500
Packing	800 Sq.ft	90	10	2,00,000	500
General Plant	400 Sq.ft	30	3	10,000	-

| Store & Maint. | 1600 Sq.ft | 60 | 5 | 1,50,000 | 1,000 |
| Total | 4800 Sq.ft | 225 | 38 | 10,00,000 | 5,000 |

Expenses charged to the stores and maintenance departments are to be distributed to the other departments by the following percentages:

Machine shop 50%; Packing 20%; General Plant 30%; General Plant overheads is distributed on the basis of number of employees:

a) Prepare an overhead distribution statement with supporting schedules to show computations and basis of distribution including distribution of the service department expenses to producing department.

b) Determine the service department distribution by the method of continued distribution. Carry through 3 cycles. Show all calculations to the nearest rupee.

Answer:

WN 1: Primary Overhead Distribution:

Particulars	Amount	Basis	MS	Pac	GP	S&M
Indirect Labour	14,650	Given	4,000	3,000	2,000	5,650
Maintenance Material	5,020	Given	1,800	700	1,020	1,500
Superintendent salary	4,000	Given			4,000	
Mis supplies	1,750	Given	400	1,000	150	200
Cost & payroll salary	10,000	Given			10,000	
Power	8,000	HP Hrs	5,600	800	-	1,600
Rent	12,000	Floor space	5,000	2,000	1,000	4,000
Fuel and Heat	6,000	Radiator Secs	1,200	2,400	800	1,600
Insurance	1,000	Investment	640	200	10	150
Taxes	2,000	Investment	1,280	400	20	300
Depreciation	1,00,000	Investment	64,000	20,000	1,000	15,000
Overheads post PD	1,64,420		83,920	30,500	20,000	30,000

- MS = Machine Shop; Pac = Packing; GP = General Plant; S&M = Stores and Maintenance

WN 2: Secondary Overhead Distribution under repeated distribution method:

Particulars	Amount	MS	Pac	GP	S&M
Overhead as per PD	1,64,420	83,920	30,500	20,000	30,000
Distribution of GP		11,429	5,714	-20,000	2,857
Distribution of S&M		16,429	6,571	9,857	-32,857
Distribution of GP		5,633	2,816	-9,857	1,408
Distribution of S&M		704	282	422	-1,408
Overhead as per PD		241	121	-422	60
Distribution of S&M		43	17	-	-60
Overheads post SD		**1,18,399**	**46,021**	**-**	**-**

- Overheads of General Plant has been distributed on the basis of number of employees. Overheads of Stores and Maintenance has been distributed on the basis of ratio given in question

30. Two-way service:

Modern Manufactures Ltd. has three Production Departments P1, P2, P3 and two Service Departments S1 and S2 details pertaining to which are as under:

	P1	P2	P3	S1	S2
Direct Wages (Rs.)	3,000	2,000	3,000	1,500	195
Working hours	3,070	4,475	2,419	-	-
Value of Machines (Rs.)	60,000	80,000	1,00,000	5,000	5,000
H.P of machines	60	30	50	10	-
Light Points	10	15	20	10	5
Floor space (Sq.ft)	2,000	2,500	3,000	2,000	500

The following figures extracted from the Accounting records are relevant:

Particulars	(Rs.)
Rent and Rates	5,000
General Lighting	600
Indirect wages	1,939
Power	1,500
Depreciation on machines	10,000
Sundries	9,695

The expenses of the Service Departments are allocated as under:

	P1	P2	P3	S1	S2
S1	20%	30%	40%	-	10%
S2	40%	20%	30%	10%	-

Find out the total cost of product X which is processed for manufacture in Departments P1, P2 and P3 for 4, 5 and 3 hours respectively, given that its Direct Material Cost is Rs. 50 and Direct Labour Cost is Rs. 30.

Answer:

WN 1: Primary Overhead Distribution

Particulars	Amount	Basis	P1	P2	P3	S1	S2
Rent and rates	5,000	Area	1,000	1,250	1,500	1,000	250
General Lighting	600	Light Points	100	150	200	100	50
Indirect wages	1,939	Direct wages	600	400	600	300	39
Power	1,500	HP of machines	600	300	500	100	-
Depreciation	10,000	Machine value	2,400	3,200	4,000	200	200
Sundries	9,695	Direct wages	3,000	2,000	3,000	1,500	195
Overheads post PD	**28,734**		**7,700**	**7,300**	**9,800**	**3,200**	**734**
Direct cost of SD	1,695		NA	NA	NA	1,500	195
Overheads to be distributed	**30,429**		**7,700**	**7,300**	**9,800**	**4,700**	**929**

Note:
- Power has been allocated on the basis of HP of machines. Working hours is not available for S1. In case the same was available then we can apportion power cost on the basis of HP of machines x working hours

WN 2: Secondary Overhead distribution (repeated distribution method):

Particulars	Amount	P1	P2	P3	S1	S2
Overheads to be distributed	30,429	7,700	7,300	9,800	4,700	929
Distribution of S1		940	1,410	1,880	-4,700	470
Distribution of S2		560	280	420	140	-1,399
Distribution of S1		28	42	56	-140	14
Distribution of S2		6	3	4	-	-14
Overheads post SD		**9,234**	**9,035**	**12,160**	**-**	**-**

WN 3: Computation of OAR:

Particulars	P1	P2	P3
1. Budgeted Overheads (WN 2)	9,234	9,035	12,160
2. Suitable base	Working hrs	Working hrs	Working hrs
3. Budgeted Suitable base	3,070	4,475	2,419
4. OAR (1/3)	**3.00/WH**	**2.02/WH**	**5.03/WH**

WN 4: Computation of cost of Job:

Particulars	Calculation	Amount
Direct Material cost		50.00

Direct Labour cost		30.00
Overhead cost		
P1	4 hrs x 3.00	12.00
P2	5 hrs x 2.02	10.10
P3	3 hrs x 5.03	15.15
Cost of Job		**117.25**

31. Two-way service

ABC Ltd. has three production departments P1, P2 and P3 and two service departments S1 and S2. The following data are extracted from the records of the Company for the month of October, 2013:

Particulars	(Rs.)
Rent and rates	62,500
General lighting	7,500
Indirect Wages	18,750
Power	25,000
Depreciation on machinery	50,000
Insurance of machinery	20,000

Other information:

	P1	P2	P3	S1	S2
Direct Wages (Rs.)	37,500	25,000	37,500	18,750	6,250
Horse Power of Machines used	60	30	50	10	-
Cost of Machinery (Rs.)	3,00,000	4,00,000	5,00,000	25,000	25,000
Floor space (Sq.ft)	2,000	2,500	3,000	2,000	500
Number of light Points	10	15	20	10	5
Production hours worked	6,225	4,050	4,100	-	-

Expenses of the service departments S1 and S2 are reapportioned as below:

	P1	P2	P3	S1	S2
S1	20%	30%	40%	-	10%
S2	40%	20%	30%	10%	-

Required:

     a. Compute overhead absorption rate per production hour of each production department.

     b. Determine the total cost of product X which is processed for manufacture in department P1, P2 and P3 for 5 hours, 3 hours and 4 hours respectively, given that its direct material cost is Rs. 625 and direct labour cost is Rs. 375.

Answer:

WN 1: Primary Overhead Distribution

Particulars	Amount	Basis	P1	P2	P3	S1	S2
Rent and rates	62,500	Area	12,500	15,625	18,750	12,500	3,125
General Lighting	7,500	Light Points	1,250	1,875	2,500	1,250	625
Indirect wages	18,750	Direct wages	5,625	3,750	5,625	2,813	938
Power	25,000	HP	10,000	5,000	8,333	1,667	-
Depreciation	50,000	Mac value	12,000	16,000	20,000	1,000	1,000
Insurance	20,000	Mac value	4,800	6,400	8,000	400	400
Overheads post PD	**1,73,750**		**46,175**	**48,650**	**63,208**	**19,630**	**6,088**
Direct cost of SD	25,000		NA	NA	NA	18,750	6,250
Overheads to be distributed	**2,08,750**		**46,175**	**48,650**	**63,208**	**38,380**	**12,338**

Note:

- Power has been allocated on the basis of HP of machines. Working hours is not available for S1. In case the same was available then we can apportion power cost on the basis of HP of machines x working hours

WN 2: Secondary Overhead distribution (repeated distribution method):

Particulars	Amount	P1	P2	P3	S1	S2
Overheads to be distributed	2,08,750	46,175	48,650	63,208	38,380	12,338
Distribution of S1		7,676	11,514	15,352	-38,380	3,838
Distribution of S2		6,470	3,235	4,853	1,618	-16,176
Distribution of S1		324	485	647	-1,618	162
Distribution of S2		65	32	49	16	-162
Distribution of S1		3	5	6	-16	2
Distribution of S2		1	-	1	-	-2
Overheads post SD		**60,714**	**63,921**	**84,116**	**-**	**-**

WN 3: Computation of OAR:

Particulars	P1	P2	P3
1. Budgeted Overheads (WN 2)	60,714	63,921	84,116
2. Suitable base	Working hrs	Working hrs	Working hrs
3. Budgeted Suitable base	6,225	4,050	4,100
4. OAR (1/3)	**9.75/WH**	**15.78/WH**	**20.52/WH**

WN 4: Computation of cost of Job:

Particulars	Calculation	Amount
Direct Material cost		625.00
Direct Labour cost		375.00
Overhead cost		
P1	5 hrs x 9.75	48.75
P2	3 hrs x 15.78	47.34
P3	4 hrs x 20.52	82.08
Cost of Job		**1,178.17**

32. Two-way service

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		
	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
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 Asset (Rs.)	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	-

Required:
- Prepare primary and secondary Overhead distribution

Answer:

WN 1: Primary Overhead Distribution:

Particulars	Amount	Basis	X	Y	Z	A	B
Indirect Material	1,25,000	Given	20,000	30,000	45,000	25,000	5,000
Indirect Labour	2,60,000	Given	45,000	50,000	70,000	60,000	35,000
Superintendent's salary	96,000	Given	-	-	96,000	-	-
Fuel & heat	15,000	Radiator sec	1,500	3,000	4,500	3,750	2,250
Power	1,80,000	KWH	52,500	60,000	45,000	22,500	-
Rent and rates	1,50,000	Area	44,000	40,000	30,000	24,000	12,000
Insurance	18,000	Capital value	4,000	6,000	5,000	1,000	2,000
Meal charges	60,000	Employees	12,000	14,000	24,000	6,000	4,000
Depreciation	2,70,000	Capital value	60,000	90,000	75,000	15,000	30,000
Overheads post PD	**11,74,000**		**2,39,000**	**2,93,000**	**3,94,500**	**1,57,250**	**90,250**

WN 2: Secondary Overhead Distribution (Repeated Distribution Method):

Particulars	Amount	P1	P2	P3	S1	S2
Overheads to be distributed	11,74,000	2,39,000	2,93,000	3,94,500	1,57,250	90,250
Distribution of A		47,175	47,175	31,450	-1,57,250	31,450
Distribution of B		30,425	48,680	30,425	12,170	-1,21,700
Distribution of A		3,651	3,651	2,434	-12,170	2,434
Distribution of B		609	974	609	243	-2,434
Distribution of A		73	73	49	-243	49
Distribution of B		14	22	14	-	-49
Overheads post SD		**3,20,947**	**3,93,575**	**4,59,481**	**-**	**-**

33. Computation of works cost:

Job No. 198 was commenced on October 10, 2011 and completed on November 1, 2011. Materials used were Rs. 600 and labour charged directly to the job was Rs. 400. Other information is as follows: Machine No. 215 used for 40 hours, the machine hour rate being Rs. 3.50. Machine No. 160 used for 30 hours, the machine hour rate being Rs. 4.00. 6 welders worked on the job for five days of 8 hours each: Direct labour hour per welder is 20P. Expenses not included for calculating the machine hour or direct labour hour rate totaled Rs. 2,000, total direct wages for the period being Rs. 20,000. Ascertain the works costs of job No.198.

Answer:

Computation of works cost:

Particulars	Calculation	Amount
Direct Material	Given	600
Direct Labour	Given	400
Factory Overheads		
Machine No.215	40 hrs x 3.50	140
Machine No.160	30 hrs x 4.00	120
Welders cost	6 x 40 hrs x 0.20	48

General Overheads	Note 1	40
Total Works Cost		**1,38**

Note:
1. The company did not consider Rs.2,000 while computing machine hour rate. This are general overheads and they would be absorbed on basis of direct wages. Direct wages for the period is Rs.20,000. Hence OAR for General Overheads is 10% of Direct wages. Overheads for Job 198 would be equal to Rs.40 (10% x 400).

34. Computation of Cost of Job

A light engineering factory fabricates machine parts to customers. The factory commenced fabrication of 12 Nos. machine parts to customers' specifications and the expenditure incurred on the job for the week ending 21st August, 2011 is given below:

	(Rs.)	(Rs.)
Direct materials (all items)		78
Direct labour (manual) 20 hours @		
Rs. 1.50 per hour		30
Machine facilities :		
Machine No. I : 4 hours @ Rs. 4.50	18	
Machine No. II : 6 hours @ Rs. 6.50	39	**57**
Total		165
Overheads @ Rs. 0.80 per hour on 20 manual hours		16
Total cost		181

The overhead rate of Rs. 0.80 per hour is based on 3,000 man hours per week; similarly, the machine hour rates are based on the normal working of Machine Nos. I and II for 40 hours out of 45 hours per week.

After the close of each week, the factory levies a supplementary rate for the recovery of full overhead expenses on the basis of actual hours worked during the week. During the week ending 21st August, 2011, the total labour hours worked was 2,400 and Machine Nos. I and II had worked for 30 hours and 32½ hours respectively.

Prepare a Cost Sheet for the job for the fabrication of 12 Nos. machine parts duly levying the supplementary rates.

Answer:

Cost Sheet for 12 Nos. of machine parts:

Particulars	Calculation	Amount
Direct Material	Given	78
Direct Labour	Given	30
Factory Overheads		
Machine no.1	4 hrs x 6.00	24
Machine no.2	6 hrs x 8.00	48
Overheads	20 hrs x 1.00	20
Total cost of job		**200**

Note:
1. **Machine 1:** Overhead recovery rate of Rs.4.50 per hour was on the basis of 40 working hours. Hence budgeted overheads of Machine 1 is Rs.180. Actual hours worked for Machine 1 is 30 hours and hence actual recovery rate is Rs.6.00 per hour (180/30). Rate of 6 would include original rate of 4.50 and supplementary recovery rate of 1.50
2. **Machine 2:** Overhead recovery rate of Rs.6.50 per hour was on the basis of 40 working hours. Hence budgeted overheads of Machine 2 is Rs.260. Actual hours worked for Machine 2 is 32.50 hours and hence actual recovery rate is Rs.8.00 per hour (260/32.50). Rate of 8 would include original rate of 6.50 and supplementary recovery rate of 1.50
3. **Other Overheads:** Overhead recovery rate of Rs.0.80 per hour was on the basis of 3,000 working hours. Hence budgeted overheads is Rs.2,400. Actual hours worked are 2,400 hours and hence actual recovery rate is Rs.1.00 per hour (2,400/2,400). Rate of 1.00 would include original rate of 0.80 and supplementary recovery rate of 0.20

35. Computation of Selling Price

A factory has three production departments. The policy of the factory is to recover the production overheads of the entire factory by adopting a single blanket rate based on the percentage of total factory overheads to total factory wages. The relevant data for a month are given below:

Department	Direct Materials (Rs.)	Direct Wages (Rs.)	Factory Overheads (Rs.)	Direct Labour hours	Machine hours
Budget:					
Machining	6,50,000	80,000	3,60,000	20,000	80,000
Assembly	1,70,000	3,50,000	1,40,000	1,00,000	10,000
Packing	1,00,000	70,000	1,25,000	50,000	-
Actual:					
Machining	7,80,000	96,000	3,90,000	24,000	96,000
Assembly	1,36,000	2,70,000	84,000	90,000	11,000
Packing	1,20,000	90,000	1,35,000	60,000	-

The details of one of the representative jobs produced during the month are as under:

Job No. CW 7083:

Dept	Direct Materials (Rs.)	Direct Wages (Rs.)	Direct Labour Hours	Machine hours
Machining	1,200	240	60	180
Assembly	600	360	120	30
Packing	300	60	40	-

The factory adds 30% on the factory cost to cover administration and selling overheads and profit.

Required:

- Calculate the overhead absorption rate as per the current policy of the company and determine the selling price of the Job No. CW 7083.
- Suggest any suitable alternative method(s) of absorption of the factory overheads and calculate the overhead recovery rates based on the method(s) so recommended by you.
- Determine the selling price of Job CW 7083 based on the overhead application rates calculated in (ii) above.
- Calculate the department wise and total under or over recovery of overheads based on the company's current policy and the method(s) recommended by you.

Answer:

WN 1: Computation of overhead absorption rate as per current policy:

Particulars	Calculation	Amount
Budgeted Factory Overheads	3,60,000 + 1,40,000 + 1,25,000	6,25,000
Budgeted Wages	80,000 + 3,50,000 + 70,000	5,00,000
OAR	$\dfrac{6,25,000}{5,00,000} \times 100$	125% of Direct Wages

WN 2: Determination of selling price of CW 7083 as per current policy:

Particulars	Calculation	Amount
Direct Material	1,200 + 600 + 300	2,100.00
Direct Wages	240 + 360 + 60	660.00
Factory Overheads	125% x 660	825.00
Factory Cost		**3,585.00**
Markup for admin, selling OH and Profit	30% x 3,585	1,075.50
Selling Price		**4,660.50**

WN 3: Alternative overhead recovery rates:

Particulars	Machining	Assembly	Packing
1. Budgeted Factory overheads	3,60,000	1,40,000	1,25,000
2. Suitable base	MH	DLH	DLH
3. Budgeted suitable base	80,000	1,00,000	50,000

4. OAR (1/3)		4.50/MH	1.40/DLH	2.50/DLH

- We can compute department wise OAR as compared to blanket recovery rate. Suitable base has been computed based either on MH/DLH

WN 4: Determination of selling price of CW 7083 as per revised policy:

Particulars	Calculation	Amount
Direct Material	1,200 + 600 + 300	2,100.00
Direct Wages	240 + 360 + 60	660.00
Factory Overheads		
Machining	180 x 4.50	810.00
Assembly	120 x 1.40	168.00
Packing	40 x 2.50	100.00
Factory Cost		**3,838.00**
Markup for admin, selling OH and Profit	30% x 3,838	1,151.40
Selling Price		**4,989.40**

WN 5: Computation of under/over absorption:
Current Policy:

Particulars	Machining	Assembly	Packing	Total
1. Overheads incurred	3,90,000	84,000	1,35,000	6,09,000
2. Overheads absorbed (125% of DW)	1,20,000	3,37,500	1,12,500	5,70,000
3. (Under)/over absorption	(2,70,00)	2,53,500	(22,500)	(39,000)

New Policy:

Particulars	Machining	Assembly	Packing	Total
1. Overheads incurred	3,90,000	84,000	1,35,000	6,09,000
2. Overheads absorbed (OAR x ASB)	4,32,000	1,26,000	1,50,000	7,08,000
3. (Under)/over absorption	42,000	42,000	15,000	99,000

36. **Reverse Working Problem**

In an engineering company, the factory overheads are recovered on a fixed percentage basis on direct wages and the administrative overheads are absorbed on a fixed percentage basis on factory cost.
The company has furnished the following data relating to two jobs undertaken by it in a period:

Particulars	Job 101	Job 102
	(Rs.)	(Rs.)
Direct materials	54,000	37,500
Direct wages	42,000	30,000
Selling price	1,66,650	1,28,250
Profit percentage on Total Cost	10%	20%

Required:
(i) Computation of percentage recovery rates of factory overheads and administrative overheads.
(ii) Calculation of the amount of factory overheads, administrative overheads and profit for each of the two jobs.
(iii) Using the above recovery rates fix the selling price of job 103. The additional data being:

        Direct materials   Rs. 24,000
        Direct wages   Rs. 20,000
        Profit percentage on selling price   12-½%

Answer:
WN 1: Computation of overhead recovery rates:
Let us assume factory overheads to be X percentage of direct wages and administrative overheads to be Y percentage of factory cost.

Particulars	Job No. 101	Job No. 102
Direct Materials	54,000	37,500
Direct Wages	42,000	30,000
Factory Overheads	42,000X	30,000X
Factory cost	**96,000 + 42,000X**	**67,500 + 30,000X**

Administrative overheads	(96,000 + 42,000X)Y	(67,500 + 30,000X)Y
Total cost	**96,000 + 42,000X + ((96,000 + 42,000X)Y)**	**67,500 + 30,000X+((67,500 + 30,000X)Y)**

Calculation of total cost:
- ❖ Job No.101 has a selling price of Rs.1,66,650 and it makes a profit of 10 percentage on cost. Hence selling price is 110% of cost and consequently cost is equal to Rs.1,51,500
- ❖ Job No.102 has a selling price of Rs.1,28,250 and it makes a profit of 20 percentage on cost. Hence selling price is 120% of cost and consequently cost is equal to Rs.1,06,875

Forming of two equations:
Cost of Job No.101: 96,000 + 42,000X + 96,000Y + 42,000XY = 1,51,500 ……………equation 1
Cost of Job No.102: 67,500 + 30,000X + 67,500Y + 30,000XY = 1,06,875 ……………equation 2
Solving two equations by multiplying second equation with 1.4 and then subtracting the same from equation 1
96,000 + 42,000X + 96,000Y + 42,000XY = 1,51,500 ………………equation 1
94,500 + 42,000X + 94,500Y + 42,000XY = 1,49,625 ………………(equation 2 * 1.4)
1,500 + 1,500Y = 1875 ………………………………………………….(equation 1 – equation 2)
Y = 375/1500; Y =0.25
We substitute Y of 0.25 in equation 1 and get the value of X
96,000 + 42,000X + 24,000 + 10,500X = 1,51,500
52,500X = 31,500; X = 0.6
Factory overheads = 60% of direct wages; Administration overheads = 25% of factory cost

WN 2: Calculation of factory overheads, administration overheads and profit for two jobs:

Particulars	Job No.101	Job No.102
Direct Materials	54,000	37,500
Direct Wages	42,000	30,000
Factory overheads (60% of wages)	25,200	18,000
Factory Cost	1,21,200	85,500
Admin overheads (25% of factory cost)	30,300	21,375
Total cost	**1,51,500**	**1,06,875**
Profit	15,150	21,375
Selling Price	**1,66,650**	**1,28,250**

WN3: Calculation of selling price for Job No.103:

Particulars	Job No.103
Direct Materials	24,000
Direct Wages	20,000
Factory overheads (60% of wages)	12,000
Factory Cost	56,000
Admin overheads (25% of factory cost)	14,000
Total cost	**70,000**
Profit (1/8 on sales or 1/7 on cost)	10,000
Selling Price	**80,000**

37. **Single rate versus dual rate for recovery**

PQR Ltd has its own power plant, which has two users, Cutting Department and Welding Department. When the plans were prepared for the power plant, top management decided that its practical capacity should be 1,50,000 machine hours. Annual budgeted practical capacity fixed costs are Rs. 9,00,000 and budgeted variable costs are Rs. 4 per machine-hour. The following data are available:

	Cutting Department	Welding Department	Total
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).

Answer:

WN 1: Allocation of power plant cost based on practical capacity:

Part 1: Computation of recovery rate:

Particulars	Amount
Fixed Power Plant Cost	9,00,000
Practical capacity	1,50,000
Fixed cost per hour (9,00,000/1,50,000)	6
Variable cost per hour	4
Recovery rate per hour	**10**

Part 2: Allocation of power cost:

Particulars	Amount
Cutting Department (60,000 x 10)	6,00,000
Welding Department (40,000 x 10)	4,00,000

WN 2: Allocation of power plant cost based on dual rate:

Particulars	Cutting Department	Welding Department
Fixed cost based on practical capacity	5,40,000 [90,000 x 6]	3,60,000 [60,000 x 6]
Variable cost based on actual capacity	2,40,000 [60,000 x 4]	1,60,000 [40,000 x 4]
Cost allocated	**7,80,000**	**5,20,000**

WN 3: Allocation of power plant cost based on dual rate:

Particulars	Cutting Department	Welding Department
Fixed cost based on practical capacity	3,60,000 [60,000 x 6]	2,40,000 [40,000 x 6]
Variable cost based on actual capacity	2,40,000 [60,000 x 4]	1,60,000 [40,000 x 4]
Cost allocated	**6,00,000**	**4,00,000**

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 Rs.3,00,000 (Rs.9,00,000 – Rs.3,00,000) 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

38. Machine hour rate

A machine costing Rs. 10,000 is expected to run for 10 years. At the end of this period its scrap value is likely to be Rs. 900. Repairs during the whole life of the machine are expected to be Rs. 18,000 and the machine is expected to run 4,380 hours per year on the average. Its electricity consumption is 15 units per hour, the rate per unit being 5 paise. The machine occupies one-fourth of the area of the department and has two points out of a total of ten for lighting. The foreman has to devote about one sixth of his

time to the machine. The monthly rent of the department is Rs. 300 and the lighting charges amount to Rs. 80 per month. The foreman is paid a monthly salary of Rs. 960. Find out the machine hour rate, assuming insurance is @ 1% p.a. and the expenses on oil, etc., are Rs. 9 per month.

Answer:

Computation of Machine Hour Rate:

Particulars	Calculation	Amount
Depreciation	(10,000 – 900)/10	910
Repairs	18,000/10	1,800
Electricity	4,380 x 15 units x 5 paise	3,285
Rent	300 x 12 months x (1/4)	900
Lighting	80 x 12 months x (2/10)	192
Foreman	960 x 12 months x (1/6)	1,920
Insurance	10,000 x 1%	100
Oil	9 x 12	108
Total expenses for year		**9,215**
Machine hours		**4,380**
Machine hour rate	$\dfrac{9,215}{4,380}$	**2.104**

39. **Machine hour rate**

A machine shop has 8 identical Drilling machines manned by 6 operators. The machine cannot be worked without an operator wholly engaged on it. The original cost of all these machines works out to Rs. 8 lakhs. These particulars are furnished for a 6 months period:

Normal available hours per month	208
Absenteeism (without pay) hours	18
Leave (with pay) hours	20
Normal idle time unavoidable-hours	10
Average rate of wages per worker for 8 hours a day.	Rs. 20
Production bonus estimated	15% on wages
Value of power consumed	Rs. 8,050
Supervision and indirect labour	Rs. 3,300
Lighting and electricity	Rs. 1,200

These particulars are for a year

- Repairs and maintenance including consumables 3% of value of machines
- Insurance Rs. 40,000
- Depreciation 10% of original cost
- Other sundry works expenses Rs. 12,000
- General management expenses allocated Rs. 54,530.

You are required to work out a comprehensive machine hour rate for the machine shop.

Answer:

- Expenses and hours are computed for 6 months to calculate MHR. Alternatively, this can be computed for a month or year.

Particulars	Calculation	Amount
Depreciation	8,00,000 x 10% /2	40,000
Operator wages	$\dfrac{20}{8}$ x 190 x 6 months x 6 operators	17,100
Production bonus	15% x 17,100	2,565
Power	Given	8,050
Supervision and indirect labour	Given	3,300
Lighting and electricity	Given	1,200
Repairs and maintenance	8,00,000 x 3% x 6/12	12,000
Insurance	40,000/2	20,000
Other sundry expenses	12,000/2	6,000
General management expenses	54,530/2	27,265
Total overheads of machine		1,37,480

Effective working hours	(208 – 18 – 20 -10) x 6 workers x 6 months	5,760
Machine hour rate	$\dfrac{1,37,480}{5,760}$	**23.87**

Note:
- Machine cannot be operated without operator. There are 8 machines but number of workers are 6. Since machine cannot be operated without operator, the number of machine hours is computed on the basis of 6 workers/6 operators

40. Multiple Machine Hour Rate

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 Rs. 5,00,000.
- Life 10 years. Estimated scrap value at the end of life is Rs. 20,000.

Particulars	(Rs.)
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 Rs. 2 per unit	

Power is required for productive purposes only. Set up time, though productive, does not require power. The Supervisor and Operator are permanent. Repairs and maintenance and consumable stores vary with the running of the machine.

Required

Calculate a two-tier machine hour rate for (a) set up time, and (b) running time

Answer:

Computation of Machine Hour Rate for Setting up time and Running Time:

Particulars	Common Costs	Setting up costs	Running Costs
Depreciation	48,000 [5,00,000 – 20,000]/10		
Repairs and Maintenance			60,480
Consumable stores			47,520
Rent	12,000 [72,000/6]		
Supervisor salary	24,000 [6,000 x 12 /3 machines]		
Operator wages	30,000 [2,500 x 12]		
General lighting	12,000 [1,000 x 12]		
Power cost			1,08,000 [25 units x Rs.2 x 180 x 12]
Total cost (A)	**1,26,000**	**0**	**2,16,000**
Machine hours (B)	**2,400** [2,160 + 240]	**240** [20 x 12]	**2,160** [180 x 12]
Machine hour rate (A/B)	**52.50**	**0**	**100**

Note:
- Repairs and maintenance, consumable stores and power cost have been considered as running cost. This is because it is assumed that these costs are not incurred for set-up activity
- MHR for setting up time = 52.50 + 0 = Rs.52.50 per hour
- MHR for running time = 52.50 + 100 = Rs.152.50 per hour

41. Computation of comprehensive machine hour rate

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)	Rs. 3,24,000
Normal working hours for the month (The machine works for only 75% of normal capacity)	200 hours
Wages to Machine-man	Rs. 125 per day (of 8 hours)
Wages to Helper (machine attendant)	Rs. 75 per day (of 8 hours)
Power cost for the month for the time worked	Rs. 15,000
Supervision charges apportioned for the machine centre for the month	Rs. 3,000
Electricity & Lighting for the month	Rs. 7,500
Repairs & maintenance (machine) including Consumable stores per month	Rs. 17,500
Insurance of Plant & Building (apportioned) for the year	Rs. 16,250
Other general expense per annum	Rs. 27,500

The workers are paid a fixed Dearness allowance of Rs.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.

Answer:

Computation of Machine Hour Rate:

Particulars	Calculation	Amount
Depreciation	3,24,000 x 10%	32,400
Wages to machine-man	125 x 25 days x 12 months	37,500
Wages to helper	75 x 25 days x 12 months	22,500
Workers dearness allowance	1,575 x 2 workers x 12 months	37,800
Production bonus	33.33% x (37,500 + 22,500 + 37,800)	32,600
Leave wages and holidays	10% x (37,500 + 22,500 + 37,800)	9,780
Power cost	15,000 x 12 months	1,80,000
Supervision charges	3,000 x 12 months	36,000
Electricity charges	7,500 x 12 months	90,000
Repairs and maintenance	17,500 x 12 months	2,10,000
Insurance	Given	16,250
Other General expenses	Given	27,500
Total overheads of machine per year		**7,32,330**
Machine hours per year	200 x 75% x 12	1,800
Machine hour rate	$\dfrac{7,32,330}{1,800}$	**406.85**

Note:
- Machine cost and machine hours have been calculated for a year. Alternatively, it can also be calculated for a month. The answer would remain same.

42. Machine Hour Rate

A machine costing Rs. 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 Rs. 10,000. The total cost of all the machines including new one was Rs. 90 lakhs. The other information is given as follows:

Working hours of the machine for the year was 4,200 including 200 non-productive hours. Repairs and maintenance for the new machine during the year was Rs. 5,000.
   (i)   Insurance Premium was paid for all the machine Rs. 9,000.
   (ii) New machine consumes 8 units of electricity per hour, the rate per unit being Rs. 3.75
   (iii) The new machine occupies 1/10th area of the department. Rent of the department is Rs. 2,400 per month.
   (iv) Depreciation is charged on straight line basis.
Compute machine hour rate for the new machine.

Answer:

Computation of Machine Hour Rate:

Particulars	Calculation	Amount

Insurance Premium	$9,000 \times \dfrac{10 \text{ lacs}}{90 \text{ lacs}}$	1,000
Electricity	8 units x 3.75 x 4,000 hours	1,20,000
Repairs and Maintenance	Given	5,000
Rent	$2,400 \times 12 \times \dfrac{1}{10}$	2,880
Depreciation	$\dfrac{10,00,000 - 10,000}{10}$	99,000
Total Cost		2,27,880
Effective machine hours	4,200 – 200	4,000
Machine hour rate	$\dfrac{2,22,880}{4,000}$	**56.97**

43. Computation of Selling Price

Maximum production capacity of JK Ltd. is 5,20,000 units per annum. Details of estimated cost of production are as follows:
   (i)   Direct material Rs. 15 per unit.
   (ii) Direct wages Rs. 9 per unit (subject to a minimum of Rs. 2,50,000 per month).
   (iii) Fixed overheads Rs. 9,60,000 per annum.
   (iv) Variable overheads Rs. 8 per unit.
   (v)   Semi-variable overheads are Rs. 5,60,000 per annum up to 50 per cent capacity and additional Rs. 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 Rs. 44 during the first three months.

You are required, what selling price per unit should be fixed for the remaining nine months to yield a total profit of Rs. 15,62,500 for the whole year.

Answer:

Computation of Selling Price:

Particulars	First 3 Months	Next 9 Months	Total
Direct Material	11,70,000 [78,000 x 15]	52,65,000 [3,51,000 x 15]	64,35,000
Direct Labour	7,50,000 [Note]	31,59,000 [3,51,000 x 9]	39,09,000
Fixed Overheads	2,40,000 [9,60,000 x 3/12]	7,20,000 [9,60,000 x 9/12]	9,60,000
Variable Overheads	6,24,000 [78,000 x 8]	28,08,000 [3,51,000 x 8]	34,32,000
Semi-variable OH	1,77,500 [Note]	6,45,000 [Note]	8,22,500
Total cost	**29,61,500**	**1,25,97,000**	**1,55,58,500**
Profit	4,70,500 [34,32,000 – 29,61,500]	10,92,000 [15,62,500 – 4,70,500]	15,62,500
Sales	34,32,000 [78,000 x 44]	**1,36,89,000** [1,25,97,000 + 10,92,000]	1,71,21,000

Selling Price for 9 months $= \dfrac{1,36,89,000}{3,51,000} = $ **Rs. 39 per unit**

Note:
   - Capacity per month = 5,20,000/12 = 43,333.33 units
   - **First 3 months:** Utilization per month = 43,333.33 x 60% = 26,000 units. Total sales for 3 months = 26,000 x 3 = 78,000 units
   - **Next 9 months:** Utilization per month = 43,333.33 x 90% = 39,000 units. Total sales for 9 months = 39,000 x 9 = 3,51,000 units
   - **Labour cost:** Labour cost for first 3 months will be higher of the following:
      o   2,50,000 x 3 months = Rs.7,50,000
      o   78,000 x 9 = Rs.7,02,000

- **Semi-variable OH:**
  - **First 3 months:** Capacity utilization for first 3 months is 60%. Semi-variable overheads per annum for 60% utilization is Rs.7,10,000 [5,60,000 + 1,50,000]. Hence semi-variable overheads for 3 months = 7,10,000 x (3/12) = Rs.1,77,500
  - **Next 9 months:** Capacity utilization for next 9 months is 90%. Semi-variable overheads per annum for 90% utilization is Rs.8,60,000 [5,60,000 + 1,50,000 + 1,50,000]. Hence semi-variable overheads for 9 months = 8,60,000 x (9/12) = Rs.6,45,000

- **Semi-variable OH:**
  - **First 3 months:** Capacity utilization for first 3 months is 60%. Semi-variable overheads per annum for 60% utilization is Rs.7,10,000 [5,60,000 + 1,50,000]. Hence semi-variable overheads for 3 months = 7,10,000 x (3/12) = Rs.1,77,500

CHAPTER 5: ACTIVITY BASED COSTING

1. What are the factors prompting development of ABC? **[Category B]**
   ❖ Growing overhead costs because of increasingly automated production
   ❖ Increasing market competition and hence the need for accurate costs
   ❖ Increasing product diversity to secure economies of scope and increased market share
   ❖ Decreasing costs of information processing

2. Explain the situations in which ABC is useful? **[Category B]**
   ❖ High amount of overhead
   ❖ Wide range of products
   ❖ Presence of non-volume related activities
   ❖ Stiff competition

3. What is ABC? **[Category A]**
   ❖ ABC is an accounting methodology that assigns costs to activities rather than products or services
   ❖ ABC assigns cost to activities based on their use of resources. It then assigns costs to cost objects, such as products or services, based on their use of activities

4. Explain the various terms associated with ABC? **[Category A]**

Activity	Activity refers to an event that incurs cost
Cost object	It is an item for which cost measurement is required
Cost driver	It is a factor that causes a change in the cost of an activity. It can either be a resource cost driver or activity cost driver
Resource cost driver	It is a measure of quantity of resources consumed by an activity
Activity cost driver	It is a measure of frequency and intensity of demand placed on activities by cost objects
Cost pool	It represents a group of various individual cost items having same cause effect relationship

5. Differentiate ABC and traditional absorption costing system? **[Category A]**

Activity Based Costing	Traditional Absorption Costing
Overheads are related to activities and grouped into activity cost pools	Overheads are related to cost centers/departments
Costs are related to activities and hence are more realistic	Costs are related to cost centers and hence not realistic
Activity-wise cost drivers are determined	Time is assumed to be the cost driver governing costs in all departments
Activity-wise recovery rates are determined and there is no concept of single overhead recovery rate	Either multiple overhead recovery rates are determined or a single overhead recovery rate may be determined for absorbing overheads
Costs are assigned to cost objects	Costs are assigned to cost units

6. What are the different types of activities under ABC? **[Category A]**

Activities basically fall into four different categories, known as the manufacturing cost hierarchy. These categories were first identified by Cooper in 1990 and help to determine the type of activity cost driver required. The categories are:

(i) **Unit level activities:** These are activities for which the consumption of resources can be identified with the number of units produced. E.g. Use of indirect materials, Inspection or testing of every item produced or say every 100th item produced, Indirect consumables, etc.

(ii) **Batch level activities:** The costs of some activities (mainly manufacturing support activities) are driven by the number of batches of units produced. These are activities related to setting up of a batch or a production run. The costs of such activities vary with

the number of batches made, but is fixed for all units within that batch. E.g. Production scheduling, Material movement, Machine set up costs, Inspection of products – like first item of every batch, etc.

(iii) **Product level activities:** The costs of some activities (often once only activities) are driven by the creation of a new product line and its maintenance. These are activities performed to support different products in the product line. E.g. Designing the product, Producing parts to a certain specification, Advertising costs, if advertisement is for individual products, etc.

(iv) **Facility level activities:** These are activities necessary for sustaining the manufacturing process and cannot be directly attributed to individual products. E.g. Maintenance of buildings, Plant security, Production manager's salaries, Advertising campaigns promoting the co., etc.

7. What are various stages in ABC implementation? **[Category C]**
- ❖ Identify the different activities within the organization
- ❖ Relate the overheads to the activities
- ❖ Support activities are then spread across the primary activities
- ❖ Determine the activity cost drivers
- ❖ Calculate activity cost driver rate for each activity
  - o Activity cost driver rate = Total cost of activity / activity driver

8. What are the advantages and limitations of ABC? **[Category B]**

Advantages:	Limitations:
✓ Accurate costing of products/services	✓ More expensive than traditional method
✓ Overhead allocation is done on logical basis	✓ Not helpful for small organization
✓ Enables better pricing policies	✓ May not be applied to organization with very limited products
✓ Utilizes unit cost rather than just total cost	✓ Selection of most suitable cost driver may not be helpful
✓ Help to identify non-value added activities	
✓ Helpful to organization with multiple product	
✓ Highlights problem areas which require attention	

9. What are the requirements of ABC implementation? **[Category B]**
- ❖ Staff Training
- ❖ Process specification
- ❖ Activity definition
- ❖ Activity driver selection
- ❖ Assigning cost

10. How ABC can be used as a decision-making tool? **[Category B]**
- ❖ ABC with other techniques can be used to improve performance and profitability
- ❖ Wholesale distributors can gain significant advantage in the decision making process by correlating costs to various activity
- ❖ Can assist in decisions related to facility and resource expansion
- ❖ Decision support for human resource can be augmented
- ❖ Companies who wish to determine price based on cost plus markup basis find ABC method of costing very relevant

11. What is activity based management? **[Category A]**
- ❖ Use of ABC as a costing tool to manage costs at activity level is known as activity based cost management (ABM)
- ❖ ABM focuses on efficient and effective management of activities to continuously improve the value received by customers

❖ Various analysis of ABM include:
  o **Cost driver analysis** – Cost driver analysis identifies the casual factors that causes a cost to take place
  o **Activity analysis** – Activities are classified into valued-added activities and non-value added activities. Valued added activities are those activities which are indispensable in order to complete the process. Non-value added activity represents work that is not valued by the external or internal customer
  o **Performance analysis** – Identification of appropriate measures to report the performance of activity centers
❖ ABM can be used for cost reduction, business process re-engineering, benchmarking and performance assessment

12. What is activity based budgeting? **[Category B]**
❖ Activity based budgeting (ABB) analyse the resource input or cost for each activity
❖ It provides a framework for estimating the amount of resource required in accordance with budgeted level of activity. Actual results can be compared with budgeted results to highlight discrepancies
❖ It means planning and controlling the expected activities of the organization to derive a cost-effective budget that meets forecast workload and agreed strategic goals
❖ **Benefits:** ABB can enhance accuracy of financial forecasts. It can also rapidly and accurately produce financial plans and models. ABB eliminates much of the needless work created by traditional budgeting techniques

1. **Basic sum in ABC Costing – Allocation of activity costs to products**

You have been appointed as a management consultant by XYZ ltd – a key manufacturer of machining tools. You need to analyse how application of activity-based costing (ABC) to costing of the company's product lines would improve product costing and help it price its product offerings in a more efficient manner. Details of the four products and relevant information are given below for one period:

Product	P	Q	R	S
Output in units	150	120	60	90
Costs per unit	Rs.	Rs.	Rs.	Rs.
Direct material	50	60	40	80
Direct labour	32	24	18	20
Machine hours (per unit)	5	4	3	2

The four products are similar and are usually produced in production runs of 15 units and sold in batches of 10 units. The production overhead is currently absorbed by using a machine hour rate, and the total of the production over head has been analysed as follows:

	Rs.
Machine department costs (rent, Business, rates, depreciation and Supervision)	18,960
Set-up costs	5,600
Stores receiving	4,000
Inspection/quality control	1,620
Material handling and dispatch	7,980

You have identified 'cost drivers'to be used are as listed below for the overhead costs shown:

Cost	Cost Driver
Set-up costs	Number of production runs
Stores receiving	Requisitions raised
Inspection/quality control	Number of production runs
Materials handling and dispatch	Orders executed

The number of requisitions raised on the stores was 20 for each product and the number of orders executed was 42, each order being for a batch of 10 of a product.

Requirements

❖ Calculate the total costs for each product if all overhead costs are absorbed on a machine-hour basis.

❖ Calculate the total cost of each product, using activity-based costing.

❖ Compare the two costs under the two scenarios and identify the implications this could have on pricing and profit.

Answer:

WN 1: Computation of OAR under traditional system:

Particulars	Amount
Budgeted Overheads (A)	38,160
Suitable base	Machine hours
Budgeted suitable base (B) [150 x 5+ 120x 4 + 60 x 3 + 90 x 2]	1,590
OAR (A/B)	**Rs.24/MH**

WN 2: Computation of total cost under traditional system:

Particulars	P	Q	R	S
Direct Material	50	60	40	80
Direct Labour	32	24	18	20
Overheads (24 x MH/unit)	120	96	72	48
Cost per unit	**202**	**180**	**130**	**148**
Number of units	150	120	60	90
Total Costs	**30,300**	**21,600**	**7,800**	**13,320**

WN 3: Computation of CDR (Cost Driver Rate) under ABC:

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Machining	18,960	Machine hours	1,590	11.9245/MH
Setting-up	5,600	No of production runs	28	200/run
Store receiving	4,000	Requisition raised	80	50/requisition
Inspection	1,620	No of production runs	28	57.8571/run
Material handling	7,980	Orders executed	42	190/order

CDR calculation:

No of Production Runs $= \dfrac{150}{15} + \dfrac{120}{15} + \dfrac{60}{15} + \dfrac{90}{15} = 28$ Production runs

WN 4: Apportionment of Overheads as per ABC:

Particulars	Product P CDQ	Amount	Product Q CDQ	Amount	Product R CDQ	Amount	Product S CDQ	Amount
Machining	750	8,943	480	5,724	180	2,146	180	2,146
Setting-up	10	2,000	8	1,600	4	800	6	1,200
Store receiving	20	1,000	20	1,000	20	1,000	20	1,000
Inspection	10	579	8	463	4	231	6	347
Material handling	15	2,850	12	2,280	6	1,140	9	1,710
Total overheads		**15,372**		**11,067**		**5,317**		**6,403**
No of units		150		120		60		90
Overhead cost per unit		**102.4800**		**92.2250**		**88.6167**		**71.1444**

WN 5: Computation of total cost under ABC:

Particulars	P	Q	R	S
Direct Material	50	60	40	80
Direct Labour	32	24	18	20
Overheads (WN 4)	102.48	92.225	88.6167	71.1444
Cost per unit	**184.48**	**176.225**	**146.6167**	**171.1444**
Number of units	150	120	60	90
Total Costs	**27,672**	**21,147**	**8,797**	**15,403**

WN 6: Implications on Pricing and Profit:

Particulars	P	Q	R	S
Cost per unit:				
Traditional Method	202	180	130	148
ABC System	184.48	176.225	146.6167	171.1444
Implications on pricing	Over-priced	Over-priced	Under-priced	Under-priced
Implication on profit	Low volumes but high profit per unit	Low volumes but high profit per unit	High volumes with low profit per unit	High volumes with low profit per unit

2. **ABC Basics – Homework:**

Linex Limited manufactures three products P, Q and R which are similar in nature and are usually produced in production runs of 100 units. Product P and R require both machine hours and assembly hours, whereas product Q requires only machine hours. The overheads incurred by the company during the first quarter are as under:

Particulars	Amount
Machine department expenses	18,48,000
Assembly department expenses	6,72,000
Setup costs	90,000
Stores receiving cost	1,20,000
Order processing and dispatch	1,80,000

Inspection and quality control cost	36,000

The data related to the three products during the period are as under:

Particulars	P	Q	R
Units produced and sold	15,000	12,000	18,000
Machine hours worked	30,000	48,000	54,000
Assembly hours worked (Direct labour hours)	15,000	-	27,000
Customers orders executed (in numbers)	1,250	1,000	1,500
Number of requisitions raised on the stores	40	30	50

Required:

Prepare a statement showing details of overhead costs allocated to each product type using activity-based costing

Answer:

WN 1: Computation of CDR (Cost Driver Rate) under ABC:

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Machining	18,48,000	Machine hours	1,32,000	14/MH
Assembling	6,72,000	Direct Labour hours	42,000	16/DLH
Setting-up	90,000	No of production runs	450	200/run
Stores receiving	1,20,000	Requisitions raised	120	1,000/requisition
Order processing	1,80,000	Orders executed	3,750	48/order
Inspection	36,000	No of production runs	450	80/run

CDR calculation:

$$\text{No of Production Runs} = \frac{15,000}{100} + \frac{12,000}{100} + \frac{18,000}{100} = 450 \text{ Production runs}$$

WN 2: Apportionment of Overheads under ABC:

	Product P		Product Q		Product R	
Particulars	CDQ	Amount	CDQ	Amount	CDQ	Amount
Machining	30,000	4,20,000	48,000	6,72,000	54,000	7,56,000
Assembling	15,000	2,40,000		-	27,000	4,32,000
Setting-up	150	30,000	120	24,000	180	36,000
Store receiving	40	40,000	30	30,000	50	50,000
Order processing	1,250	60,000	1,000	48,000	1,500	72,000
Inspection	150	12,000	120	9,600	180	14,400
Total overheads		**8,02,000**		**7,83,600**		**13,60,400**
No of units		15,000		12,000		18,000
Overhead cost per unit		**53.4667**		**65.3000**		**75.5778**

3. **ABC – Basics:**

CDE Limited is following Activity based costing. Budgeted overheads, cost drivers and volume are as follows:

Cost Pool	Budgeted Overheads	Cost Driver	Budgeted Volume
Material procurement	18,42,000	No of orders	1,200
Material handling	8,50,000	No of movement	1,240
Maintenance	24,56,000	Maintenance hours	17,550
Set-up	9,12,000	No of set-ups	1,450
Quality control	4,42,000	No of inspection	1,820

The company has produced a batch of 7,600 units, its material cost was Rs.24,62,000 and wages Rs.4,68,500. Usage activities of the said batch are as follows:

Material orders	56
Material movements	84
Maintenance hours	1,420 hours

Set-ups	60
No of inspections	18

Required:
 a. Calculate cost driver rates
 b. Calculate the total and unit cost for the batch

Answer:

WN 1: Computation of Cost Driver Rates under ABC:

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Material procurement	18,42,000	No of orders	1,200	1,535.00
Material handling	8,50,000	No of movement	1,240	685.48
Maintenance	24,56,000	Maintenance hours	17,550	139.94
Set-up	9,12,000	No of set-ups	1,450	628.97
Quality Control	4,42,000	No of inspection	1,820	242.86

WN 2: Apportionment of overheads under ABC:

Particulars	Product	
	CDQ	Amount
Material procurement	56	85,960
Material handling	84	57,580
Maintenance	1,420	1,98,715
Set-up	60	37,738
Quality Control	18	4,371
Total overheads		**3,84,364**

WN 3: Computation of total and unit cost of batch:

Particulars	Amount
Direct Material	24,62,000
Direct Labour	4,68,500
Overheads (WN 2)	3,84,364
Total cost (A)	**33,14,864**
No of units (B)	7,600
Cost per unit (A/B)	**436.17**

4. ABC Costing – Allocation of costs to activities and then to products

Golden North Ltd. manufactures for products, namely A, B, C and using the same plant and process. The following information relates to a product Production Period:

	Product A	Product B	Product C	Product D
Output in units	720	600	480	504
Cost Per units:	Rs.	Rs.	Rs.	Rs.
Direct Material	42	45	40	48
Direct Labour	10	9	7	8
Machine hours per unit	4 hrs.	3hrs.	2hrs	1hr.

The four products are similar and are usually produced in production runs of 24 units and sold in batches of 12 units. Using machine hour rate currently absorbs the production overheads. The total overheads incurred by the company for the period is as follows:

Machine operation and Maintenance cost (Rs.)	63,000
Setup cost (Rs.)	20,000
Store receiving (Rs.)	15,000
Inspection (Rs.)	10,000
Material handling and dispatch (Rs.)	2,592

During the period the following cost drivers are to be used for the overhead cost:

Activity	Cost Driver
Setup cost	No. of production runs

Store Receiving	Requisition raised
Inspection	No. of production runs
Material handling and dispatch	Order executed

It is also determined that:
- ❖ Machine operation and maintenance cost should be apportioned between setup cost, Store receiving and inspection activity in 4:3:2.
- ❖ Number of requisition raised on store is 50 for each product and the no. of order executed is 192, each order being for a batch of 12 of product.

Required:
- ❖ Calculate the total cost of product, if all overhead costs are absorbed on machine hour rate basis
- ❖ Calculate the total cost of each product using activity base costing.
- ❖ Comment briefly on differences disclosed between overhead traced by present system and those traced by activity based costing.

Answer:
WN 1: Computation of OAR under traditional system:

Particulars	Amount
Budgeted Overheads (A)	1,10,592
Suitable base	Machine hours
Budgeted suitable base (B) [720 x 4+ 600x 3 + 480 x 2 + 504 x 1]	6,144
OAR (A/B)	Rs.18/MH

WN 2: Computation of total cost under traditional system:

Particulars	A	B	C	D
Direct Material	42	45	40	48
Direct Labour	10	9	7	8
Overheads (18 x MH/unit)	72	54	36	18
Cost per unit	124	108	83	74
Number of units	720	600	480	504
Total Costs	89,280	64,800	39,840	37,296

WN 3: Computation of CDR (Cost Driver Rate) under ABC:

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Setting-up	48,000	No of production runs	96	500/run
Stores receiving	36,000	Requisitions	200	180/requisition
Inspection	24,000	No of production runs	96	250/run
Material Handling	2,592	Orders	192	13.50/order

Note:

Setting up cost $= 20,000 + \left(\frac{4}{9} \times 63,000\right) = 48,000$

Store receiving cost $= 15,000 + \left(\frac{3}{9} \times 63,000\right) = 36,000$

Inspection cost $= 10,000 + \left(\frac{2}{9} \times 63,000\right) = 24,000$

CDR:

No of production runs $= \frac{720}{24} + \frac{600}{24} + \frac{480}{24} + \frac{504}{24} = 96$ Production runs

WN 4: Apportionment of overheads as per ABC:

Particulars	A		B		C		D	
	CDQ	Rs.	CDQ	Rs.	CDQ	Rs.	CDQ	Rs.
Setting-up	30	15,000	25	12,500	20	10,000	21	10,500
Store receiving	50	9,000	50	9,000	50	9,000	50	9,000
Inspection	30	7,500	25	6,250	20	5,000	21	5,250
Material handling	60	810	50	675	40	540	42	567

Total overheads		32,310		28,425		24,540		25,317
No of units		720		600		480		504
Overhead cost per unit		44.8750		47.3750		51.1250		50.2321

WN 5: Computation of total cost under ABC:

Particulars	A	B	C	D
Direct Material	42	45	40	48
Direct Labour	10	9	7	8
Overheads	44.8750	47.3750	51.1250	50.2321
Cost per unit	96.8750	101.3750	98.1250	106.2321
Number of units	720	600	480	504
Total Costs	69,750	60,825	47,100	53,541

WN 6: Comparison of overheads under traditional and ABC:

Particulars	A	B	C	D
Overheads per unit:				
Traditional	72	54	36	18
ABC	44.875	47.375	51.125	50.2321

- Product A and B are having higher cost per unit under traditional system. This is because higher proportion of overheads are traced to these products under traditional system. Consequently, they would be overpriced and will have lower sales volumes
- Product C and D are having lower cost per unit under traditional system. This is because lower proportion of overheads are traced to these products under traditional system. Consequently, they would be underpriced and will have higher sales volumes

5. Development of ABC System

During the last 20 years, JPY Ltd's manufacturing operation has become increasingly automated with computer-controlled robots replacing operators. JPY currently manufactures over 100 products of varying levels of design complexity. A single plant wise overhead absorption rate, base on direct labour hours, is used to absorb overhead costs. In the quarter ended March, JPY's manufacturing overhead costs were:

	(Rs.000)
Equipment Operation Expense	125
Equipment Maintenance Expens	25
Wages Paid to Technicians	85
Wages Paid to Store Men	35
Wages Paid to Despatch Staff	40

During the quarter, the company reviewed the Cost Accounting System and   concluded that absorbing overhead costs to individual products on a labour hour absorption basis is meaningless. Overhead costs should be attributed to products using an Activity Based Costing (ABC) system and the following was identified as the most significant activities.

- ❖ Receiving component consignments from suppliers
- ❖ Setting up equipment for production runs
- ❖ Quality inspections
- ❖ Despatching goods as per customer's orders.

It was further observed that in the short-term JPY's overhead are 40% fixed and 60% variable. Approximately, half the variable overheads vary in relating to direct labour hours worked and half very in relation to the number of quality inspections. Equipment operation and maintenance expense are apportioned as:

Component stores 15%, manufacturing 70% and goods dispatch 15%

Technicians's wages are apportioned as"

- ❖ Equipment maintenance 30%, set up equipment for production runs 40% and quality inspection 30%

During the quarter:

- ❖ A total of 2,000 direct labour hours were worked (paid at Rs. 12 per hr.)

❖ 980 components consignments were received from suppliers
❖ 1020 production runs were set up
❖ 640 quality inspections were carried out
❖ 420 orders were dispatched to customers.

JPY's production during the quarter included components R, S and T. The following information is available:

	Component R	Component S	Component T
Direct Material	Rs. 1,200	Rs. 2,900	Rs. 1,800
Direct Labour Hrs worked	25	480	50
Component Consignments Recd.	42	24	28
Production Runs	16	18	15
Quality Inspections	10	8	18
Orders (goods) despatched	22	85	46
Quantity Produced	560	12,800	2,400

Required:
❖ Calculate the unit cost of R, S and T components, using JPY's existing cost accounting system.
❖ Explain how an ABC system would be developed using the information given.
❖ Calculate the unite cost of components R, S and T using ABC system.

Answer:

WN 1: Computation of OAR under traditional system:

Particulars	Amount
Budgeted Overheads (A)	3,10,000
Suitable base	Direct Labour Hours
Budgeted suitable base (B)	2,000
OAR (A/B)	**155**

WN 2: Computation of cost per unit under traditional system:

Particulars	Component R	Component S	Component T
Direct Material	1,200	2,900	1,800
Direct Labour (hours x 12)	300	5,760	600
Overheads (hours x 155)	3,875	74,400	7,750
Total cost	**5,375**	**83,060**	**10,150**
No of units	560	12,800	2,400
Cost per unit	**9.5982**	**6.4891**	**4.2292**

WN 3: Computation of costs of various activities:

Particulars	Receiving	Setting up	Quality inspection	Despatching
Equipment operation	18,750	87,500	-	18,750
Equipment maintenance	3,750	17,500		3,750
Technician wages				
To equipment maintenance (30%)	3,825	17,850		3,825
To others (70%)		34,000	25,500	
Store men wages	35,000			
Despatch staff wages				40,000
Total cost	**61,325**	**1,56,850**	**25,500**	**66,325**

WN 4: Computation of Cost Driver Rate under ABC:

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Receiving	61,325	Consignments received	980	62.5765
Setting-up	1,56,850	Production runs	1,020	153.7745
Quality inspection	25,500	Quality inspections	640	39.8438
Dispatching	66,325	Order dispatched	420	157.9167

WN 5: Apportionment of Overheads under ABC:

Particulars	Component R CDQ	Component R Amount	Component S CDQ	Component S Amount	Component T CDQ	Component T Amount
Receiving	42	2,628	24	1,502	28	1,752
Setting up	16	2,460	18	2,768	15	2,307
Quality inspection	10	398	8	319	18	717
Dispatching	22	3,474	85	13,423	46	7,264
Total overheads		**8,960**		**18,012**		**12,040**

WN 6: Computation of cost per unit under ABC:

Particulars	Component R	Component S	Component T
Direct Material	1,200	2,900	1,800
Direct Labour (hours x 12)	300	5,760	600
Overheads (WN 5)	8,960	18,012	12,040
Total cost	**10,460**	**26,672**	**14,440**
No of units	560	12,800	2,400
Cost per unit	**18.6786**	**2.0838**	**6.0167**

6. **Activity based costing – basics:**

ABC Limited is a multiproduct company, manufacturing three products A, B and C. The budgeted costs and production for the year ending 31st March, 2018 are as follows:

Particulars	A	B	C
Production quantity (units)	4,000	3,000	1,600
Resources per unit:			
Direct material (kg.)	4	6	3
Direct Labour (minutes)	30	45	60

The budgeted direct labour rate was Rs.10 per hour, and the budgeted material cost was Rs.2 per kg. Production overheads were budgeted at Rs.99,450 and were absorbed to products using the direct labour hour rate. ABC Limited followed an absorption costing system. ABC Limited is now considering to adopt an Activity Based Costing System. The following additional information is made available for this purpose.

Budgeted overheads were analyzed into the following:

Particulars	Amount
Material handling	29,100
Storage costs	31,200
Electricity	39,150

Cost drivers identified were as follows:

Material handling	Weight of material handled
Storage costs	Number of batches of material
Electricity	Number of machine operations

Data on cost drivers was as follows:

Particulars	A	B	C
For complete production:			
Batches of material	10	5	15
Per unit of production:			
Number of machine operators	6	3	2

You are requested to:
  i.   Prepare a statement for management showing the unit costs and total costs of each product using the absorption costing method
  ii. Prepare a statement for management showing the products costs of each product using the ABC approach
  iii. What are the reasons for the different product costs under the two approaches?

Answer:
WN 1: Computation of OAR under traditional System:

Particulars	Amount
Budgeted Overheads (A)	99,450

Suitable base	Direct Labour Hours
Budgeted suitable base (B)	5,850
OAR (A/B)	Rs.17 per DLH

Note: Computation of total DLH:

Total DLH = (4,000 x 30 mins) + (3,000 x 45 mins) + (1,600 x 60) = 3,51,000 mins (or) 5,850 hours

WN 2: Computation of cost per unit under traditional system:

Particulars	A	B	C
Direct Material (kgs x 2)	8.00	12.00	6.00
Direct Labour (hours x 10)	5.00	7.50	10.00
Overheads (hours x 17)	8.50	12.75	17.00
Cost per unit	21.50	32.25	33.00
No of units	4,000	3,000	1,600
Total cost	86,000	96,750	52,800

WN 3: Computation of Cost Driver Rate under ABC:

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Material handling	29,100	Weight handled	38,800	0.75
Storage costs	31,200	Number of batches	30	1,040
Electricity	39,150	Number of machine operations	36,200	1.082

Note: Computation of CDQ:
- Weight handled = (4,000 x 4) + (3,000 x 6) + (1,600 x 3) = 38,800 KG
- No of batches = 10 + 5 + 15 = 30 batches
- No of machine operations = (4,000 x 6) + (3,000 x 3) + (1,600 x 2) = 36,200 operations

WN 4: Apportionment of Overheads under ABC:

Particulars	A		B		C	
	CDQ	Amount	CDQ	Amount	CDQ	Amount
Material handling	16,000	12,000	18,000	13,500	4,800	3,600
Storage Costs	10	10,400	5	5,200	15	15,600
Electricity	24,000	25,968	9,000	9,738	3,200	3,462
Total overheads		48,368		28,438		22,662
No of units		4,000		3,000		1,600
Overhead cost per unit		12.09		9.48		14.16

WN 5: Computation of cost per unit under ABC:

Particulars	A	B	C
Direct Material (kgs x 2)	8.00	12.00	6.00
Direct Labour (hours x 10)	5.00	7.50	10.00
Overheads (WN 4)	12.09	9.48	14.16
Cost per unit	25.09	28.98	30.16
No of units	4,000	3,000	1,600
Total cost	1,00,360	86,940	48,256

Difference in costs:

The difference in total cost under two systems is due to the difference in the overheads borne by each of the products. The activity-based costing method appear to be more precise.

7. **Developing ABC System**

Chicago Manufacturing Co. (CMC) manufactures several product of varying levels of designs and models. It uses a single overhead recovery rate based on direct labour hours. The Overheads incurred by the CMC in the half of the year are as under:

	Rs.
Machine Operation Expenses	10,12,500
Machine Maintenance Expenses	1,87,500
Salaries of technical staff	6,37,500

Wages and salaries of stores staff	2,62,500

During this period, CMC introduced activity based costing system and the following significant activities were identified:

❖ Receiving materials and components
❖ Set up of machines for production runs
❖ Quality inspection

It is determined that:

    ❖ The machine operation and machine maintenance expenses should be apportioned between stores and production activity in 20:80 ratio
    ❖ The technical staff salaries should be apportioned between machine maintenance, set-up and quality inspection in 30:40:30 ratio

The Consumption of activities during the period under review are use under:

❖ Direct labour hours worked 40,000
❖ Direct wage rate Rs. 6 per hour
❖ Production set-up 2,040
❖ Material and component consignments from received from suppliers 1,960
❖ Number of quality inspections carried out 1,280

The data relation to two product manufactured by the CMC during period are as under:

	Product P	Product Q
Direct Material costs (Rs.)	6,000	4,000
Direct labour hours	960	100
Direct material consignments received	48	52
Number of quality inspections done	30	10
Quantity products (units)	15,000	5,000
Number of production runs	36	30

A potential customer has approached CMC for the supply of 24,000 units of components K to be delivered in lots of 3,000 units per quarter. The job will involve an initial design cost of Rs. 60,000 and the manufacture will involve the following per quarter:

Direct material costs	Rs. 12,000
Direct labour hours	300
Production runs	6
Inspections	24
Number of consignments of	20
Direct materials to be received	

CMC desires a mark up to 25% on cost.

Required:

    ❖ Calculate the cost of product P and Q based on the existing system of single overhead recovery rate.
    ❖ Determine the cost of product P and Q using activity based costing system
    ❖ Compute the sales value per quarter of component K using activity based costing system.

Answer:

WN 1: Calculation of Overhead absorption rate under traditional system:

Particulars	Amount
Budgeted overheads (10,12,500 + 1,87,500 + 6,37,500 + 2,62,500)	21,00,000
Suitable base	Direct labour hours
Budgeted suitable base	40,000 hours
OAR (Budgeted overheads/budgeted suitable base)	Rs.52.5/labour hour

WN 2: Calculation of cost/unit under traditional system:

Particulars	Product P	Product Q
Direct material cost	6,000	4,000
Direct labour cost (No of hours * Rs.6/hour)	5,760	600
Overheads (No of labour hours * Rs.52.5/hour)	50,400	5,250
Total cost	**62,160**	**9,850**
Number of units	15,000	5,000

Cost/unit		4.144	1.97

WN 3: Calculation of cost driver rate under ABC system:

Particulars	Receiving components	Set-up of machines	Quality Inspection
Machine operation	2,02,500	8,10,000	
Machine maintenance	37,500	1,50,000	
Technical staff: Amount apportioned to machine maintenance (30% distributed in 20:80) Amount apportioned to set-up and quality inspection	38,250	1,53,000 2,55,000	1,91,250
Wages and salaries to store staff	2,62,500		
Total cost of activity	**5,40,750**	**13,68,000**	**1,91,250**
Cost driver name	Number of receipts	Number of set-up	Number of inspection
Cost driver quantity	1,960	2,040	1,280
Cost driver rate	**275.89**	**670.59**	**149.41**

WN 4: Calculation of overheads under ABC:

Particulars	Product P		Product Q		Product K	
	CDQ	Amount	CDQ	Amount	CDQ	Amount
Receiving components	48	13,243	52	14,346	20	5,518
Set-up of machines	36	24,141	24	16,094	6	4,024
Number of inspection	30	4,482	10	1,494	24	3,586
Total cost		**41,866**		**31,934**		**13,128**

WN 5: Calculation of cost per unit of P and Q under ABC

Particulars	Product P	Product Q
Direct material cost	6,000	4,000
Direct labour cost (No of hours * Rs.6/hour)	5,760	600
Overheads (WN 4)	**41,866**	**31,934**
Total cost	**53,626**	**36,534**
Number of units	15,000	5,000
Cost/unit	**3.58**	**7.31**

WN 6: Calculation of sales value per quarter of component K:

Particulars	Product P
Direct material cost	12,000
Direct labour cost (No of hours * Rs.6/hour)	1,800
Overheads (WN 4)	**13,128**
Design cost (Rs.60,000/8 quarters)	7,500
Total cost	**34,428**
Add: Mark up (25% of cost)	8,607
Total sales value	**43,035**
Selling price per unit (43,035/3,000 units)	**14.35**

8. **Activity Based Costing:**
Woolmark Limited manufactures three types of products namely P, Q and R. The data relating to a period are as under:

Particulars	P	Q	R
Machine hours per unit	10	18	14

Direct labour hours per unit @ Rs.20	4	12	8
Direct material per unit (Rs.)	90	80	120
Production (units)	3,000	5,000	20,000

Currently the company uses traditional costing method and absorbs all production overheads on the basis of machine hours. The machine hour rate of overheads is Rs.6 per hour. The company proposes to use activity-based costing system and the activity analysis is as under:

Particulars	P	Q	R
Batch size (units)	150	500	1,000
Number of purchase orders per batch	3	10	8
Number of inspections per batch	5	4	3

The total production overheads are analyzed as under:

Machine set up costs	20%
Machine operation costs	30%
Inspection costs	40%
Material procurement related costs	10%

Required:

i. Calculate the cost per unit of each product using traditional method of absorbing all production overheads on the basis of machine hours

ii. Calculate the cost per unit of each product using activity based costing principles

Answer:

WN 1: Computation of total overheads:

Particulars	Amount
Budgeted Overheads (A x B) (reverse working)	**24,00,000**
Suitable base	Machine hours
Budgeted suitable base (A) [3,000 x 10 + 5,000 x 18 + 20,000 x 14]	4,00,000
OAR (B)	6/MH

WN 2: Computation of cost per unit under traditional system:

Particulars	P	Q	R
Direct Material	90	80	120
Direct Labour (20 x DLH/unit)	80	240	160
Overheads (6 x MH/unit)	60	108	84
Cost per unit	**230**	**428**	**364**

WN 3: Computation of CDR (Cost Driver Rate) under ABC:

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Setting-up	4,80,000	No of batches	50	9,600/batch
Machine operation	7,20,000	Machine hours	4,00,000	1.80/MH
Inspection	9,60,000	No of inspections	200	4,800/inspection
Material Procurement	2,40,000	No of purchase orders	320	750/order

CDR:

No of batches $= \dfrac{3,000}{150} + \dfrac{5,000}{500} + \dfrac{20,000}{1,000} = 50$ batches

No of inspections $= (20 \times 5) + (10 \times 4) + (20 \times 3) = 200$ inspections

No of purchase orders $= (20 \times 3) + (10 \times 10) + (20 \times 8) = 320$ purchase orders

WN 4: Apportionment of overheads under ABC:

Particulars	Product P		Product Q		Product R	
	CDQ	Amount	CDQ	Amount	CDQ	Amount
Setting-up	20	1,92,000	10	96,000	20	1,92,000
Machine operation	30,000	54,000	90,000	1,62,000	2,80,000	5,04,000
Inspection	100	4,80,000	40	1,92,000	60	2,88,000
Material procurement	60	45,000	100	75,000	160	1,20,000
Total overheads		**7,71,000**		**5,25,000**		**11,04,000**
No of units		3,000		5,000		20,000

Overhead cost per unit		257.00		105.00		55.20

WN 5: Computation of cost per unit under ABC:

Particulars	P	Q	R
Direct Material	90	80	120
Direct Labour (20 x DLH/unit)	80	240	160
Overheads (WN 4)	257	105	55.20
Cost per unit	**427**	**425**	**335.20**

9. ABC Costing for a retail store

Asian Mfg. Co. had decided to increase the size of the store. It was the information about the probability of the individual product lines : Lemon, Grapes and Papaya. It provides the following data for the 2013 for each product line:

Particulars	Lemon	Grapes	Papaya
Revenues (Rs.)	79.350	2,10,060	1,20,900
Cost of Goods Sold (Rs.)	60,000	1,50,000	90,000
Cost of Bottles returned (Rs.)	1,200	0	0
Number of purchase orders placed	36	84	36
Number of deliveries received	30	219	66
Hours of shelf stocking time	54	540	270
Items sold	12,600	1,10,400	30,600

Asian Mfg. Co. also provides the following information for the year 2013:

Activity	Description of Activity	Total Costs (Rs.)	Cost Allocation Basis
Bottle Returns	Returning of empty bottles to the store	1,200	Direct tracing to product line
Ordering	Placing of orders of purchases	15,600	156 Purchase orders
Delivery	Physical delivery and the receipts of merchandise	25,200	315 deliveries
Self Stocking	Stocking of merchandise on store shelves and ongoing restocking	17,280	864 hours of time
Customer support	Assistance provided to customers including bagging and checkout	30,720	1,53,600 items sold

Required:

❖ Asian Mfg. Co. Currently allocates store support costs (all costs other than the cost of goods sold) to the product line on the basis of the cost of goods sold of each product line. Calculate the operating income and operating income as the percentage of revenue of each product line.

❖ If Asian Mfg. Co. allocates store support costs (all costs other than the cost of goods Sold) to the product line on the basis of ABC system, calculate the operating income and Operating income as the percentage of revenue of each product line.

❖ Compare both the systems.

Answer:

WN 1: Computation of OAR under traditional system:

Particulars	Amount
Budgeted Overheads (A)	90,000
Suitable base	COGS
Budgeted suitable base (B)	3,00,000
OAR (A/B)	**30% of COGS**

WN 2: Profitability statement under existing system:

Particulars	Lemon	Grapes	Papaya
Revenues	79,350	2,10,060	1,20,900
Less: Cost of goods sold	(60,000)	(1,50,000)	(90,000)
Less: Store support costs	(18,000)	(45,000)	(27,000)

Operating income	1,350	15,060	3,900
Operating income (%)	1.70	7.17	3.23

WN 3: Computation of cost Driver Rate under ABC:

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Bottle Returns	1,200	Direct tracing to Lemon		
Ordering	15,600	Purchase orders	156	100
Delivery	25,200	Deliveries	315	80
Shelf-stocking	17,280	Shelf-stocking hours	864	20
Customer support	30,720	Items sold	1,53,600	0.20

WN 4: Apportionment of overheads under ABC:

Particulars	Lemon		Grapes		Papaya	
	CDQ	Amount	CDQ	Amount	CDQ	Amount
Bottle returns		1,200				
Ordering	36	3,600	84	8,400	36	3,600
Delivery	30	2,400	219	17,520	66	5,280
Shelf-stocking	54	1,080	540	10,800	270	5,400
Customer support	12,600	2,520	1,10,400	22,080	30,600	6,120
Total store support costs		**10,800**		**58,800**		**20,400**

WN 5: Profitability statement under ABC:

Particulars	Lemon	Grapes	Papaya
Revenues	79,350	2,10,060	1,20,900
Less: Cost of goods sold	(60,000)	(1,50,000)	(90,000)
Less: Store support costs	(10,800)	(58,800)	(20,400)
Operating income	**8,550**	**1,260**	**10,500**
Operating income (%)	**10.78**	**0.60**	**8.68**

WN 6: Comparison of two systems:

Particulars	Lemon	Grape	Papaya
Operating Income % under traditional system	1.70%	7.17%	3.23%
Operating Income % under ABC	10.78%	0.60%	8.68%

- ❖ The grapes line drops sizeably when ABC is used. Although it constitutes 50 % COGS, it uses a higher percentage of total resources in each activity area., especially the high cost of customer support area. In contrast, lemon line draws a much lower percentage of total resources used in each activity area than its percentage of total COGS. Hence under ABC, Lemon is most profitable. The company can explore ways to increase sales of lemons and also explore price increases on grapes.
- ❖ Operating Income Ranking is highest for Grapes under Traditional System because other products bear its overhead cost, whereas under ABC a more accurate picture shows Grapes as the lowest ranking product.

10. ABC System – Product Specific Overheads

Super Food Ltd. Manufactures 3 types of biscuits, A, B and C, in a fully mechanised factory. The company has been following conventional method of costing and wishes to shift to Activity Based Costing System and therefore wishes to have the following data presented under both the systems for the month.

Inspection Cost	73,000
Machine – Repairs & Maintenance	1,42,000
Dye Cost	10,250
Selling Overheads	1,62,000

Particulars	Product A	Product B	Product C
Prime cost (Rs. Per unit)	12	9	8

Selling Price (Rs. Per unit)	18	14	12
Gross production (units/production run)	2,520	2,810	3,010
No of defective (units/production run)	20	10	10
Inspection hours per production run	3	4	4
Dye cost/production run	200	300	250
Machine hours/production run	20	12	30
Sale units/month	25,000	56,000	27,000

The following additional information is given:
- ❖ No accumulation of inventory is considered. All good units produced are sold.
- ❖ All manufacturing and selling overheads are conventionally allocated on the basis of units sold.
- ❖ Product A needs no advertisement. Due to its nutritive value, it is readily consumed by diabetic patients of a hospital. Advertisement costs included in the total selling overhead is Rs. 83,000.
- ❖ Product B needs to be specially packed before being sold, so that it meets competition. Rs. 54,000 was the amount spent for the month in specially packing B, and this has been included in the total selling overhead cost given.

Required:
Present product wise profitability of statements under the conventional system and the ABC system and accordingly rank the products.
Answer:
WN 1: Computation of units produced

Particulars	Product A	Product B	Product C
Gross production/run	2,520	2,810	3,010
Less: Defectives	(20)	(10)	(10)
Net production/run (A)	2,500	2,800	30,00
Units sold (B)	25,000	56,000	27,000
No of productions runs (A/B)	10	20	9
Units produced (No of runs x Gross Production/run)	**25,200**	**56,200**	**27,090**

WN 2: Profitability statement under conventional system:

Particulars	Product A	Product B	Product C
Sales	4,50,000	7,84,000	3,24,000
Less: Prime cost (units produced x cost per unit)	-3,02,400	-5,05,800	-2,16,720
Gross Profit	**1,47,600**	**2,78,200**	**1,07,280**
Less: Overheads (3,87,250 in ratio of units sold)	-89,641	-2,00,796	-96,813
Net Profit	**57,959**	**77,404**	**10,468**
Rank	**II**	**I**	**III**

WN 3: Computation of cost Driver Rate under ABC:

Activity	Total cost	CDN	CDQ	CDR
Inspection	73,000	Inspection hours	146	500
Machine - R&M	1,42,000	Machine hours	710	200

- ❖ Inspection hours = (3 hours x 10) + (4 hours x 20) + (4 hours x 9) = 146 hours
- ❖ Machine hours = (20 hours x 10) + (12 hours x 20) + (30 hours x 9) = 710 hours

WN 4: Apportionment of Overheads under ABC:

Particulars	Product A CDQ	Product A Amount	Product B CDQ	Product B Amount	Product C CDQ	Product C Amount
Inspection cost	30	15,000	80	40,000	36	18,000
R&M Cost	200	40,000	240	48,000	270	54,000
Dye cost	10	2,000	20	6,000	9	2,250
Selling OH						

Advertisement (83,000)				56,000		27,000
Packing (54,000)				54,000		
Others (25,000)		5,787		12,963		6,250
Total OH		**62,787**		**2,16,963**		**1,07,500**

❖ The cost driver rate for dye cost is different for Product A, B and C. It has been taken as Rs.200 per run, Rs.300 per run and Rs.250 per run for three products
❖ Advertisement cost has been distributed to Product B and Product C as Product A does not need Advertisement. The cost has been distributed on the basis of units sold
❖ Packing cost has been directly allocated to Product B
❖ Other selling cost has been distributed to A, B and C in the ratio of units sold

WN 5: Profitability statement under ABC:

Particulars	Product A	Product B	Product C
Sales	4,50,000	7,84,000	3,24,000
Less: Prime cost	-3,02,400	-5,05,800	-2,16,720
Gross Profit	**1,47,600**	**2,78,200**	**1,07,280**
Less: Overheads (WN 4)	-62,787	-2,16,963	-1,07,500
Net Profit	**84,813**	**61,237**	**-220**
Rank	**I**	**II**	**III**

11. Customer level operating income:

Alpha Limited has decided to analyze the profitability of its five new customers. It buys bottled water at Rs.90 per case and sells to retail customers at a list price of Rs.108 per case. The data pertaining to five customers are

Particulars	A	B	C	D	E
Cases sold	4,680	19,688	1,36,800	71,550	8,775
List selling price	108	108	108	108	108
Actual selling price	108	106.20	99	104.40	97.20
Number of purchase orders	15	25	30	25	30
Number of customer visits	2	3	6	2	3
Number of deliveries	10	30	60	40	20
Kilometers travelled per delivery	20	6	5	10	30
Number of expedited deliveries	0	0	0	0	1

Its five activities and their cost driver rates are:

Activity	Cost Driver Rate
Order taking	Rs.750 per purchase order
Customer visits	Rs.600 per customer visit
Deliveries	Rs.5.75 per delivery km travelled
Product handling	Rs.3.75 per case sold
Expedited deliveries	Rs.2,250 per expedited delivery

Required:
i.   Compute the customer-level operating income of each of five retail customers now being examined (A, B, C, D and E). Comment on the results
ii. What insights are gained by reporting both the list selling price and the actual selling price for each customer?

Answer:
Computation of customer-level operating income:

Particulars	A	B	C	D	E
Cases sold	4,680	19,688	1,36,800	71,550	8,775
List SP	108	108	108	108	108
Revenues at list price (A)	5,05,440	21,26,304	1,47,74,000	77,27,400	9,47,700
Discount per case	-	1.80	9	3.60	10.80
Total discount (B)	-	35,438	12,31,200	2,57,580	94,770
Cost of goods sold (C) (Cases x 90)	4,21,200	17,71,920	1,23,12,000	64,39,500	7,89,750
Support costs					

Order taking costs (orders x 750)	11,250	18,750	22,500	18,750	22,500
Customer visit (visits x 600)	1,200	1,800	3,600	1,200	1,800
Delivery (Kilometres x 5.75)	1,150	1,035	1,725	2,300	3,450
Product handling (cases x 3.50)	17,550	73,830	5,13,000	2,68,313	32,906
Expedited deliveries (no x 2,250)	-	-	-	-	2,250
Total support costs (D)	**31,150**	**95,415**	**5,40,825**	**2,90,563**	**62,906**
Operating income (A – B – C – D)	**53,090**	**2,23,531**	**6,90,375**	**7,39,757**	**274**

Comments on results:
- Customer D is the most profitable customer despite having only 52.30% of unit volume of customer C. The main reason is that C receives a Rs.9 per case discount while customer D received only Rs.3.60 discount per case
- Customer E is less profitable, in comparison with small customer A being profitable. Customer E received a discount of Rs.10.80 per case, makes more frequent orders, requires more customer visits and requires more delivery kms in comparison with customer A

Insights gained by reporting both list selling price and actual selling price:
- Separate reporting of both the listed and actual selling price enables Alpha Limited to examine which customer has received what discount per case, whether the discount received has any relationship with sales volume. The data given below provides us with the following information:

Sales volume	Discount per case
C (1,36,800 cases)	9.00
D (71,550 cases)	3.60
B (19,688 cases)	1.80
E (8,775 cases)	10.80
A (4,680 cases)	0

- The above data clearly shows that the discount given to customers per case has direct relationship with sales volume, except in the case of customer E. The reasons for Rs.10.80 discount per case for customer E should be explored

12. Apportionment of overheads:
PQR Pens Limited manufactures two products – 'Gel Pen' and 'Ball Pen'. It furnishes the following data for the year 2017:

Product	Annual output (units)	Total Machine hours	Total number of purchase orders	Total number of set-ups
Gel Pen	5,500	24,000	240	30
Ball Pen	24,000	54,000	448	56

The annual overheads are as under:

Particulars	Amount
Volume related activity costs	4,75,020
Set up related costs	5,79,988
Purchase related costs	5,04,992

Calculate the overhead cost per unit of each product – Gel Pen and Ball Pen on the basis of:
a) Traditional method of charging overheads
b) Activity based costing method and
c) Find out the difference in cost per unit between both the methods

Answer:
WN 1: Computation of OAR under traditional system:

Particulars	Amount
Budgeted Overheads (A) (4,75,020 + 5,79,988 + 5,04,992)	15,60,000
Suitable base	Machine hours
Budgeted suitable base (B)	78,000
OAR (A/B)	**Rs.20 per MH**

WN 2: Computation of overhead cost per unit under traditional system:

Particulars	Gel Pen	Ball Pen

Total overheads (MH x 20)	4,80,000	10,80,000
No of units	5,500	24,000
Overhead cost per unit	87.27	45

WN 3: Computation of Cost Driver Rate under ABC:

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Volume related cost	4,75,020	Machine hours	78,000	6.09
Setup cost	5,79,988	Set-ups	86	6,744.05
Purchase cost	5,04,992	Purchase orders	688	734

WN 4: Apportionment of Overheads under ABC:

Particulars	Gel Pen		Ball Pen	
	CDQ	Amount	CDQ	Amount
Volume related cost	24,000	1,46,160	54,000	3,28,860
Setup cost	30	2,02,321	56	3,77,667
Purchase cost	240	1,76,160	448	3,28,832
Total overheads (A)		**5,24,641**		**10,35,359**
No of units (B)		5,500		24,000
Overhead cost per unit (A/B)		**95.39**		**43.13**

WN 5: Computation of difference in cost:

Particulars	Gel Pen	Ball Pen
OH cost per unit (Traditional)	87.27	45
OH cost per unit (ABC)	95.39	43.13
Difference per unit	-8.12	+1.87

13. Activity based costing:

M/s. HMB Limited is producing a product in 10 batches each of 15,000 units in a year and incurring following overheads their on:

Particulars	Amount
Material Procurement	22,50,000
Maintenance	17,30,000
Set-up	6,84,500
Quality control	5,14,800

The prime costs for the year amounted to Rs.3,01,39,000. The company is using currently the method of absorbing overheads on the basis of prime cost. Now it wants to shift to activity-based costing. Information relevant to activity drivers for a year are as under:

Activity Driver	Activity Volume
No of purchase orders	1,500
Maintenance hours	9,080
No of setups	2,250
No of inspections	2,710

The company has produced a batch of 15,000 units and has incurred Rs.26,38,700 and Rs.3,75,200 on materials and wages respectively. The usage of activities of the said batch are as follows:

Material orders	48 orders
Maintenance hours	810 hours
No of setups	40
No of inspections	25

You are required to:
  i.   Find out the cost of product per unit on absorption costing basis for the said batch
  ii.   Determine cost driver rate, total cost and cost per unit of output on the said batch on the basis of activity-based costing

Answer:
WN 1: Computation of OAR under traditional system:

Particulars	Amount

Budgeted Overheads (A) (22,50,000 + 17,30,000 + 6,84,500 + 5,14,800)	51,79,300
Suitable base	Prime cost
Budgeted suitable base (B)	3,01,39,000
OAR $\left(\dfrac{51,79,300}{3,01,39,000} \times 100\right)$	17.18471%

WN 2: Computation of total cost under traditional system:

Particulars	Amount
Direct Material	26,38,700
Direct Labour	3,75,200
Prime cost	30,13,900
Overheads (30,13,900 x 17.18471%)	5,17,930
Total cost (A)	**35,31,830**
Units (B)	15,000
Cost per unit (A/B)	**235.46**

WN 3: Computation of CDR (Cost Driver Rate) under ABC:

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Material procurement	22,50,000	Material orders	1,500	1,500
Maintenance	17,30,000	Maintenance hours	9,080	190.53
Set-up	6,84,500	No of set-ups	2,250	304.22
Quality control	5,14,800	No of inspection	2,710	189.96

WN 4: Apportionment of Overheads as per ABC:

	Product	
Particulars	CDQ	Amount
Material procurement	48	72,000
Maintenance	810	1,54,328
Set-up	40	12,169
Quality control	25	4,749
Total overheads		**2,43,246**

WN 5: Computation of cost per unit under ABC:

Particulars	Amount
Direct Material	26,38,700
Direct Labour	3,75,200
Prime cost	30,13,900
Overheads (WN 4)	2,43,246
Total cost (A)	**32,57,146**
Units (B)	15,000
Cost per unit (A/B)	**217.14**

Additional Problems for Practice

14. Activity Based Costing:

MST Limited has collected the following data for its two activities. It calculates activity cost rates based on cost driver capacity

Activity	Cost Driver	Capacity	Cost
Power	Kilowatt hours	50,000 kilowatt hours	Rs.2,00,000
Quality inspections	Number of inspections	10,000 inspections	Rs.3,00,000

The company makes three products, M, S and T. For the year ended March 31, 2004, the following consumption of cost drivers was reported:

Product	Kilowatt hours	Quality inspections
M	10,000	3,500

S	20,000	2,500
T	15,000	3,000

Required:
    a. Compute the cost allocated to each product from each activity
    b. Calculate the cost of unused capacity of each activity
    c. Discuss the factors the management considers in choosing a capacity level to compute the budgeted fixed overhead cost rate

Answer:
WN 1: Computation of cost driver rate:

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Power	2,00,000	KWH	50,000	4.00
Quality inspections	3,00,000	Inspections	10,000	30.00

WN 2: Computation of cost of product:

	M		S		T	
Particulars	CDQ	Amount	CDQ	Amount	CDQ	Amount
Power	10,000	40,000	20,000	80,000	15,000	60,000
Quality inspections	3,500	1,05,000	2,500	75,000	3,000	90,000
Total overheads (A)		**1,45,000**		**1,55,000**		**1,50,000**

WN 3: Computation of cost of unused capacity:

Particulars	Amount
Power (2,00,000 – 1,80,000)	20,000
Quality inspections (3,00,000 – 2,70,000)	30,000
Total cost of unused capacity	**50,000**

Factors management consider in choosing a capacity level to compute the budgeted fixed overhead rate:
    • Effect on product costing and capacity management
    • Effect on pricing decisions
    • Effect on performance evaluation
    • Effect on financial statements
    • Regulatory requirements
    • Difficulties in forecasting chosen capacity level concepts

15. Applicability of ABC:
State with a brief reason whether you would recommend an activity based system of costing in each of the following independent situations:
    ❖ Company K produces one product. The overhead costs mainly consist of depreciation.
    ❖ Company L produces 5 different products using different production facilities.
    ❖ A consultancy firm consisting of lawyers, accountants and computer engineers provides management consultancy services to clients.
    ❖ Company S produces two different labour intensive products. The contribution per unit in both products is very high. The BEP is very low. All the work is carried on efficiently to meet the target costs.

Answer:

S.No	Description	Recommended ABC (Yes/No)	Reasons
(a)	K produces one product. Overhead is mainly depreciation	No	❖ One product situation. For allocation of overhead, ABC is not required ❖ ABC for cost reduction is not beneficial since most of the overhead is depreciation
(b)	L produces five different products with different facilities	Yes	❖ Multi product situation. ABC is required for allocation of overhead ❖ ABC is necessary for pricing ❖ Cost drivers are likely to be different

S.No	Description	Recommended ABC (Yes/No)	Reasons
			❖ Cost reduction may be possible ❖ Production facilities are different
(c)	Professional services – lawyers/ accountants/ computer engineers	Yes	❖ Variety of services. Hence ABC is required for cost allocation ❖ Services are very different ❖ ABC is necessary for pricing ❖ Cost reduction possible
(d)	S produces 2 different labour intensive products. High unit contribution and efficient operations	No	❖ Different products, but labour intensive. Hence, overhead allocation based on readily traceable direct labour cost will be accurate. Hence ABC not required for cost allocation ❖ Low BEP level implies low level of fixed cost as a % of sale price or as a % of total cost ❖ Many fixed cost activity drivers are likely to be aligned with the direct labour costs. Hence not required for cost allocation ❖ Efficient operation. Hence ABC not required even for cost reduction or ABC management

16. Activity Based Costing System:

'Humara-Apna' bank offers three products, viz. deposits, Loans and Credit Cards. The bank has selected 4 activities for a detailed budgeting exercise, following activity-based costing methods. The bank wants to know the product wise total cost per unit for the selected activities, so that prices may be fixed accordingly. The following information is made available to formulate the budget:

Activity	Total Cost	Estimation for the budget period
ATM services (a) Machine Maintenance (b) Rents (c) Currency replenishment cost	4,00,000 2,00,000 1,00,000	All fixed, no change All fixed, no change Expected to double during budget period (This activity is driven by no of ATM transactions)
Computer processing	5,00,000	Half this amount if fixed and no change is expected. The variable portion is expected to increase the three times the current level. This activity is driven by the number of computer transactions
Issuing statements	18,00,000	Presently, 3 lakh statements are made. In the budget period, 5 lakh statements are expected. For every increase of one lakh statement, one lakh rupees is the budgeted increase. This activity is driven by number of statements
Computer inquiries	2,00,000	Estimated to increase by 80% during the budget period. This activity is driven by telephone minutes

The activity drivers and their budget quantities are given below:

Activity Drivers	Deposits	Loans	Credit Cards
No of ATM transactions	1,50,000	-	50,000
No of computer processing transactions	15,00,000	2,00,000	3,00,000
No of statements to be issued	3,50,000	50,000	1,00,000
Telephone Minutes	3,60,000	1,80,000	1,80,000

The bank budgets a volume of 58,600 deposit accounts, 13,000 loan accounts and 14,000 credit card accounts.

Required:
  i.   Calculate the budgeted rate for each activity
  ii. Prepare the budgeted cost statement activity wise
  iii. Compute the budgeted product cost per account for each product using (i) and (ii) above

Answer:
WN 1: Computation of cost driver rate (budgeted rate) and budgeted cost:

Activity	Total Cost	Cost Driver

		Name	Quantity	Rate
ATM services	8,00,000	No of ATM Transactions	2,00,000	4.00
Computer processing	10,00,000	No of computer transactions	20,00,000	0.50
Issuing statements	20,00,000	No of statements	5,00,000	4.00
Customer enquiries	3,60,000	Telephone minutes	7,20,000	0.50

Note:
- ATM services = 4,00,000 + 2,00,000 + (1,00,000 x 2) = 8,00,000
- Computer processing = (50% x 5,00,000) + (50% x 5,00,000 x 3) = 10,00,000
- Issuing statements = 18,00,000 + (1,00,000 x 2) = 20,00,000
- Customer enquiries = 2,00,000 + 80% = 3,60,000

WN 2: Computation of cost per account of each product:

	Deposits		Loans		Credit Cards	
Particulars	CDQ	Amount	CDQ	Amount	CDQ	Amount
ATM services	1,50,000	6,00,000	-	-	50,000	2,00,000
Computer processing	15,00,000	7,50,000	2,00,000	1,00,000	3,00,000	1,50,000
Issuing statements	3,50,000	14,00,000	50,000	2,00,000	1,00,000	4,00,000
Customer enquiries	3,60,000	1,80,000	1,80,000	90,000	1,80,000	90,000
Total cost (A)		**29,30,000**		**3,90,000**		**8,40,000**
No of units of product (B)		58,600		13,000		14,000
Cost per unit (A/B)		**50**		**30**		**60**

17. Activity Based Costing System
A company manufactures three products namely A, B and C in a factory. The following cost data for the month of March, 2018 are as under:

Activity	A	B	C
Unit produced	10,000	15,000	20,000
Direct labour hour per unit	3	4.5	4
Machine hours per unit	6	4	5
Set-up of machines	20	25	30
Number of orders	15	12	10
Machine operating cost	34,50,000		
Machine set-up cost	4,36,000		
Order processing cost	2,56,000		

Required:
i. Identify cost pool and cost drivers
ii. Calculate cost driver rate
iii. Calculate overheads rate per unit using activity-based costing

Answer:
WN 1: Computation of cost driver rate

Activity	Total Cost	Cost Driver		
		Name	Quantity	Rate
Machine operating cost	34,50,000	Machine hours	2,20,000	15.68
Machine set-up	4,36,000	No of machine set-ups	75	5,813.33
Order processing cost	2,56,000	No of orders	37	6,918.92

Note:
- Machine hours = (10,000 x 6) + (15,000 x 4) + (20,000 x 5) = 2,20,000 Machine hours
- Set-ups = 20 + 25 + 30 = 75 set-ups
- No of orders = 15 + 12 + 10 = 37 orders

WN 2: Computation of overhead cost per unit

	A		B		C	
Particulars	CDQ	Amount	CDQ	Amount	CDQ	Amount
Machine operating cost	60,000	9,40,800	60,000	9,40,800	1,00,000	15,68,000
Machine set-up	20	1,16,267	25	1,45,333	30	1,74,400
Order processing cost	15	1,03,784	12	83,027	10	69,189

Total cost (A)		11,60,851		11,69,160		18,11,589
No of units of product (B)		10,000		15,000		20,000
Cost per unit (A/B)		116.0851		77.944		90.5795

CHAPTER 6: COST SHEET

Classification of costs:
Classification A: Classification by relationship to end product:
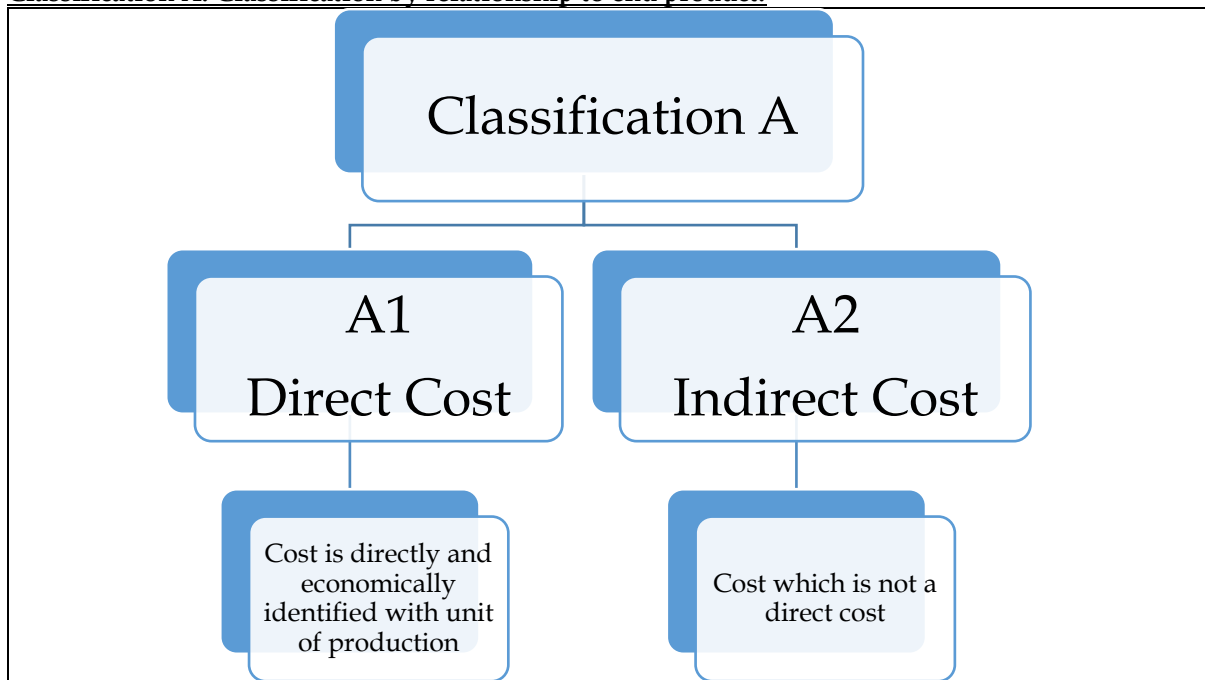
Explanation:
- ❖ The term directly means instantly or spontaneously
- ❖ The term economically means cost of identifying as direct cost should be cost effective

Example:
- ❖ Cloth in the making of shirt – Direct Cost
- ❖ Leather in the making of shoe – Direct Cost
- ❖ Thread in the making of shirt – Indirect Cost – This is because it is not cost-effective to find out how much of a thread went into the production

PRINCIPLE NO.1:

DIRECTLY IDENTIFIABLE	ECONOMICALLY IDENTIFIABLE	TYPE OF COST
YES	YES	DIRECT
YES	NO	INDIRECT
NO	NO	INDIRECT
NO	YES	INDIRECT

Classification B: Classification by Nature of Cost:

```
                        ┌─────────────────┐
                        │ Classification B │
                        └─────────────────┘
          ┌──────────────────┼──────────────────┐
   ┌─────────────┐    ┌─────────────┐    ┌─────────────┐
   │     B1      │    │     B2      │    │     B3      │
   │ Material Cost│   │ Labour Cost │    │  Expenses   │
   └─────────────┘    └─────────────┘    └─────────────┘
          │                  │                  │
   ┌─────────────┐    ┌─────────────┐    ┌─────────────┐
   │ Physical thing│  │Monetary reward│  │             │
   │that goes into │  │  paid to the  │  │  Residuary  │
   │the making of  │  │  workforce    │  │  Category   │
   │the product    │  │               │  │             │
   └─────────────┘    └─────────────┘    └─────────────┘
```
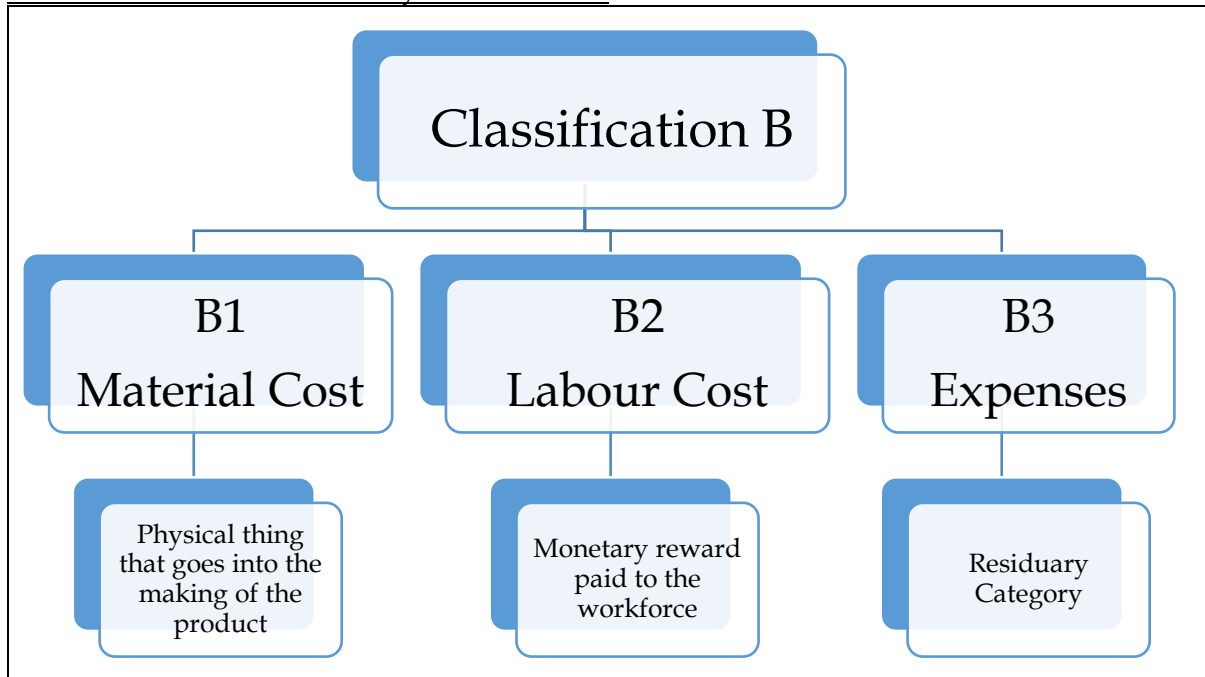
Examples:
- ❖ Cloth in the making of shirt – Material cost
- ❖ Wages paid to the tailor – Labour cost
- ❖ Rent in the organisation - Expenses

Classification C: Classification by function or department

```
                        ┌─────────────────┐
                        │ Classification  │
                        │       C         │
                        └─────────────────┘
          ┌──────────────────┼──────────────────┐
   ┌─────────────┐    ┌─────────────┐    ┌─────────────┐
   │     C1      │    │     C2      │    │     C3      │
   │   Factory   │    │  Marketing  │    │Administration│
   └─────────────┘    └─────────────┘    └─────────────┘
          │                  │                  │
   ┌─────────────┐    ┌─────────────┐    ┌─────────────┐
   │ Related to  │    │ Related to  │    │             │
   │manufacturing│    │   Sales     │    │Residuary Category│
   └─────────────┘    └─────────────┘    └─────────────┘
```
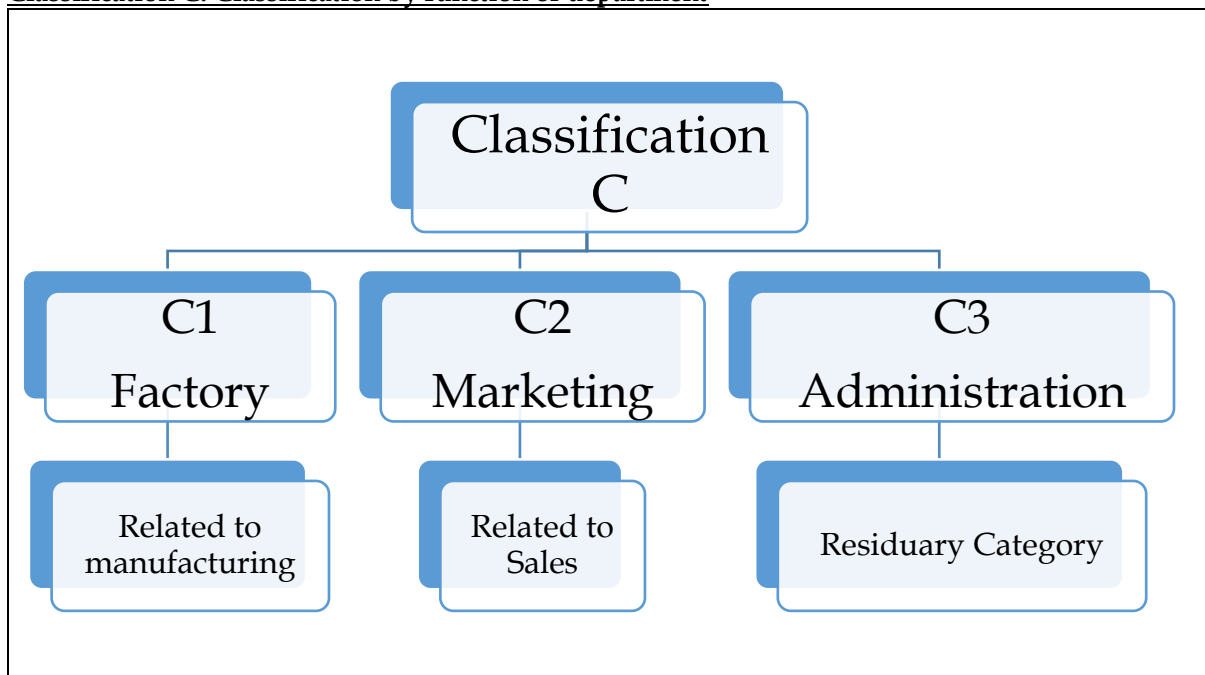
PRINCIPLE NO.2:
- ❖ CLASSIFICATION A,B OR C ARE NOT MUTUALLY EXCLUSIVE
- ❖ THE SUB-CLASSIFICATION WITHIN A CLASSIFICATION IS HOWEVER MUTUALLY EXCLUSIVE. FOR EXAMPLE AN ITEM OF COST CAN BE EITHER DIRECT OR INDIRECT COST BUT CANNOT BE BOTH

Construction of Cost-Sheet:
- ❖ Sub-classification A1 (Direct Cost) is combined with sub-classification B1, B2 and B3 to arrive at
  - o Direct Material

- o Direct Labour
- o Direct Expenses
- ❖ Sub-classification A2 is combined with C1, C2 and C3 to arrive at
  - o Factory overheads
  - o Selling & Distribution Overheads
  - o Administration Overheads

Indicative list of expenses along with classification:

PRIME COST	ADMINISTRATION EXPENSES
➢ Productive Wages ➢ Direct Material ➢ Freight on Purchase ➢ Carriage on Purchase ➢ Taxes and Duties on the material ➢ Direct Wages ➢ Direct Expenses ➢ Chargeable Expenses ➢ Carriage Inward ➢ Hire charges ➢ Royalty	➢ Office Salaries and Expenses ➢ Depreciation on Office Appliances ➢ Office Heat, Light and Power ➢ Office Rent and Taxes ➢ Management Salary / Manager's Salary / Directors' fees ➢ Office Printing and Stationery ➢ Telephone charges Postage and Telegrams ➢ Legal Charges and Bank Commission ➢ Office cleaning
FACTORY OVERHEADS	**SELLING & DISTRIBUTION EXPENSES**
➢ Indirect Material ➢ Indirect Labour / Wages ➢ Factory Supervision ➢ Factory Expenses ➢ Factory Stationery ➢ Repairs & Maintenance ➢ Factory Heat, Fuel, Light and Power / Electric Power ➢ Factory insurance and taxes ➢ Factory supplies ➢ Experimental expenses ➢ Wastage of Material ➢ Wages of Foreman ➢ Storekeeper's wages ➢ Oil and Water ➢ Consumable Stores ➢ Drawing office Expenses ➢ Depreciation of Plant & Machinery ➢ Water Consumption in Factory	➢ Sales Expenses ➢ Sales Commission ➢ Sales Travelling ➢ Sales Promotion ➢ Distribution Department – Salaries & Expenses ➢ Heat, Light and Power ➢ Depreciation on showroom, delivery vans etc ➢ Salaries of Salesmen ➢ Salaries to Travelling Agents ➢ Carriage Outward ➢ Advertising ➢ Warehouse Rent and Rates ➢ Warehouse Staff Salaries ➢ Showroom Rent & Showroom Expenses ➢ Repairs and Depn of Delivery vans

Format of Cost-Sheet:

Particulars	Amount	Amount
Direct Material Consumed		
Opening stock of RM	XXX	
Add: Purchases and other incidental expenses	XXX	
Less: Closing stock of RM	(XXX)	XXX
Direct employee (labour) cost		XXX
Direct expenses		XXX
Prime cost		**XXX**
Add: Works/factory overheads		XXX
Gross Works Cost		**XXX**
Add: Opening work-in-progress		XXX
Less: Closing work-in-progress		(XXX)
Works/factory cost		**XXX**
Add: Quality control cost		XXX
Add: Research and development cost		XXX
Add: Administrative overheads relating to production		XXX
Less: Credit for recoveries/scrap		(XXX)
Add: Primary packing cost		XXX
Cost of Production		**XXX**
Add: Opening stock of FG		XXX
Less: Closing stock of FG		(XXX)
Cost of goods sold		**XXX**
Add: General administrative overheads		XXX
Add: Selling and distribution overheads		XXX
Cost of sales		**XXX**
Profit		XXX
Sales		XXX

Flow-chart for classification of costs:
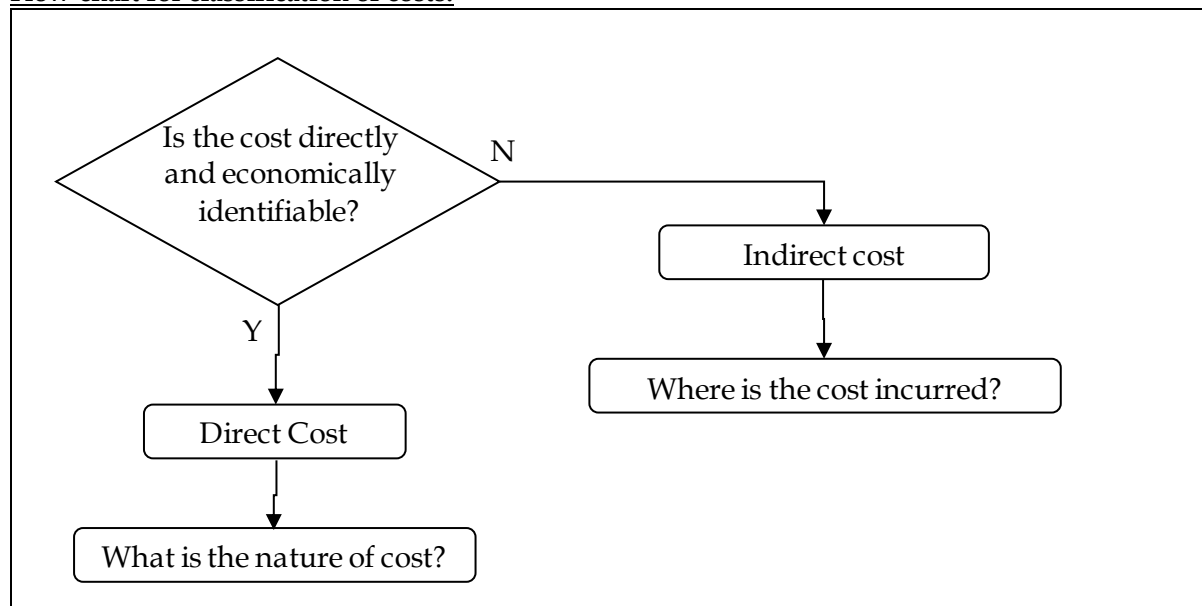
Explanation:
- ❖ In the case of direct cost the question to be raised is "What is the nature of cost"?
- ❖ In the case of indirect cost the question to be raised is "Where is cost incurred"?

Treatment of few items of cost:
1. **Packing:**

```
                          ┌──────────────┐
                          │   Packing    │
                          └──────────────┘
                   ┌─────────────┴─────────────┐
            ┌──────────┐                 ┌──────────────┐
            │ Primary  │                 │  Secondary   │
            └──────────┘                 └──────────────┘
                  │                             │
    ┌──────────────────────────┐   ┌──────────────────────────┐
    │ Preserves quality of the │   │   Attracts the Customers  │
    │         product          │   │                           │
    └──────────────────────────┘   └──────────────────────────┘
                  │                             │
          ┌──────────────┐              ┌──────────────┐
          │ Seperate line│              │   Selling    │
          │ item in cost │              │  Overhead    │
          │    sheet     │              │              │
          └──────────────┘              └──────────────┘
```

2. **Carriage:**

```
                          ┌──────────────┐
                          │   Carriage   │
                          └──────────────┘
                   ┌─────────────┴─────────────┐
            ┌──────────┐                 ┌──────────────┐
            │  Inward  │                 │   Outward    │
            └──────────┘                 └──────────────┘
                  │                             │
    ┌──────────────────────────┐   ┌──────────────────────────┐
    │   Related to Raw Material │   │ Related to Finished Goods │
    └──────────────────────────┘   └──────────────────────────┘
                  │                             │
          ┌──────────────┐              ┌──────────────┐
          │    Direct    │              │   Selling    │
          │   Material   │              │  Overhead    │
          └──────────────┘              └──────────────┘
```

3. Wages:

```
                          Wages
            ┌───────────────┴───────────────┐
       Productive                      Non-Productive
            │                               │
      Direct wages                    Factory Overheads
```

4. Distribution of Profit:

```
                 Distribution of Profit
          ┌───────────────┴───────────────┐
     Shareholders                     Government
          │                               │
      Dividend                       Income Taxes
          │                               │
       Ignored                         Ignored
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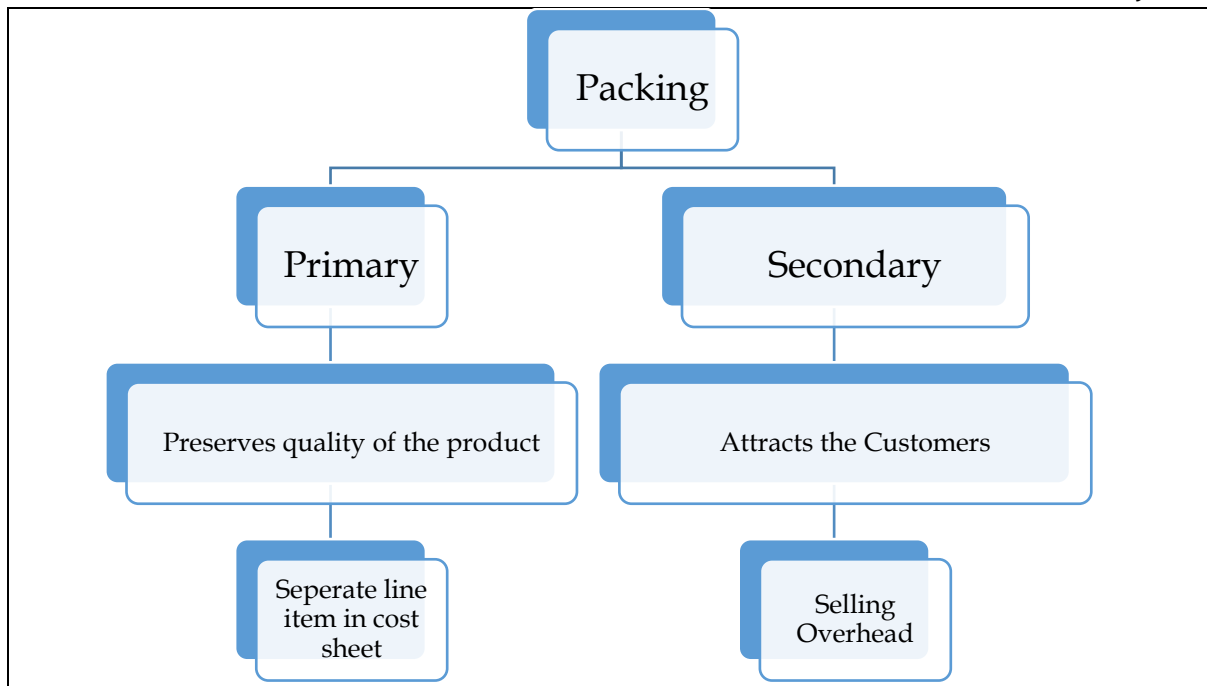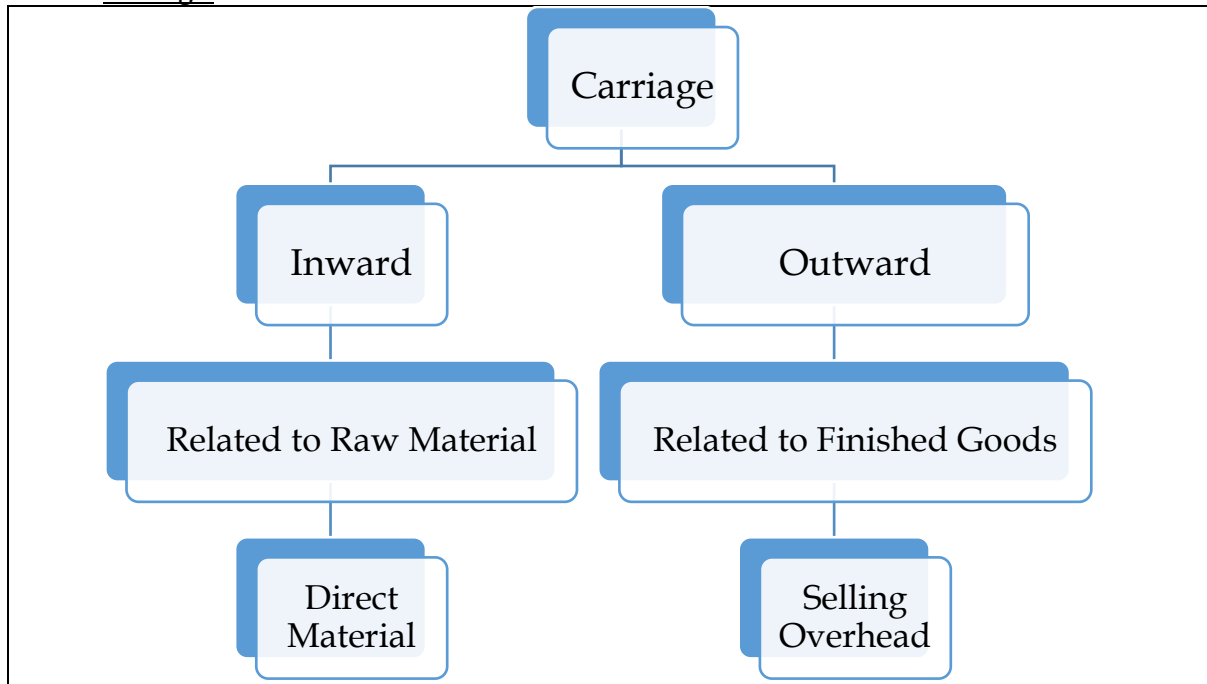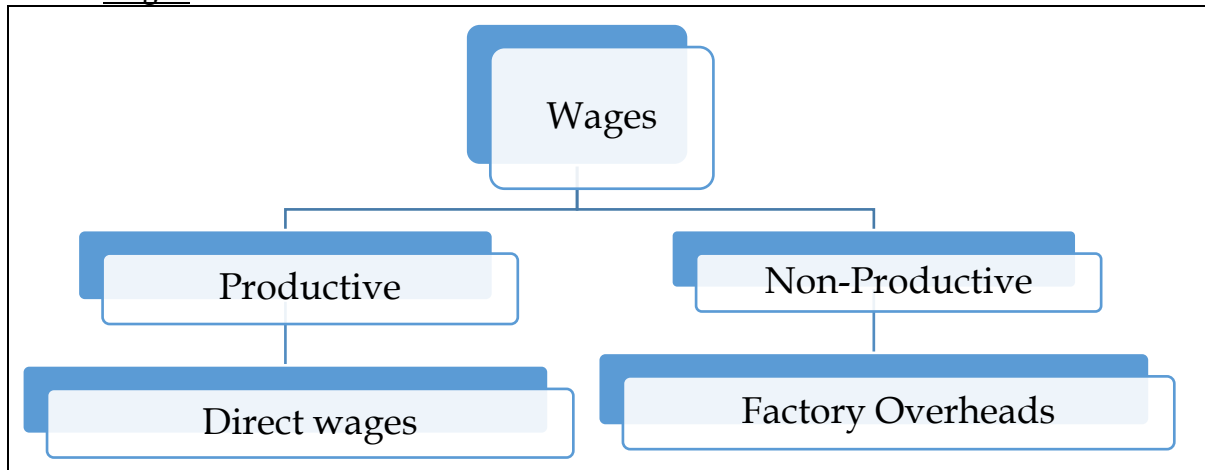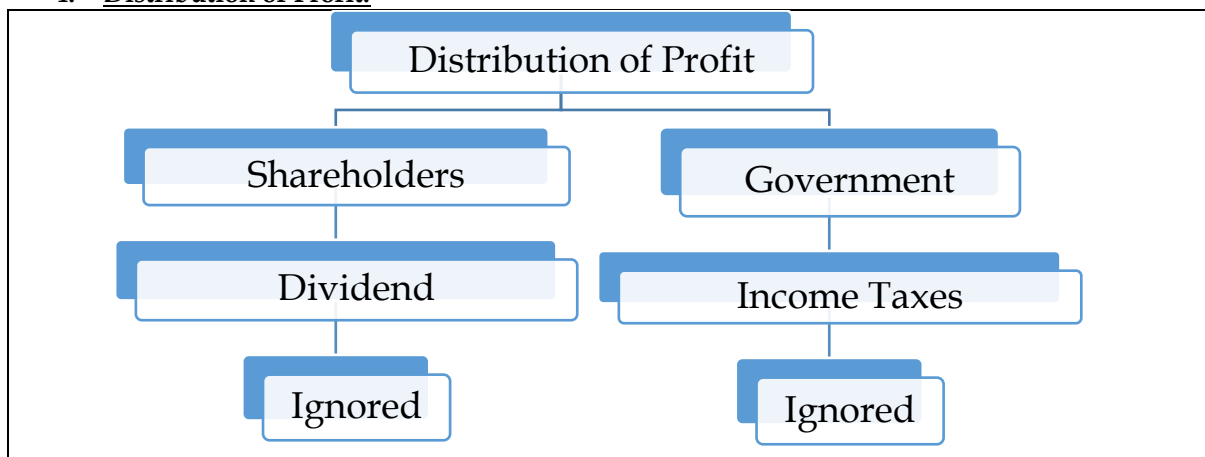
5. Interest on capital/loan:

- ❖ Interest represents reward to the providers of loan capital while dividend represents reward to the providers of equity capital
- ❖ Since dividend is not a part of cost, interest should not be a part of the cost in order to make analysis or comparisons practical
- ❖ Cost accounting is not connected with rewarding providers of capital, be it debt capital or equity capital

6. **Taxes:**

```
                        ┌─────────────┐
                        │    Taxes    │
                        └──────┬──────┘
              ┌────────────────┴────────────────┐
      ┌───────────────┐                ┌───────────────┐
      │  Direct Tax   │                │  Indirect Tax │
      └───────┬───────┘                └───────┬───────┘
   ┌──────────────────────┐      ┌──────────────────────────────┐
   │ Impact and incidence │      │ Impact on one person and     │
   │   on one person      │      │ incidence on another person  │
   └──────────┬───────────┘      └──────────────┬───────────────┘
       ┌─────────────┐                   ┌─────────────┐
       │   Ignored   │                   │   Selling   │
       │             │                   │  Overhead   │
       └─────────────┘                   └─────────────┘
```

7. **Customs Duty:**

```
                   ┌──────────────────┐
                   │   Customs Duty   │
                   └─────────┬────────┘
           ┌─────────────────┴─────────────────┐
    ┌───────────────┐                  ┌───────────────┐
    │ Import of Raw │                  │   Import of   │
    │   Material    │                  │   Machinery   │
    └───────┬───────┘                  └───────┬───────┘
  ┌──────────────────────┐          ┌──────────────────────────┐
  │ Direct Material Cost │          │ Capitalize as part of    │
  │                      │          │      asset cost          │
  └──────────────────────┘          └──────────────────────────┘
```
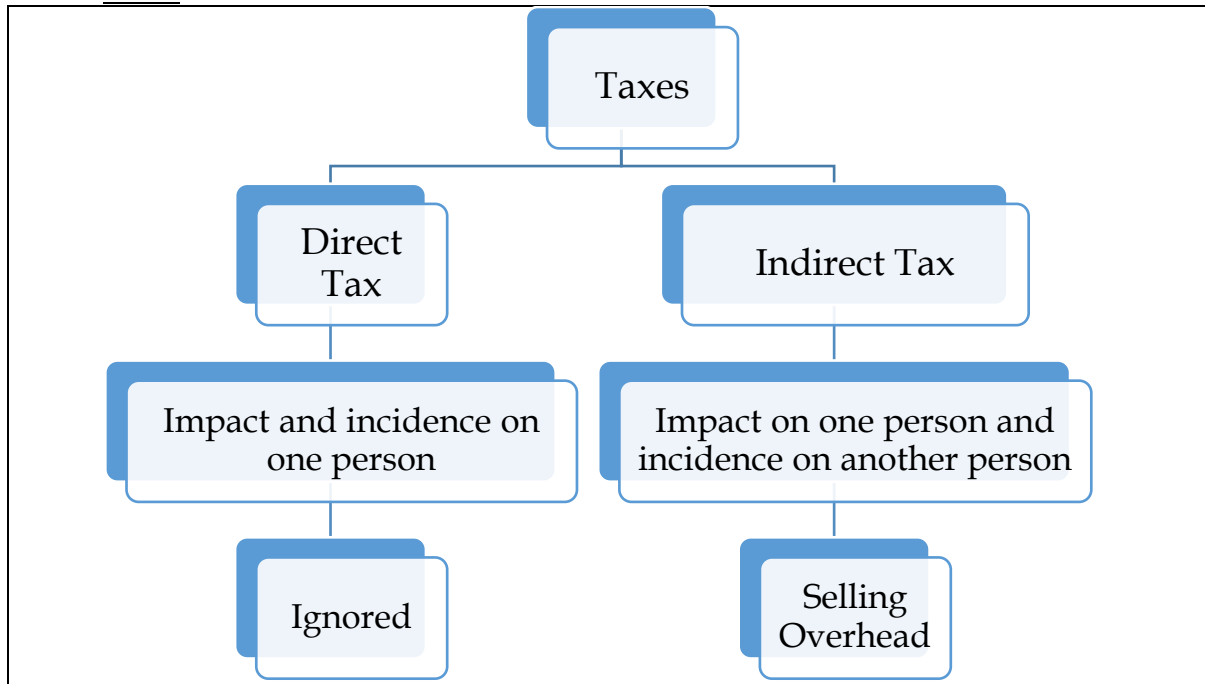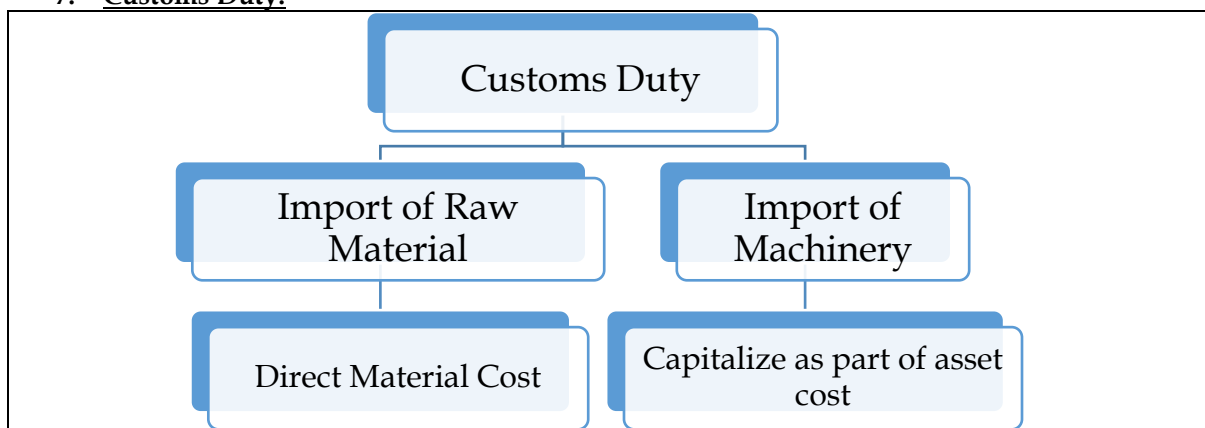
Methods of Valuation of FG:
   ❖ **FIFO Method:** Closing stock is to be valued based on FIFO Method in case the closing stock comes entirely from current year production
   ❖ **Weighted Average Cost Method:** Closing stock is to be valued under weighted average cost method in case the closing stock comes partly from current year production and partly from last year production

1. **Comprehensive Cost Sheet**

Given below are some of the details of the Trial balance of ABC Limited as on March 31, 2013:

Particulars	Amount	Amount
Inventories		
Finished Goods	80,000	
Raw Materials	1,40,000	
Work-in-process	2,00,000	
Office appliances	17,400	
Plant and Machinery	4,60,000	
Buildings	2,00,000	
Sales		7,68,000
Sales returns	14,000	
Materials purchased	3,20,000	
Freight incurred on materials	16,000	
Purchase returns		4,800
Productive labour	1,60,000	
Indirect labour	18,000	
Factory supervision	10,000	
Repairs & upkeep – factory	14,000	
Heat, light and power	65,000	
Taxes	6,300	
Miscellaneous factory expenses	18,700	
Sales commission	33,600	
Sales Travelling	11,000	
Sales Promotion	22,500	
Distribution department expenses	18,000	
Office salaries	8,600	
Interest on borrowed funds	2,000	

Further details are as follows:

Particulars	Amount
Closing inventories:	
Finished goods	1,15,000
Raw materials	1,80,000
Work-in-progress	1,92,000
Accrued expenses on:	
Direct labour	8,000
Indirect labour	1,200
Interest on borrowed funds	2,000
Depreciation to be provided on:	
Office appliances	5%
Plant and Machinery	10%
Buildings	4%

The following additional information is relevant:
- Heat, light and power are distributed to the factory, office and selling functions in the ratio of 8:1:1
- Taxes: Two-thirds to factory and one-third to office. Depreciation on building distributed to factory, office and selling in the ratio of 8:1:1

Prepare the cost sheet.

Answer:

Cost Sheet of ABC Limited for the year ended March 31, 2013

Particulars	Amount	Amount
Direct Material		
Opening stock of Raw Material	1,40,000	
Add: Purchases net of purchase returns (3,20,000 – 4,800)	3,15,200	
Add: Freight incurred on materials	16,000	

Less: Closing stock of Raw material	(1,80,000)	2,91,200
Direct Labour (including accrued)		1,68,000
Direct Expenses		0
Prime Cost		**4,59,200**
Factory Overheads		
Depreciation on Plant and Machinery (10% x 4,60,000)	46,000	
Depreciation on Building (4% x 2,00,000 x 8/10)	6,400	
Indirect labour (including accrued)	19,200	
Factory Supervision	10,000	
Repairs & Up-keep factory	14,000	
Heat, Light and Power (65,000 x 8/10)	52,000	
Taxes (6,300 x 2/3)	4,200	
Miscellaneous factory expenses	18,700	1,70,500
Gross Works Cost		**6,29,700**
Add: Opening Work in Progress		2,00,000
Less: Closing Work in Progress		(1,92,000)
Net Works Cost/Factory Cost		**6,37,700**
Primary Packing Cost		0
Research and Development		0
Quality Control Cost		0
Administrative Overheads relating to Production		0
Less: Credit for recoveries/scrap		0
Cost of Production		**6,37,700**
Add: Opening stock of Finished Goods		80,000
Less: Closing stock of Finished Goods		(1,15,000)
Cost of Goods Sold		**6,02,700**
General and Administrative Overheads		
Depreciation on office appliances (17,400 x 5%)	870	
Depreciation on building (2,00,000 x 4% x 1/10)	800	
Heat Light and Power (65,000 x 1/10)	6,500	
Taxes (6,300 x 1/3)	2,100	
Office Salaries	8,600	18,870
Selling and Distribution Overheads		
Depreciation on building (2,00,000 x 4% x 1/10)	800	
Heat Light and Power (65,000 x 1/10)	6,500	
Sales commission	33,600	
Sales Travelling	11,000	
Sales Promotion	22,500	
Distribution department expenses	18,000	92,400
Cost of Sales		**7,13,970**
Profit (balancing figure)		**40,030**
Sales (net of sales returns)		**7,54,000**

Notes:
1. Interest cost is ignored as the reward paid to providers of money is not considered in Cost Accounting

2. Comprehensive cost sheet

Prepare a cost sheet from the following information:

	Rs.		Rs
Opening stock – RM	50,000	Closing stock -RM	40,000
Opening stock -FS	40,000	Closing stock -FS	50,000
Purchase of materials	5,00,000	Wages	2,00,000
Income Tax	6,500	Import Duty on Purchases	85,000
Chargeable expenses	20,000	Rent and rates - Factory	50,000
Power	20,000	Heating and lighting - Factory	20,000

Factory insurance	10,000	Experimental expenses	5,000
Opening stock – WIP	6,000	Office salaries	40,000
MD's Salary	9,000	Printing and Stationery	12,000
Office expenses	2,000	Salesmen salaries	20,000
Commission for agents	10,000	Sales	12,00,000
Closing stock – WIP	10,000	Bank Charges	2,500
Loss on Sale of Machinery	7,500	Dividend Received	3,000

Answer:

Cost Sheet of _____ for the year ended _____

Particulars	Amount	Amount
Direct Material		
Opening stock of Raw Material	50,000	
Purchases of materials	5,00,000	
Import duty on purchases	85,000	
Less: Closing stock of raw material	(40,000)	5,95,000
Direct Labour		2,00,000
Direct Expenses (Chargeable expenses)		20,000
Prime Cost		**8,15,000**
Add: Factory Overheads		
Power	20,000	
Factory Insurance	10,000	
Rent and rates – factory	50,000	
Heating and Lighting – Factory	20,000	1,00,000
Gross Works Cost		**9,15,000**
Add: Opening Work in Progress		6,000
Less: Closing Work in Progress		(10,000)
Net Works Cost/Factory Cost		**9,11,000**
Primary Packing Cost		0
Research and Development (experimental expenses)		5,000
Quality Control Cost		0
Administrative Overheads relating to Production		0
Less: Credit for recoveries/scrap		0
Cost of Production		**9,16,000**
Add: Opening stock of Finished Goods		40,000
Less: Closing stock of Finished Goods		(50,000)
Cost of Goods Sold		**9,06,000**
General and Administrative Overheads		
MD's Salary	9,000	
Office expenses	2,000	
Office salaries	40,000	
Printing and stationery	12,000	
Bank Charges	2,500	65,500
Selling and Distribution Overheads		
Commission for agents	10,000	
Salesmen salaries	20,000	30,000
Cost of sales		**10,01,500**
Profit (balancing figure)		**1,98,500**
Sales		**12,00,000**

Notes:

1. Income tax is distribution of profit and hence ignored in cost accounting
2. It is assumed that MD's salary is entirely chargeable to administration activity
3. Loss on sale of machinery is an abnormal item and hence ignored in cost accounting
4. Dividend received is a non-operating income and ignored in cost accounting

3. **Valuation of inventory:**

The following is the summary of expenses of a manufacturing company:

The works cost is Rs.5,00,000. The value of opening WIP is Rs.60,000 and the value of closing WIP is Rs.90,000.

The number of units produced during the year was 10,000 units. The opening stock was 2,000 units and year's sales were 10,000 units. Cost of units on hand on 1st day was Rs.30 per unit. All these units were sold during the year.

- Calculate the value of finished goods.
- Rework assuming:
  - Current production is 10000 units.
  - Closing stock includes unknown units of opening stock.

Answer:

WN 1: Valuation of finished goods:

- Entire units of opening stock have been sold. Therefore, closing stock would be from current year production
- We should follow FIFO method of inventory valuation for the current scenario

Particulars	Amount	Amount
Gross Works cost		**5,00,000**
Add: Opening work in progress		60,000
Less: Closing work in progress		(90,000)
Net works cost		**4,70,000**
Primary Packing Cost		0
Research and Development		0
Quality Control Cost		0
Administrative Overheads relating to Production		0
Less: Credit for recoveries/scrap		0
Cost of Production (10,000 units)		**4,70,000**
Add: Opening stock of FG (2,000 units) [2,000 x 30]		60,000
Less: Closing stock of FG (Note 1)		(94,000)
Cost of Goods Sold (10,000 units)		**4,36,000**

Note 1: Valuation of Closing FG

Computation of closing stock units:
Sales + Closing stock = Opening stock + Production
10,000 + Closing stock = 2,000 + 10,000
Closing stock = 2,000 units
Valuation of Closing FG:
$\text{Value of Closing FG} = \dfrac{\textbf{Cost of Production}}{\textbf{Units Produced}} \times \textbf{Closing stock (units)}$
$\text{Value of Closing FG} = \dfrac{4,70,000}{10,000} \times 2,000 \text{ units} = \text{Rs. } 94,000$

WN 2: Rework scenario:

- Closing stock includes unknown units of opening stock. Under this scenario we should do valuation as per weighted average cost method

Particulars	Amount	Amount
Cost of Production (10,000 units)		**4,70,000**
Add: Opening stock of FG (2,000 units) [2,000 x 30]		60,000
Less: Closing stock of FG (Note 2)		(88,333)
Cost of Goods Sold (10,000 units)		**4,41,667**

Note 2: Valuation of Closing FG

Valuation of Closing FG:
$\text{Value of Closing FG} = \dfrac{\textbf{Cost of Production} + \textbf{Value of opening stock}}{\textbf{Units Produced} + \textbf{Opening stock units}} \times \textbf{Closing stock (units)}$
$\text{Value of Closing FG} = \dfrac{4,70,000 + 60,000}{10,000 + 2,000} \times 2,000 \text{ units} = \text{Rs. } 88,333$

4. **Valuation of inventory**

A industries' manufactures a product X. in the beginning there were 5,000 units of finished products in stock valued @ Rs 15 per unit. Other stocks as on that date was: WIP –Rs57, 400 and raw materials – Rs.1, 16,200. The following information is gathered

	Rs.		Rs.
Materials	9.06,000	Labour	3,26,400
Freight inwards	55,700	Indirect labour	1,21,600
Other factory overheads	3,17,300	Closing stock of raw materials	96,400
Closing stock of WIP	2,000	Sales- 1,50,000 units	30,00,000

There are 15,000 units of finished stock on hand at the end. You are required to prepare a statement showing the profit and sales for the year

Answer:

Cost Sheet of A industries for year ended _____

Particulars	Amount	Amount
Direct Material		
Opening stock of Raw Material	1,16,200	
Purchases	9,06,000	
Freight inwards	55,700	
Less: Closing stock of Raw Material	(96,400)	9,81,500
Direct Labour		3,26,400
Direct expenses		0
Prime cost		**13,07,900**
Factory Overheads		
Indirect labour	1,21,600	
Other factory overheads	3,17,300	4,38,900
Gross Works Cost		**17,46,800**
Add: Opening WIP		57,400
Less: Closing WIP		(2,000)
Net Works Cost		**18,02,200**
Primary Packing Cost		0
Research and Development		0
Quality Control Cost		0
Administrative Overheads relating to Production		0
Less: Credit for recoveries/scrap		0
Cost of Production (1,60,000 units)		**18,02,200**
Add: Opening stock of FG (5,000 units) [5,000 x 15]		75,000
Less: Closing stock of FG (Note 1)		(1,70,655)
Cost of Goods Sold (1,50,000 units)		**17,06,545**
Add: General and administrative expenses		0
Add: Selling and distribution expenses		0
Cost of Sales		**17,06,545**
Profit (balancing figure)		**12,93,455**
Sales		**30,00,000**

Note 1: Valuation of Closing FG

It is assumed that company follows weighted average cost method for inventory valuation

> **Computation of Units produced:**
> Sales + Closing stock = Opening stock + Production
> 1,50,000 + 15,000 = 5,000 + Production
> **Production = 1,60,000 units**
>
> **Valuation of Closing FG:**
> $$\text{Value of Closing FG} = \frac{\textbf{Cost of Production} + \textbf{Value of opening stock}}{\textbf{Units Produced} + \textbf{Opening stock units}} \times \textbf{Closing stock (units)}$$
> $$\text{Value of Closing FG} = \frac{18,02,200 + 75,000}{1,60,000 + 5,000} \times 15,000 \text{ units} = \text{Rs. } 1,70,655$$

5. **Reverse working**

A fire occurs in the factory premises on 31st October. The accounting records have been destroyed. Certain accounting records were kept in another building. They reveal the following for the period 1st September to 31st October:

Particulars	Amount
Direct Materials Purchased	2,50,000
Opening WIP	40,000
Opening RM	20,000
Opening FG	37,750
Indirect manufacturing costs	40 % of conversion costs
Sales revenue	7,50,000
Direct manufacturing labour	2,22,250
Prime cost	3,97,750
Gross margin percentage based on revenues	30%
Cost of goods available for sale	5,55,775

The loss is covered by insurance company. The insurance company wants to know the historical cost of the inventories as a basis for negotiating a settlement, although the settlement is actually to be based on replacement cost , not historical cost.

Required:
- Finished goods inventory as on October 31
- WIP inventory as on October 31
- Direct materials inventory as on October 31

Answer:
Cost sheet of _____ for the period September 1 to October 31:

Particulars	Amount	Amount
Direct Material		
Opening stock of raw material	20,000	
Purchases of raw material	2,50,000	
Closing stock of raw material (balancing figure)	**(94,500)**	1,75,500
Direct Labour		2,22,250
Direct Expenses		0
Prime Cost (Given)		**3,97,750**
Factory Overheads (40 percent of conversion cost – Conversion cost is cost other than raw material – 40 % x 2,22,250)		88,900
Gross Works Cost		**4,86,650**
Add: Opening Work in Progress		40,000
Less: Closing Work in Progress (balancing figure)		**(8,625)**
Net Works Cost/Factory Cost (reverse worked from COP)		**5,18,025**
Primary Packing Cost		0
Research and Development		0
Quality Control Cost		0
Administrative Overheads relating to Production		0
Less: Credit for recoveries/scrap		0
Cost of Production (reverse worked from COGS)		**5,18,025**
Add: Opening stock of Finished Goods		37,750
Less: Closing stock of Finished Goods (Note 2)		**(30,775)**
Cost of Goods Sold (Note 1)		5,25,000

Note 1: Computation of COGS
- Gross profit is 30 percent of revenues and hence COGS is 70 percent of revenues
- COGS = Rs.7,50,000 x 70% = Rs.5,25,000

Note 2: Computation of closing stock of finished goods
- Cost of goods available for sale = Cost of goods sold + Cost of goods unsold (closing FG)
- 5,55,775 = 5,25,000 + Closing FG
- **Closing FG = Rs.30,775**

Summary:

- Closing stock of raw material = Rs.94,500
- Closing stock of work in progress = Rs.8,625
- Closing stock of finished goods = Rs.30,775

6. **Reverse working**

The books and records of ABC Limited for the month of July revealed the following.

Direct labour cost   Rs 17,500 (being 175% of factory overheads)

Cost of goods sold   Rs 56,000

Inventory accounts showed the opening and closing balance as:

	1st July Rs.	31st July Rs.
Raw materials	8,000	10,600
Work-in-progress	10,500	14,500
Finished stock	17,600	19,000

Other data: Selling overhead – Rs3,500, General and administrative expenses – Rs. 2,500 and Sales for the month –Rs75,000.

You are required to:

- Compute the value of material purchased
- Prepare a cost statement showing the various elements of cost and also the profit earned

Answer:

Cost Sheet of ABC Limited for the month of July

Particulars	Amount	Amount
Direct Material		
Opening stock of Raw Material	8,000	
Purchases of raw material (balancing figure)	**36,500**	
Less: Closing stock of raw material	(10,600)	**33,900**
Direct Labour		17,500
Direct expenses		0
Prime Cost (reverse worked from GWC)		**51,400**
Factory Overheads (17,500/175%)		10,000
Gross Works Cost (reverse worked from NWC)		**61,400**
Add: Opening Work in Progress		10,500
Less: Closing Work in Progress		(14,500)
Net Works Cost/Factory Cost (reverse worked from COP)		**57,400**
Primary Packing Cost		0
Research and Development		0
Quality Control Cost		0
Administrative Overheads relating to Production		0
Less: Credit for recoveries/scrap		0
Cost of Production (reverse worked from COGS)		**57,400**
Add: Opening stock of Finished Goods		17,600
Less: Closing stock of Finished Goods		(19,000)
Cost of Goods Sold (given)		**56,000**
General and Administrative Overheads		2,500
Selling and distribution Overheads		3,500
Cost of Sales		**62,000**
Profit (balancing figure)		**13,000**
Sales (Given)		75,000

7. **Preparation of cost sheet for revised level of production**

The following are extracted from the books of Nila & Co for a year. Output: 1,000 units.

	Rs.		Rs.
Raw materials	20,00,000	Wages	12,00,000
Factory overheads	8,00,000	Office overheads	4,00,000
Selling overhead	1,00,000	Rate of profit- 25% on sales.	

The manufacturer decided to produce 1,500 units for the next year. It is estimated that the materials cost will increase by 20% and the labour cost by 10%. 50% of the factory overheads are fixed and the

remaining are variable. The selling expenses per unit will be reduced by 20%. The rate of profit will remain the same. Prepare a cost sheet for the year and an estimate for the next year.

Answer:

Cost sheet of current year and estimate of next year:

Particulars	Current year (1,000 units)		Next year (1,500 units)	
	Calculation	Amount	Calculation	Amount
Direct Material		20,00,000	$\left(\dfrac{20,00,000}{1,000} + 20\%\right)$ x 1,500 units	36,00,000
Direct Labour		12,00,000	$\left(\dfrac{12,00,000}{1,000} + 10\%\right)$ x 1,500 units	19,80,000
Direct expenses		0		0
Prime cost		**32,00,000**		**55,80,000**
Variable FOH		4,00,000	$\left(\dfrac{4,00,000}{1,000}\right)$ x 1,500 units	6,00,000
Fixed FOH		4,00,000		4,00,000
GWC/NWC/COP/COGS		**40,00,000**		**65,80,000**
General and Admin expenses		4,00,000	Assumed to be fixed	4,00,000
Selling and distribution expenses		1,00,000	$\left(\dfrac{1,00,000}{1,000} - 20\%\right)$ x 1,500 units	1,20,000
Cost of Sales		**45,00,000**		**71,00,000**
Profit (1/4 on sales = 1/3 on cost)		15,00,000		23,66,667
Sales		**60,00,000**		**94,66,667**

Note:
- Any change in variable cost will be taken as change in variable cost per unit. In this question Direct Material, Direct Labour, Variable FOH and Selling OH are variable in nature. We should first compute the cost per unit of last year, apply given change and multiply with current year units to get the cost
- Any change in fixed cost will be taken as change in total fixed cost. In this question Fixed FOH and General and Administrative expenses are fixed cost. We should take the total cost of last year and apply given change to get current year cost. **Units produced does not matter while calculating fixed cost of current year**
- **General rule on nature of cost:**
  - Direct Material – Assumed to be variable unless provided otherwise
  - Direct Labour - Assumed to be variable unless provided otherwise
  - Direct expenses – Assumed to be variable unless provided otherwise
  - **Factory overheads – Need to be assumed as either fixed or variable**
  - Administrative overheads - Assumed to be fixed unless provided otherwise
  - Selling overheads – Assumed to be variable unless provided otherwise

8. **Comprehensive cost sheet:**

Arnav Ispat Udyog Limited has the following expenditure for the year ended March 31, 2018:

Particulars	Amount	Amount
Raw materials purchased		10,00,00,000
GST paid on the above purchases @ 18% (eligible for input credit)		1,80,00,000
Freight inward		11,20,600
Wages paid to factory workers		29,20,000
Contribution made towards employees' PF and ESIS		3,60,000
Production bonus paid to factory workers		2,90,000
Royalty paid for production		1,72,600
Amount paid for power and fuel		4,62,000
Amount paid for purchase of moulds and patterns (life is equivalent to two years production)		8,96,000
Job charges paid to job workers		8,12,000
Stores and spares consumed		1,12,000

Depreciation on		
Factory building	84,000	
Office building	56,000	
Plant and machinery	1,26,000	
Delivery vehicles	86,000	3,52,000
Salary paid to supervisors		1,26,000
Repairs and maintenance paid for		
Plant and machinery	48,000	
Sales office building	18,000	
Vehicles used by directors	19,600	85,600
Insurance premium paid for		
Plant and machinery	31,200	
Factory building	18,100	
Stock of raw materials and WIP	36,000	85,300
Expenses paid for quality control check activities		19,600
Salary paid to quality control staff		96,200
Research and development cost paid for improvement in production process		18,200
Expenses paid for pollution control and engineering & maintenance		26,600
Expenses paid for administration of factory work		1,18,600
Salary paid to functional managers		
Production control	9,60,000	
Finance and accounts	9,18,000	
Sales & marketing	10,12,000	28,90,000
Salary paid to General manager		12,56,000
Packing cost paid for		
Primary packing	96,000	
For re-distribution of finished goods	1,12,000	2,08,000
Interest and finance charges paid		7,20,000
Fee paid to auditors		1,80,000
Fee paid to legal advisors		1,20,000
Fee paid to independent directors		2,20,000
Performance bonus paid to sales staff		1,80,000
Value of stock as on April 1, 2017		
Raw materials	18,00,000	
Work in process	9,20,000	
Finished goods	11,00,000	38,20,000
Value of stock as on March 31, 2018		
Raw materials	9,60,000	
Work in process	8,70,000	
Finished goods	18,20,000	36,50,000

Amount realized by scrap and waste generated during manufacturing process is Rs.86,000

Prepare a statement giving the following information:

(a) Prime cost;

(b) Factory cost;

(c) Cost of Production

(d) Cost of goods sold and

(e) Cost of sales

Answer:

Cost Sheet of Arnav Ispat Udyog Limited for year ended March 31, 2018

Particulars	Amount	Amount
Direct Material		
Opening stock of raw material	18,00,000	
Raw material purchased	10,00,00,000	
GST paid (Note 1)	-	
Freight inward	11,20,600	
Less: Closing stock of raw material	(9,60,000)	10,19,60,600

Direct Labour		
Wages paid to factory workers	29,20,000	
Contribution to PF & ESI (Note 2)	3,60,000	
Production bonus paid to factory workers (Note 2)	2,90,000	35,70,000
Direct Expenses		
Royalty	1,72,600	
Power and fuel (Note 3)	4,62,000	
Moulds and patterns (Note 4) [8,96,000/2]	4,48,000	
Job charges (Note 5)	8,12,000	18,94,600
Prime Cost		**10,74,25,200**
Factory Overheads		
Stores and spares consumed	1,12,000	
Depreciation on factory building	84,000	
Depreciation on plant and machinery	1,26,000	
Salary paid to supervisors	1,26,000	
Repairs and maintenance of plant and machinery	48,000	
Insurance premium of plant and machinery	31,200	
Insurance premium of Factory building	18,100	
Insurance premium of stock of RM and WIP	36,000	
Pollution control and engineering and maintenance	26,600	6,07,900
Gross Works cost		**10,80,33,100**
Add: Opening work in progress		9,20,000
Less: Closing work in progress		(8,70,000)
Net Works cost/Factory Cost		**10,80,83,100**
Quality control cost		
Expenses paid for quality control check activities	19,600	
Salary paid to quality control staff	96,200	1,15,800
Administrative overheads relating to production		
Expenses paid for administration of factory work	1,18,600	
Salary to production control manager (Note 6)	9,60,000	10,78,600
Research and development cost		18,200
Primary packing cost		96,000
Less: Credit for recoveries and scrap		(86,000)
Cost of Production		**10,93,05,700**
Add: Opening stock of Finished Goods		11,00,000
Less: Closing stock of Finished Goods		(18,20,000)
Cost of Goods Sold		**10,85,85,700**
General and Administrative Overheads:		
Depreciation on office building	56,000	
Repairs and maintenance for vehicles used by directors	19,600	
Salary to Finance and Accounts Manager	9,18,000	
Salary to General Manager	12,56,000	
Interest and finance charges (Note 7)	-	
Fee paid to auditors	1,80,000	
Fee paid to legal advisors	1,20,000	
Fee paid to independent directors	2,20,000	27,69,600
Selling and Distribution Overheads:		
Depreciation on delivery vehicles	86,000	
Repairs and maintenance for sales office	18,000	
Salary to sales & marketing manager	10,12,000	
Packing cost for re-distribution of finished goods	1,12,000	
Performance bonus paid to sales staff	1,80,000	14,08,000
Cost of Sales		**11,27,63,300**

Notes:
1. GST paid is eligible for input tax credit and hence is not an expenditure

2. It is assumed that contribution to PF, Contribution to ESI and production bonus is of direct workers and hence taken as part of Direct wages
3. Power and fuel can alternatively be classified as factory overheads
4. Moulds and Patterns can alternatively be classified as factory overheads
5. Job charges can alternatively be classified as factory overheads
6. Salary paid to production control manager is assumed to be related to administration of factory and hence treated as administrative overhead relating to production. This can alternatively be classified as factory overhead
7. Interest and finance charges is assumed for long term loan and hence ignored in cost accounting

Additional Problems for Practice

9. Simple cost sheet:

From the following figures, calculate cost of production and profit for the month of March 2019

Particulars	Amount	Particulars	Amount
Stock on 1st march 2019		Purchase of raw materials	28,57,000
Raw materials	6,06,000		
Finished goods	3,59,000		
Stock on 31st March 2019		Sale of finished goods	1,34,00,000
Raw Materials	7,50,000		
Finished goods	3,09,000		
Work in process:		Direct Wages	37,50,000
On 1st march 2019	12,56,000		
On 31st March 2019	14,22,000		
Factory expenses	21,25,000	Office and administration expenses	10,34,000
Selling and distribution expenses	7,50,000	Sale of scrap	26,000

Answer:

Cost sheet of _____ for the month of March 2019:

Particulars	Amount	Amount
Direct Material		
Opening stock of Raw Material	6,06,000	
Purchases of raw material	28,57,000	
Less: Closing stock of raw material	(7,50,000)	**27,13,000**
Direct Labour		37,50,000
Direct expenses		0
Prime Cost		**64,63,000**
Factory Overheads		21,25,000
Gross Works Cost		**85,88,000**
Add: Opening Work in Progress		12,56,000
Less: Closing Work in Progress		(14,22,000)
Net Works Cost/Factory Cost		**84,22,000**
Primary Packing Cost		0
Research and Development		0
Quality Control Cost		0
Administrative Overheads relating to Production		0
Less: Credit for recoveries/scrap		(26,000)
Cost of Production		**83,96,000**
Add: Opening stock of Finished Goods		3,59,000
Less: Closing stock of Finished Goods		(3,09,000)
Cost of Goods Sold		**84,46,000**
General and Administrative Overheads		10,34,000
Selling and distribution Overheads		7,50,000
Cost of Sales		**1,02,30,000**
Profit (balancing figure)		**31,70,000**
Sales (Given)		1,34,00,000

10. **Simple cost sheet – Homework:**

Following information relate to a manufacturing concern for the year ended 31st March 2019:

Particulars	Amount
Raw material (opening)	2,28,000
Raw material (closing)	3,05,000
Purchases of raw material	42,25,000
Freight inwards	1,00,000
Direct wages paid	12,56,000
Direct wages – outstanding at the end of the year	1,50,000
Factory overheads	20% of prime cost
Work-in-progress (opening)	1,92,500
Work-in-progress (closing)	1,40,700
Administrative overheads relating to production	1,73,000
Distribution expenses	Rs.16 per unit
Finished stock (opening) – 1,217 units	6,08,500
Sale of scrap of material	8,000

The firm produced 14,000 units of output during the year. The stock of finished goods at the end of year is valued at cost of production. The firm sold 14,153 units at a price of Rs.618 per unit during the year. Prepare the cost sheet of the firm

Answer:

Cost sheet of _____ for the year ended March 2019:

Particulars	Amount	Amount
Direct Material		
Opening stock of Raw Material	2,28,000	
Purchases of raw material	42,25,000	
Freight inwards	1,00,000	
Less: Scrap of material	(8,000)	
Less: Closing stock of raw material	(3,05,000)	**42,40,000**
Direct Labour (including outstanding)		14,06,000
Direct expenses		0
Prime Cost		**56,46,000**
Factory Overheads (20% of prime cost)		11,29,200
Gross Works Cost		**67,75,200**
Add: Opening Work in Progress		1,92,500
Less: Closing Work in Progress		(1,40,700)
Net Works Cost/Factory Cost		**68,27,000**
Primary Packing Cost		0
Research and Development		0
Quality Control Cost		0
Administrative Overheads relating to Production		1,73,000
Less: Credit for recoveries/scrap		0
Cost of Production		**70,00,000**
Add: Opening stock of Finished Goods		6,08,500
Less: Closing stock of Finished Goods (Note 1)		(5,32,000)
Cost of Goods Sold		**70,76,500**
General and Administrative Overheads		0
Selling and distribution Overheads (16 x 14,153)		2,26,448
Cost of Sales		**73,02,948**
Profit (balancing figure)		**14,43,606**
Sales (618 x 14,153)		87,46,554

Note 1: Computation of value of closing stock:

Particulars	Calculation	Amount
Opening stock of FG (units)		1,217
Production during the year		14,000
Less: Closing stock of FG (units)		(14,153)

Closing stock in units		1,064
Cost per unit #	70,00,000/14,000	500
Value of closing stock	1,064 x 500	5,32,000

It is assumed that the company is following FIFO method of accounting and hence cost per unit has been calculated based on current year production cost

11. Cost sheet at different levels:

A Limited has capacity to produce 1,00,000 units of a product every month. Its works cost at varying levels of production is as under:

Level	Works cost per unit
10%	400
20%	390
30%	380
40%	370
50%	360
60%	350
70%	340
80%	330
90%	320
100%	310

Its fixed administration expenses amount to Rs.1,50,000 and fixed marketing expenses amount to Rs.2,50,000 per month respectively. The variable distribution cost amounts to Rs.30 per unit.

It can sell 100% of its output at Rs.500 per unit provided it incurs the following further expenditure:
   a) It gives gift items costing Rs.30 per unit of sale
   b) It has lucky draws every month giving the first prize of Rs.50,000; 2nd prize of Rs.25,000, 3rd prize of Rs.10,000 and three consolation prizes of Rs.5,000 each to customers buying the product
   c) It spends Rs.1,00,000 on refreshments served every month to its customers
   d) It sponsors a television programme every week at a cost of Rs.20,00,000 per month

It can market 30% of its output at Rs.550 per unit without incurring any of the expenses referred to in (a) to (d) above. Prepare a cost sheet for the month showing total cost and profit at 30% and 100% capacity level.

Answer:

Cost sheet of A Limited for the month of _____:

Particulars	30% capacity		100% capacity	
	30,000 units		1,00,000 units	
	Per unit	Total	Per unit	Total
Works cost/COP/COGS	380.00	1,14,00,00	310.00	3,10,00,000
Fixed Administration expenses	5.00	1,50,000	1.50	1,50,000
Fixed marketing expenses	8.33	2,50,000	2.50	2,50,000
Variable distribution cost	30.00	9,00,000	30.00	30,00,000
Special costs				
Gift items costs			30.00	30,00,000
Customers prizes #			1.00	1,00,000
Refreshments			1.00	1,00,000
Television programme sponsorship cost			20.00	20,00,000
Cost of Sales	423.33	1,27,00,000	396.00	3,96,00,000
Profit (balancing figure)	126.67	38,00,000	104.00	1,04,00,000
Sales	550.00	1,65,00,000	500.00	5,00,00,000

 # Customers prizes cost:

Particulars	Amount
1st prize	50,000
2nd prize	25,000
3rd prize	10,000
Consolation prizes (3 x 5,000)	15,000
Total	**1,00,000**

12. Cost sheet:

M/S Areeba Private Limited has a normal production capacity of 36,000 units of toys per annum. The estimated costs of production are as under:

- Direct Material   Rs.40 per unit
- Direct Labour   Rs.30 per unit (subject to a minimum of Rs.48,000 p.m.)
- Factory Overheads
  - o Fixed   Rs.3,60,000 per annum
  - o Variable   Rs.10 per unit
  - o Semi-variable   Rs.1,08,000 per annum upto 50% capacity and additional Rs.46,800 for every 20% increase in capacity or any part thereof
- Administrative overheads   Rs.5,18,400 per annum (fixed)
- Selling overheads are incurred at Rs.8 per unit
- Each unit of raw material yields scrap which is sold at the rate of Rs.5 per unit
- In year 2019, the factory worked at 50% capacity for the first three months but it was expected that it would work at 80% capacity for the remaining nine months
- During the first three months, the selling price per unit was Rs.145

You are required to:
  i.   Prepare a cost sheet showing prime cost, works cost, cost of production and cost of sales
  ii. Calculate the selling price per unit for remaining nine months to achieve the total annual profit of Rs.8,76,600

Answer:

Cost sheet of Areeba Private Limited for the year ended _____:

Particulars	3 Months	9 Months
No of units manufactured	**4,500 units** (3,000 x 50% x 3 months)	**21,600 units** (3,000 x 80% x 9 months
Direct Material	1,80,000 (4,500 x 40)	8,64,000 (21,600 x 40)
Less: Scrap of material	22,500 (4,500 x 5)	1,08,000 (21,600 x 5)
Raw material consumed	**1,57,500**	**7,56,000**
Direct Labour	1,44,000 (48,000 x 3)	6,48,000 (21,600 x 30)
Direct expenses	0	0
Prime Cost	**3,01,500**	**14,04,000**
Fixed Factory Overheads	90,000 (3,60,000 x 3/12)	2,70,000 (3,60,000 x 9/12)
Variable Factory Overheads	45,000 (4,500 x 10)	2,16,000 (21,600 x 10)
Semi-variable factory overheads	27,000 (1,08,000 x 3/12)	1,51,200 (Note 1)
Works cost/COP/COGS	**4,63,500**	**20,41,200**
Administrative overheads	1,29,600 (5,18,400 x 3/12)	3,88,800 (5,18,400 x 9/12)
Selling overheads	36,000 (4,500 x 8)	1,72,800 (21,600 x 8)
Cost of Sales	**6,29,100**	**26,02,800**
Profit (balancing figure)	**23,400**	**8,52,200** (Note 2)
Sales (balancing figure)	**6,52,500** (145 x 4,500)	**34,56,000** (Note 3)

Notes:
1. Semi-variable overheads for 50 percent capacity is Rs.1,08,000. Proportionate expenditure for nine months is Rs.81,000. Semi-variable overheads will increase by Rs.46,800 for additional 20 percent capacity and will further increase by 10 percent additional capacity. Capacity utilization for nine months is 80 percent. Hence semi-variable overheads cost is Rs.1,51,200 (81,000 + 46,800 + 23,400)

2. Target profit of the company is Rs.8,76,600. The company earns profit of Rs.23,400 for first three months and hence the profit for balance nine months is Rs.8,52,200 (8,76,600 – 23,400)
3. Sales for balance nine months = 26,02,800 + 8,52,200 = Rs.34,56,000
4. **Selling price per unit for nine months = 34,56,000/21,600 = Rs.160 per unit**

13. <u>Cost sheet:</u>

DFG Ltd. manufactures leather bags for office and school purpose. The following information is related with the production of leather bags for the month of September 2019.

(i) Leather sheets and cotton cloths are the main inputs, and the estimated requirement per bag is two meters of leather sheets and one meter of cotton cloth. 2,000 meter of leather sheets and 1,000 meter of cotton cloths are purchased at Rs.3,20,000 and Rs.15,000 respectively. Freight paid on purchases is Rs.8,500.

(ii) Stitching and finishing need 2,000 man hours at Rs.80 per hour.

(iii) Other direct cost of Rs.10 per labour hour is incurred.

(iv) DFG has 4 machines at a total cost of Rs.22,00,000. Machine has a life of 10 years with a scrape value of 10% of the original cost. Depreciation is charged on straight line method.

(v) The monthly cost of administrative and sales office staffs are Rs.45,000 and Rs.72,000 respectively. DFG pays Rs.1,20,000 per month as rent for a 2400 sq.feet factory premises. The administrative and sales office occupies 240 sq. feet and 200 sq. feet respectively of factory space.

(vi) Freight paid on delivery of finished bags is Rs.18,000.

(vii) During the month 35 kg. of leather and cotton cuttings are sold at Rs.150 per kg.

(viii) There is no opening and closing stocks for input materials. There is 100 bags in stock at the end of the month.

Required:

PREPARE a cost sheet following functional classification for the month of September 2019.

Answer:

Cost sheet of _____ for the month of September 2019:

Particulars	Amount	Amount
Direct Material		
Leather sheets	3,20,000	
Cotton cloths	15,000	
Freight on purchase	8,500	**3,43,500**
Direct Labour (2,000 x 80)		1,60,000
Direct expenses (2,000 x 10)		20,000
Prime Cost		**5,23,500**
Factory Overheads		
Depreciation [(22,00,000 -2,20,000)/10]/12 months	16,500	
Rent (Note 1)	98,000	1,14,500
Gross Works Cost/ Net Works cost/Factory cost		**6,38,000**
Less: Credit for recoveries/scrap (150 x 35)		(5,250)
Cost of Production		**6,32,750**
Add: Opening stock of Finished Goods		0
Less: Closing stock of Finished Goods (Note 2)		(63,275)
Cost of Goods Sold		**5,69,475**
Administrative Overheads		
Staff Salary	45,000	
Rent (Note 1)	12,000	57,000
Selling and distribution Overheads		
Staff salary	72,000	
Rent (Note 1)	10,000	
Freight on delivery of bags	18,000	1,00,000
Cost of Sales		**7,26,475**

Notes:

1. The company pays monthly rent of Rs.1,20,000. Administrative office occupies 240 square feet, sales office occupies 200 square feet and balance area of 1,960 square feet (2,400 – 240 -200) is occupied by factory
   a. Rent for factory = (1,20,000 x 1,960/2,400) = 98,000

    b. Rent for administrative office = (1,20,000 x 240/2,400) = 12,000
    c. Rent for sales office building = (1,20,000 x 200/2,400) = 10,000
2. Two metres of leather sheets is needed for producing one unit of bag. The company has used 2,000 metres of leather sheets and hence the company has produced 1,000 units. Cost of production for 1,000 units is Rs.6,32,750
    a. Cost per unit = 6,32,750/1,000 = Rs.632.75
    b. Value of closing stock = 632.75 x 100 = Rs.63,275

14. Cost sheet:

Following details are provided by M/s ZIA Private Limited for the quarter ending 30 September 2018

Direct Expenses	1,80,000
Direct wages being 175% of factory overheads	2,57,250
Cost of goods sold	18,75,000
Selling and distribution overheads	60,000
Sales	22,10,000
Administration overheads	10% of factory overheads

Stock details as per stock register:

Particulars	30.6.2018	30.09.2018
Raw material	2,45,600	2,08,000
Work-in-process	1,70,800	1,90,000
Finished goods	3,10,000	2,75,000

You are required to prepare a cost sheet showing:
    i. Raw material consumed
    ii. Prime cost
    iii. Factory cost
    iv. Cost of goods sold
    v. Cost of sales and profit

Answer:

Cost Sheet of ZIA Private Limited for the quarter ended September 2018

Particulars	Amount	Amount
Direct Material		
Opening stock of Raw Material	2,45,600	
Purchases of raw material (balancing figure)	**12,37,350**	
Less: Closing stock of raw material	(2,08,000)	**12,60,250**
Direct Labour		2,57,250
Direct expenses		1,80,000
Prime Cost (reverse worked from GWC)		**17,12,200**
Factory Overheads (2,57,250/175%)		1,47,000
Gross Works Cost (reverse worked from NWC)		**18,59,200**
Add: Opening Work in Progress		1,70,800
Less: Closing Work in Progress		(1,90,000)
Net Works Cost/Factory Cost (reverse worked from COP)		**18,40,000**
Primary Packing Cost		0
Research and Development		0
Quality Control Cost		0
Administrative Overheads relating to Production		0
Less: Credit for recoveries/scrap		0
Cost of Production (reverse worked from COGS)		**18,40,000**
Add: Opening stock of Finished Goods		3,10,000
Less: Closing stock of Finished Goods		(2,75,000)
Cost of Goods Sold (given)		**18,75,000**
General and Administrative Overheads (10% x 1,47,000)		14,700
Selling and distribution Overheads		60,000
Cost of Sales		**19,49,700**
Profit (balancing figure)		**2,60,300**
Sales (Given)		22,10,000

CHAPTER 7: COST ACCOUNTING SYSTEM

1. What are the two methods of maintaining cost accounting records? **[Category B]**

Cost accounting records can be maintained under the following two systems
   ❖ Non-Integrated – Cost and financial accounting records are maintained separately
   ❖ Integrated – Cost and financial accounting records are integrated

2. What is non-integrated accounting system? **[Category A]**
   ❖ System in which **separate ledgers** are being maintained for cost and financial accounts
   ❖ Under this system the cost accounts records **only those transactions which relate to the product or service being provided**. Hence transactions like interest, bad debts, miscellaneous income, income taxes etc. are ignored in this system
   ❖ An advantage of non-integrated accounting system is that **it would record notional expenses** like rent on own premises facilitating comparison amongst factories
   ❖ NIA system does not record all accounts and hence items of accounts which are excluded are represented by account called **cost ledger control account**.

3. What are the ledgers maintained under non-integrated system? **[Category A]**

Ledger	Description
Cost Ledger Control Account	✓ This is also known as General Ledger Adjustment Account. This account is used to complete double entry
Stores Ledger Control Account	✓ This account records all inflow (debited) and outflow (credited) of raw material. ✓ Normal loss of raw material is transferred to overhead account whereas abnormal loss of raw material is transferred to costing profit and loss account
Wages Control Account	✓ This account is debited with entire wages paid. ✓ Direct wages is transferred to WIP control account and indirect wages is transferred to factory overhead control account. ✓ Wages for abnormal idle time is transferred to costing profit and loss account ✓ Non-productive of direct workers is to be treated as indirect wages and the same will be transferred to factory overhead control account
Factory Overhead Control Account	✓ This account is debited with overheads incurred ✓ The account is credited with overheads recovered and the same is transferred to WIP control account ✓ The difference between debit and credit side is under/over absorption of overheads. This amount can be either carried forward to next year or be transferred to costing profit & loss account
Work-in-progress control account	✓ This account is debited with cost of production which would include Direct Material, Direct Labour, Direct Expenses and Factory overheads ✓ The production for the current year will be transferred to finished goods control account and the same would be credited in this account
Administration overhead control account	✓ This account is debited with overheads incurred ✓ The account is credited with overheads recovered and the same is transferred to FG Control account ✓ The difference between debit and credit side is under/over absorption of overheads. This amount can be either carried forward to next year or be transferred to costing profit & loss account
Finished Goods Control Account	✓ This account is debited with value of goods transferred from work-in-progress and administration overheads recovered. ✓ This account is credited with cost of units sold during the year and the same is transferred to cost of sales account
Selling and Distribution Account	✓ This account is debited with overheads incurred ✓ The account is credited with overheads recovered and the same is transferred to cost of sales account

Ledger	Description
	✓ The difference between debit and credit side is under/over absorption of overheads. This amount can be either carried forward to next year or be transferred to costing profit & loss account
Cost of sales account	✓ This account is debited with cost of finished goods transferred from FG account as well as selling and distribution overheads account ✓ This account is closed by transferring the balance to costing profit and loss account
Sales account	✓ This account is credited with sales and the same is transferred to costing profit and loss account
Costing Profit and Loss Account	✓ This account records cost of sales, sales and under/over absorbed overheads ✓ Profit/loss for the year is transferred to cost ledger control account

4. What are the journal entries under NIA system? **[Category A]**

Transaction	Journal Entry
Entries relating to raw material:	
Purchase of raw material	Stores Ledger Control A/c Dr To Cost Ledger Control A/c
Purchases for special job	WIP Control A/c Dr To Cost Ledger Control A/c
Return of materials to vendor	Cost Ledger Control A/c Dr To Stores Ledger Control A/c
Materials issued to production	WIP Control A/c Dr To Stores Ledger Control A/c
Materials issued for maintenance	FOH/AOH/SOH Control A/c Dr To Stores Ledger Control A/c
Material returned from shop to stores	Stores Ledger Control A/c Dr To WIP Control A/c
Normal loss of raw material	FOH Control A/c Dr To Stores Ledger Control A/c
Abnormal loss of raw material	Costing P& L A/c Dr To Stores Ledger Control A/c
Entries relating to direct wages	
Payment of wages	Wages control A/c Dr To Cost Ledger Control A/c
Analysis of wages into direct and indirect wages	WIP Control A/c Dr (Direct) FOH Control A/c Dr (Indirect) To Wages Control A/c
Abnormal idle time	Costing P& L A/c Dr To Wages Control A/c
Entries relating to direct expenses	
Incurrence of direct expenses	WIP Control A/c Dr To Cost Ledger Control A/c
Entries relating to overheads	
Incurrence of FOH / AOH / SOH	FOH / AOH / SOH Control A/c Dr To Cost Ledger Control A/c
Recovery of Manufacturing overheads	WIP Control A/c Dr To FOH Control A/c
Recovery of Administration overheads	FG Control A/c Dr To AOH Control A/c
Recovery of Selling Overheads	Cost of Sales A/c Dr To SOH Control A/c
Under recovery of overheads	Costing P& L A/c Dr To FOH/AOH/SOH Control A/c
Over recovery of overheads	FOH / AOH / SOH Control A/c Dr To Costing P & L A/c

Transaction	Journal Entry
Other entries	
Completion of production during the year	FG Control A/C Dr To WIP Control A/c
Recording cost of goods sold	Cost of sales A/c Dr To FG Control A/c
Recording sales	Cost Ledger Control A/c Dr To Sales A/c
Transfer of cost of sales	Costing P & L A/c Dr To Cost of sales A/c
Transfer of sales	Sales A/c Dr To Costing P&L A/c
Recording of Profit for the year	Costing P&L A/c Dr To Cost Ledger Control A/c
Recording of loss for the year	Cost Ledger Control A/c Dr To Costing P&L A/c

5. What is integrated accounting system? **[Category B]**
❖ Integrated accounts is a system of accounting whereby both cost and financial accounts are kept in the same set of books
❖ The system can provide information for finding out cost of a product or service as well as information to prepare a profit and loss account and balance sheet

Advantages	Pre-requisites
✓ No need for reconciliation ✓ Less efforts ✓ Less time consuming ✓ Economical process	✓ Stage of integration is to be decided. Some companies can integrate up to the stage of primary cost and some companies prefer full integration of the entire accounting records ✓ Coding system must be prepared ✓ Perfect coordination between the staff responsible for financial and cost accounting must be ensured

6. What are the features of integrated accounting system? **[Category B]**
❖ Complete details of all cost, sales, cash transactions, all assets and liabilities are kept
❖ Notional transactions like rent on own premises is not recorded
❖ Journal entries are similar to NIA. However entries having cost ledger control account will get replaced with such as Bank Account, Debtors Account, Creditors Account and Provision for depreciation account

7. Why reconciliation of profits under cost and financial accounts are necessary? **[Category A]**
When the cost and financial accounts are kept separately, it is imperative to reconcile the profits under both systems due to following reasons:
   a) Items included in financial accounts but not in cost accounts:
      a. Appropriation of profits
         i. Income-tax
         ii. Transfer to reserve
         iii. Dividends paid
         iv. Goodwill preliminary expenses written off
      b. Pure financial items
         i. Interest, dividends
         ii. Losses on sale of investments
         iii. Expenses of Co's share transfer office
         iv. Damages & penalties

   b) Items included in cost accounts but not in financial accounts
      a. Opportunity cost of capital
      b. Notional rent
      c. Under/over absorption of expenses in cost accounts

d. Different bases of inventory valuation

Format for reconciliation of profits:

S. No	Item	End book	Start book	Difference	Dr/Cr	Action	Difference

Explanation to the table:

Column reference	Explanation
1	Self-explanatory
2	Item causing the difference
3	Figure as per Ending book
4	Figure as per Starting book
5	Column 3 – column 4, only sign to be displayed
6	Debit to be denoted with – and Credit to be denoted with +
7	Column (5) * Column (6)
8	(3) – (4). Only amount to be displayed

Note:
❖ Reconciliation can be prepared in the statement or account form. In case of Memorandum Reconciliation Account all minus items will be debited and all plus items will be credited

1. **Journal entries in non-integrated system**

Pass journal entries in the cost books, maintained on non-intergrated system, for the following:

(i) Issue of materials	Direct Rs. 5,50,000; Indirect Rs. 1,50,000
(ii) Allocation of wages	Direct Rs. 2,00,000; Indirect Rs. 40,000
(iii)Under/Over absorbed overheads:	Factory (over) Rs.20,000; Adinistration (under) Rs.10,000

Answer:

WIP Control A/c Dr	5,50,000	
Factory OH Control A/c Dr	1,50,000	
To Stores Ledger Control A/c		7,00,000
(Issue of direct and indirect material)		
WIP Control A/c Dr	2,00,000	
Factory OH Control A/c Dr	40,000	
To Wages Control A/c		2,40,000
(Allocation of wages)		
Factory OH Control A/c Dr	20,000	
To Costing Profit and Loss A/c		20,000
(Over-absorption of Factory OH)		
Costing Profit and Loss A/c Dr	10,000	
To Administrative OH Control A/c		10,000
(Under-absorption of Admin OH)		

2. **Journal entries in integrated system**

Journalise the following transactions assuming cost and financial accounts are integrated:

Particulars	(Rs.)
(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

Answer:

WIP Control A/c Dr	3,25,000	
Factory OH Control A/c Dr	1,15,000	
To Stores Ledger Control A/c		4,40,000
(Issue of direct and indirect material)		
WIP Control A/c Dr	4,87,500	
Factory OH Control A/c Dr	1,62,500	
To Wages Control A/c		6,50,000
(Allocation of wages)		
Factory OH Control A/c Dr	2,50,000	
To Profit and Loss A/c		2,50,000
(Over-absorption of Factory OH)		
Profit and Loss A/c Dr	1,75,000	
To Administrative OH Control A/c		1,75,000
(Under-absorption of Admin OH)		
Sundry Creditors A/c Dr	1,50,000	
To Bank A/c		1,50,000
(Payment made to creditors)		
Bank A/c Dr	2,00,000	
To Sundry Debtors A/c		2,00,000
(Money collected from debtors)		

3. **Journal entries under integrated system**

Journalise the following transactions assuming that cost and financial transactions are integrated:

Particulars	(Rs.)
Raw materials purchased	2,00,000
Direct materials issued to production	1,50,000
Wages paid (30% indirect)	1,20,000
Wages charged to production	84,000
Manufacturing expenses incurred	84,000
Manufacturing overhead charged to production	92,000
Selling and distribution costs	20,000
Finished products (at cost)	2,00,000
Sales	2,90,000
Closing stock	Nil
Receipts from debtors	69,000
Payments to creditors	1,10,000

Answer:

Stores Ledger Control A/c Dr	2,00,000	
To Creditors A/c		2,00,000
(Purchase of raw material)		
WIP Control A/c Dr	1,50,000	
To Stores Ledger Control A/c		1,50,000
(Issue of RM to Production)		
Wages Control A/c Dr	1,20,000	
To Bank A/c		1,20,000
(Wages Paid)		
WIP Control A/c Dr	84,000	
Manufacturing OH Control A/c Dr	36,000	
To Wages Control A/c		1,20,000
(Analysis of wages into direct and indirect)		
Manufacturing OH Control A/c Dr	84,000	
To Bank A/c		84,000
(Incurrence of manufacturing OH)		
WIP Control A/c Dr	92,000	

To Manufacturing OH Control A/c (Absorption of manufacturing OH)		92,000
Selling and Distribution OH Control A/c Dr To Bank A/c (Incurrence of SOH)	20,000	20,000
Cost of sales A/c Dr To Selling and Distribution OH Control A/c (Absorption of SOH)	20,000	20,000
FG Control A/c Dr To WIP Control A/c (Production during the year)	2,00,000	2,00,000
Debtors A/c Dr To Sales A/c (Sales during the year)	2,90,00	2,90,000
Closing stock – No entry – This would mean full production is sold Cost of Sales A/c Dr To FG Control A/c	2,00,000	2,00,000
Bank A/c Dr To Debtors A/c (Money collected from debtors)	69,000	69,000
Creditors A/c Dr To Bank A/c (Money paid to creditors)	1,10,000	1,10,000

4. **Non-integrated system**

As on 31st March, 2013, the following balances existed in a firm's Cost Ledger:

	Dr.	Cr.
	(Rs.)	(Rs.)
Stores Ledger Control A/c	3,01,435	
Work-in-Progress Control A/c	1,22,365	
Finished Stock Ledger Control A/c	2,51,945	
Manufacturing Overhead Control A/c		10,525
Cost Ledger Control A/c		6,65,220
	6,75,745	**6,75,745**

During the next three months the following items arose:

Particulars	(Rs.)
Finished product (at cost)	2,10,835
Manufacturing overhead incurred	91,510
Raw materials purchased	1,23,000
	(Rs.)
Factory Wages	50,530
Indirect Labour	21,665
Cost of Sales	1,85,890
Material issued to production	1,27,315
Sales returned at Cost	5,380
Material returned to suppliers	2,900
Manufacturing overhead charged to production	77,200

You are required to pass the Journal Entries; write up the accounts and schedule the balances, stating what each balance represents.
Answer:
Journal Entries:

FG Control A/c Dr	2,10,835		
To WIP Control A/c		2,10,835	
(Production during the year)			
Manufacturing Overhead Control A/c Dr	91,510		
To Cost Ledger Control A/c		91,510	
(Manufacturing overheads incurred)			
Stores Ledger Control A/c Dr	1,23,000		
To Cost Ledger Control A/c		1,23,000	
(Raw materials purchased)			
Wages Control A/c Dr	72,195		
To Cost Ledger Control A/c		72,195	
(Payment of wages)			
It is assumed that Factory wages of 50,530 do not include indirect labour			
WIP Control A/c Dr	50,530		
Manufacturing OH Control A/c Dr	21,665		
To Wages Control A/c		72,195	
(Analysis of wages into direct and indirect)			
Cost of Sales A/c Dr	1,85,890		
To FG Control A/c		1,85,890	
(Recording of sales at cost)			
WIP Control A/c Dr	1,27,315		
To Stores Ledger Control A/c		1,27,315	
(Issue of materials to production)			
FG Control A/c Dr	5,380		
To Cost of Sales A/c		5,380	
(Recording of sales returns at cost)			
Cost Ledger Control A/c Dr	2,900		
To Stores Ledger Control A/c		2,900	
(Materials returned to suppliers)			
WIP Control A/c Dr	77,200		
To Manufacturing Overheads Control A/c		77,200	

Ledger Account:

Dr		Stores Ledger Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Balance b/d	3,01,435	By WIP Control A/c	1,27,315
To Cost Ledger Control A/c	1,23,000	By Cost Ledger Control A/c	2,900
		By Balance c/d (b/f)	**2,94,220**
	4,24,435		**4,24,435**

Dr		WIP Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Balance b/d	1,22,365	By FG Control A/c	2,10,835
To Wages Control A/c	50,530	**By balance c/d (b/f)**	**1,66,575**
To Stores Ledger Control A/c	1,27,315		
To Manufacturing OH Control A/c	77,200		
	3,77,410		**3,77,410**

Dr		FG Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Balance b/d	2,51,945	By Cost of sales A/c	1,85,890
To WIP Control A/c	2,10,835	**By balance c/d (b/f)**	**2,82,270**
To Cost of Sales A/c	5,380		
	4,68,160		**4,68,160**

Dr		Manufacturing OH Control A/c	Cr
Particulars	Amount	Particulars	Amount

To Cost Ledger Control A/c	91,510	By Balance b/d	10,525
To Wages Control A/c	21,665	By WIP Control A/c	77,200
		By Balance c/d (b/f)	**25,450**
	1,13,175		**1,13,175**

Dr	Cost Ledger Control A/c		Cr
Particulars	Amount	Particulars	Amount
To Stores Ledger Control A/c	2,900	By Balance b/d	6,65,220
To Balance c/d (b/f)	**9,49,025**	By Manufacturing OH control A/c	91,510
		By Stores Ledger Control A/c	1,23,000
		By Wages Control A/c	72,195
Total	**9,51,925**	**Total**	**9,51,925**

Dr	Wages Control A/c		Cr
Particulars	Amount	Particulars	Amount
To Cost Ledger Control A/c	72,195	By WIP Control A/c	50,530
		By Manufacturing OH Control A/c	21,665
Total	**72,195**		**72,195**

Dr	Cost of Sales A/c		Cr
Particulars	Amount	Particulars	Amount
To FG Control A/c	1,85,890	By FG Control A/c	5,380
		By Balance c/d (cost of sales)	**1,80,510**
Total	**1,85,890**	**Total**	**1,85,890**

Trial Balance as on 31st March, 2013:

Name of account	Debit	Credit	Nature
Stores Ledger Control A/c	2,94,220		Closing RM
WIP Control A/c	1,66,575		Closing WIP
FG Control A/c	2,82,270		Closing FG
Manufacturing OH Control A/c	25,450		Under-absorption carried to next year
Cost of Sales A/c	1,80,510		Cost of sales for the year
Cost Ledger Control A/c		9,49,025	-
Total	**9,49,025**	**9,49,025**	

Assumptions:
- It is assumed that factory wages of Rs.50,530 does not include indirect wages of Rs.21,665
- It is assumed that under/over absorption of overheads is carried forward to next year
- It is assumed that cost of sales of Rs.1,85,890 is gross transfer from FG to cost of sales. Net cost of sales will come down because of sales returns

5. **Integrated system**

In the absence of the Chief Accountant, you have been asked to prepare a month's cost accounts for a company which operates a batch costing system fully integrated with the financial accounts. The following relevant information is provided to you:

Particulars	(Rs.)	(Rs.)
Balances at the beginning of the month:		
Stores ledger control account		25000
Work-in-Progress Control Account		20,000
Finished Goods Control Account		35,000
Prepaid Production Overheads brought forward from previous month		3000
Transactions during the month:		
Materials Purchased		75,000
Materials Issued: Rs.		
To Production 30,000	30000	

To Factory Maintenance	4000	34000
Materials transferred between batches		5,000
Total wages paid:		
To Direct workers	25,000	
To Indirect workers	5,000	30,000
Direct wages charged to batches		20,000
Recorded non-productive time of direct workers		5,000
Selling and Distribution Overheads Incurred		6,000
Other Production Overheads Incurred		12,000
Sales		1,00,000
Cost of Finished Goods Sold		80,000
Cost of Goods completed and transferred into finished goods during the month		65,000
Physical value of work-in-progress at the end of the month		40,000

The production overhead absorption rate is 150% of direct wages charged to work- in progress.

Prepare the following accounts for the month:
- a) Stores Ledger Control Account.
- b) Work-in-Progress Control Account.
- c) Finished Goods Control Account.
- d) Production Overhead Control Account.
- e) Profit and Loss Account.

Answer:

Ledger Account:

Dr		Stores Ledger Control A/c	Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Balance b/d	25,000	By WIP Control A/c	30,000
To Bank A/c (Purchase)	75,000	By Production OH Control A/c	4,000
		By Balance c/d (b/f)	**66,000**
	1,00,000		**1,00,000**

Dr		Work-in-progress Control A/c	Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Balance b/d	20,000	By FG Control A/c	65,000
To Stores Ledger Control A/c	30,000		
To Wages Control A/c	20,000	By Balance c/d	40,000
To Production OH Control A/c	30,000		
To Profit and Loss A/c (Gain)	**5,000**		
	1,05,000		**1,05,000**

Dr		Finished Goods Control A/c	Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Balance b/d	35,000	By Cost of Sales A/c	80,000
To WIP Control A/c	65,000	**By Balance c/d (b/f)**	**20,000**
Total	**1,00,000**	**Total**	**1,00,000**

Dr		Production OH Control A/c	Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Prepaid production OH	3,000	By WIP Control A/c (150% x 20,000)	30,000
To Stores Ledger Control A/c	4,000		
To Wages Control A/c	10,000		
To Bank A/c	12,000		
To Profit and Loss A/c (Note 1) (over-absorption)	**1,000**		

	30,000		30,000

Dr		Profit and Loss Account	Cr
Particulars	Amount	Particulars	Amount
To Cost of Sales A/c	86,000	By Sales A/c	1,00,000
To Capital A/c (Profit)	20,000		
		By Production OH Control A/c	1,000
		By WIP Control A/c	5,000
Total	1,06,000	Total	1,06,000

Dr		Wages Control Account	Cr
Particulars	Amount	Particulars	Amount
To Bank A/c	30,000	By WIP Control A/c	20,000
		By Production OH Control A/c	10,000
Total	30,000	Total	30,000

Dr		Selling and Distribution OH Account	Cr
Particulars	Amount	Particulars	Amount
To Bank A/c	6,000	By Cost of Sales A/c	6,000
Total	6,000	Total	6,000

Dr		Sales Account	Cr
Particulars	Amount	Particulars	Amount
To Profit and Loss A/c	1,00,000	By Bank A/c	1,00,000
Total	1,00,000	Total	1,00,000

Dr		Cost of Sales Account	Cr
Particulars	Amount	Particulars	Amount
To FG Control A/c	80,000	By Profit and Loss A/c	86,000
To Selling and distribution OH A/c	6,000		
Total	86,000	Total	86,000

Note:
1. It is assumed that under/over absorption of overheads is charged to Profit and Loss A/c

6. Non-integrated system

A company operates on historic job cost accounting system, which is not integrated with the financial accounts. At the beginning of a month, the opening balances in cost ledger were:

Particulars	Rs. (in lakhs)
Stores Ledger Control Account	80
Work-in-Progress Control Account	20
Finished Goods Control Account	430
Building Construction Account	10
Cost Ledger Control Account	540
During the month, the following transaction took place:	
Materials	
− Purchased	40
Issued to production	50
Issued to general maintenance	6
Issued to building construction	4
Wages	
− Gross wages paid	150
Indirect wages	40
For building construction	10

Work Overheads	
− Actual amount incurred	160
(excluding items shown above)	
Absorbed in building construction	20
Under absorbed	8
Royalty paid	5
Selling, distribution and administration overheads	25
Sales	450

At the end of the month, the stock of raw material and work-in-progress was Rs. 55 lakhs and Rs. 25 lakhs respectively. The loss arising in the raw material accounts is treated as factory overheads. The building under construction was completed during the month. Company's gross profit margin is 20% on sales. Prepare the relevant control accounts to record the above transactions in the cost ledger of the company.

Answer:

Ledger Account:

Dr		Stores Ledger Control A/c	Cr
Particulars	**Amount**	**Particulars**	**Amount**
To balance b/d	80	By WIP Control A/c	50
To Cost Ledger Control A/c	40	By Works OH Control A/c	6
		By Building construction A/c	4
		By Works OH Control A/c (Normal loss)	**5**
		By Balance c/d	55
Total	**120**	**Total**	**120**

Dr		Work-in-progress Control A/c	Cr
Particulars	**Amount**	**Particulars**	**Amount**
To balance b/d	20	**By FG Control A/c (b/f)**	**333**
To Stores Ledger Control A/c	50	By Balance c/d	25
To Cost Ledger Control A/c (Royalty)	5		
To Wages Control A/c	100		
To Works OH Control A/c	183		
	358		**358**

Dr		Finished Goods Control A/c	Cr
Particulars	**Amount**	**Particulars**	**Amount**
To balance b/d	430	By Cost of Sales A/c (450 x 80%)	360
To WIP Control A/c	333	**By Balance c/d (b/f)**	**403**
Total	**763**		**763**

Dr		Building Construction A/c	Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Balance b/d	10	By Cost Ledger Control A/c	44
To Stores Ledger Control A/c	4		
To Wages Control A/c	10		
To Works OH Control A/c	20		
Total	**44**	**Total**	**44**

Dr		Cost Ledger Control A/c	Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Sales A/c	450	By Balance b/d	540
To Building Construction A/c	44	By Stores Ledger Control A/c	40
To Balance c/d	**483**	By Wages Control A/c	150
		By Works OH Control A/c	160

		By WIP Control A/c	5
		By Selling distribution & administration OH Control A/c	25
		By Costing P&L A/c	57
Total	**977**	**Total**	**977**

Dr		Works Overhead Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Stores Ledger Control A/c	6	By Building Construction A/c	20
To Wages Control A/c	40	By WIP Control A/c (absorption)	183
To Cost Ledger Control A/c	160	By Costing P&L A/c (under-absorption)	8
To Stores Ledger Control A/c	5		
Total	**211**	**Total**	**211**

Dr		Wages Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Cost Ledger Control A/c	150	By Works OH Control A/c	40
		By Building construction A/c	10
		By WIP Control A/c (b/f)	**100**
Total	**150**	**Total**	**150**

Dr		Costing Profit and Loss A/c	Cr
Particulars	Amount	Particulars	Amount
To Cost of Sales A/c	385	By Sales A/c	450
To Works OH Control A/c	8		
To Cost Ledger Control A/c (Profit)	**57**		
Total	**450**	**Total**	**450**

Dr		Selling distribution and administration OH Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Cost Ledger Control A/c	25	By Cost of Sales A/c	25
Total	25	Total	25

Dr		Sales Account	Cr
Particulars	Amount	Particulars	Amount
To Costing P&L A/c	450	By Cost Ledger Control A/c	450
Total	450	Total	450

Dr		Cost of Sales A/c	Cr
Particulars	Amount	Particulars	Amount
To FG Control A/c	360	By Costing P&L A/c	385
To Selling distribution and administration OH Control A/c	25		
Total	**385**	**Total**	**385**

Mandatory entries and order of balancing accounts:

Ledger	Transaction
Stores Ledger Control A/c	- Opening Balance - Purchase - Transfer to WIP - Closing Balance
Wages Control A/c	- Payment - Transfer to WIP

Factory OH Control A/c	• Payment • Absorption to WIP
WIP Control A/c	• Opening balance • Transfer from Stores Ledger • Transfer from Wages Control • Transfer from Factory OH Control • Transfer to FG Control • Closing balance
Administration OH Control A/c	• Payment • Absorption to FG Control (Admin OH relating to production)/ Absorption to Cost of Sales A/c (General and Admin OH)
FG Control A/c	• Opening Balance • Transfer from WIP • Transfer to COS • Closing Balance
Selling OH Control A/c	• Payment • Absorption to COS
Cost of Sales A/c	• Transfer from FG Control A/c • Transfer to P&L A/c
Sales	• Sale entry • Transfer to P&L A/c
Costing P&L A/c	• Cost of Sales • Sales

7. Reverse working

The following incomplete accounts are furnished to you for the month ended 31st October, 2012.

Stores Control Account

1.10.12 To Balance   Rs. 54,000

Work in Progress Control Account

1.10.12 To Balance   Rs. 6,000

Finished Goods Control Account

1.10.12 To Balance   Rs. 75,000

Factory Overheads Control Account

Total debits for October, 2012   Rs. 45,000

Factory Overheads Applied Account

Cost of Goods Sold Account

Creditors for Purchases Account

1.10.12 By Balance   Rs. 30,000

Additional information:
a) The factory overheads are applied by using a budgeted rate based on Direct Labour Hours. The budget for overheads for 2012 is Rs. 6,75,000 and the budget of direct labour hours is 4,50,000.
b) The balance in the account of creditors for purchases on 31.10.12 is Rs. 15,000 and the payments made to creditors in October, 2012 amount to Rs. 1,05,000.
c) The finished goods inventory as on 31st October, 2012 is Rs. 66,000.
d) The cost of goods sold during the month was Rs. 1,95,000.
e) On 31st October, 2012 there was only one unfinished job in the factory. The cost records show that Rs. 3,000 (1,200 direct labour hours) of Direct Labour Cost and Rs. 6,000 of Direct Material Cost had been charged.
f) A total of 28,200 direct labour hours were worked in October, 2012. All factory workers earn same rate of pay.
g) All actual factory overheads incurred in October, 2012 have been posted.

You are required to find:
I.   Materials purchased during October, 2012.
II. Cost of goods completed in October, 2012.

III. Overheads applied to production in October, 2012.
IV. Balance of work in progress on 31st October, 2012.
V. Direct materials consumed during October, 2012.
VI. Balance of Stores Control Account on 31st October, 2012.
VII. Over absorbed or under absorbed overheads for October, 2012.

Answer:
Ledger Account:

Dr		Stores Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Balance b/d	54,000	By WIP Control A/c	78,000
To Creditors A/c	90,000	**By Balance c/d (b/f)**	**66,000**
Total	**1,44,000**	**Total**	**1,44,000**

Dr		Work-in-progress Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Balance b/d	6,000	By FG Control A/c	1,86,000
To Wages Control A/c	70,500		
To Factory OH Control A/c	42,300	By Balance c/d	10,800
To Stores Control A/c (b/f)	**78,000**		
Total	**1,96,800**	**Total**	**1,96,800**

Dr		Finished Goods Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Balance b/d	75,000	By COGS A/c	1,95,000
To WIP Control A/c (b/f)	**1,86,000**	By Balance c/d	66,000
Total	**2,61,000**	**Total**	**2,61,000**

Dr		Factory OH Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Bank (payment)	45,000	By WIP Control A/c (28,200 x 1.50)	42,300
		By Profit and Loss A/c (under-absorption)	**2,700**
Total	**45,000**		**45,000**

Dr		Cost of Goods Sold A/c	Cr
Particulars	Amount	Particulars	Amount
To FG Control A/c	1,95,000	By cost of Sales Account	1,95,000
Total	**1,95,000**	**Total**	**1,95,000**

Dr		Creditors Account	Cr
Particulars	Amount	Particulars	Amount
To Bank A/c	1,05,000	By Balance b/d	30,000
To Balance c/d	15,000	**By Stores Control A/c (purchases)**	**90,000**
Total	**1,20,000**		**1,20,000**

Dr		Wages Control Account	Cr
Particulars	Amount	Particulars	Amount
To bank A/c (28,200 x 2.5)	70,500	By WIP Control A/c	70,500
Total	**70,500**	**Total**	**70,500**

Notes:
Note 1: Computation of OAR:

Particulars	Amount
Budgeted Overheads	6,75,000
Suitable base	Direct Labour Hours
Budgeted suitable base	4,50,000
OAR	1.5/DLH

Note 2: Valuation of Closing WIP:

Particulars	Amount
Direct Material	6,000
Direct Labour	3,000
Overheads (1,200 x 1.50)	1,800
Total	**10,800**

Solution:

- Material purchased = Rs.90,000 (Refer Creditors Account)
- Cost of goods completed = Rs.1,86,000 (Refer FG Control Account)
- Overheads applied/absorbed = Rs.42,300 (Refer Factory Overheads Account)
- Balance of Work-in-progress = Rs.10,800 (refer Note 2)
- Direct materials consumed = Rs.78,000 (refer WIP Control Account)
- Balance of stores control account = Rs.66,000 (refer Stores Control Account)
- Under-absorbed Overheads = Rs.2,700 (refer Factory Overheads Account)

8. Reconciliation of profits:

A manufacturing company disclosed a net loss of Rs. 3,47,000 as per their cost accounts for the year ended March 31,2014. The financial accounts however disclosed a net loss of Rs. 5,10,000 for the same period. The following information was revealed as a result of scrutiny of the figures of both the sets of accounts.

Particulars	(Rs.)
(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.

Answer:

WN 1: Identification of plus and minus items:

S.No	Item	Figures as per cost book	Figure as per financial book	Difference	Dr/cr -/+	Action	Amount
1	Depreciation	2,75,000	3,25,000	-	-	+	50,000
2	Interest on investment	0	96,000	-	+	-	96,000
3	Income tax	0	54,000	-	-	+	54,000
4	Interest on loan	0	2,45,000	-	-	+	2,45,000
5	Transfer fees	0	24,000	-	+	-	24,000
6	Stores adjustment	0	14,000	-	+	-	14,000
7	Dividend	0	32,000	-	+	-	32,000
8	Factory OH*	60,000	1,00,000	-	-	+	40,000
9	Admin OH*	1,60,000	1,00,000	+	-	-	60,000

* Admin and Factory OH has been assumed as 1,00,000 in financial accounting and based on that costing figure is ascertained. You can assume any number for financial accounting.

WN 2: Memorandum Reconciliation Account:

Dr	Profit and Loss Account	Cr

Particulars	Amount	Particulars	Amount
To Loss as per financial book	5,10,000	By Difference in depreciation	50,000
To Interest on investment not recorded in cost books	96,000	By Income tax not recorded in cost books	54,000
To Transfer fees not recorded in cost books	24,000	By Interest on loan not recorded in cost books	2,45,000
To Stores adjustment not recorded in cost books	14,000	By Factory overheads under-absorbed	40,000
To Dividend received not recorded in cost books	32,000	**By Loss as per cost books**	**3,47,000**
To Admin OH over-absorbed	60,000		
Total	**7,36,000**	**Total**	**7,36,000**

9. **Reconciliation of profits:**

A manufacturing company has disclosed a net loss of Rs. 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 Rs. 2,58,000 for the same period. A scrutiny of data of both the sets of books of accounts revealed the following information:

Particulars	(Rs.)
(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.

Answer:

WN 1: Identification of plus and minus items:

S.No	Item	Figures as per financial book	Figure as per Cost book	Difference	Dr/cr -/+	Action	Amount
1	Factory OH	1,00,000	95,000	+	-	-	5,000
2	Admin OH	1,00,000	1,03,000	-	-	+	3,000
3	Depreciation	70,000	80,000	-	-	+	10,000
4	Interest on investments	20,000	0	+	+	+	20,000
5	Income tax	65,000	0	+	-	-	65,000
6	Transfer fees	2,000	0	+	+	+	2,000
7	Preliminary expenses	3,000	0	+	-	-	3,000
8	Closing stock	1,00,000	1,07,000	-	+	-	7,000

WN 2: Memorandum Reconciliation Account:

Dr		Profit and Loss Account	Cr
Particulars	Amount	Particulars	Amount
To loss as per cost books	2,13,000	By Admin OH over-absorbed	3,000
To factory OH under-absorbed	5,000	By difference in depreciation	10,000
To Income tax not recorded in cost books	65,000	By Interest on investment not recorded in cost books	20,000
To Preliminary expenses written off not recorded in cost books	3,000	By Transfer fees not recorded in cost books	2,000

To over-valuation of closing stock in cost books	7,000	By Loss as per financial books	2,58,000
Total	**2,93,000**	**Total**	**2,93,000**

10. **Reconciliation of profits:**

R Limited showed a net loss of Rs. 35,400 as per their cost accounts for the year ended 31st March, 2014. However, the financial accounts disclosed a net profit of Rs. 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:

Particulars	(Rs.)
(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.

Answer:

WN 1: Identification of plus and minus items:

S.No	Item	Figures as per financial book	Figure as per Cost book	Difference	Dr/cr -/+	Action	Amount
1	Admin OH	1,00,000	74,500	+	-	-	25,500
2	Factory OH	1,00,000	2,35,000	-	-	+	1,35,000
3	Depreciation	1,00,000	74,000	+	-	-	26,000
4	Dividend	20,000	0	+	+	+	20,000
5	Obsolescence	16,800	0	+	-	-	16,800
6	Income tax	43,600	0	+	-	-	43,600
7	Bank interest	13,600	0	+	+	+	13,600
8	Opening stock	1,45,000	1,65,000	-	-	+	20,000
9	Closing stock	1,32,000	1,25,500	+	+	+	6,500
10	Goodwill	25,000	0	+	-	-	25,000
11	Notional rent	0	60,000	-	-	+	60,000
12	Provision for doubtful debts	15,000	0	+	-	-	15,000

WN 2: Reconciliation statement:

Particulars	Amount	Amount
Loss as per Cost book		**-35,400**
Add: Plus items:		
Factory OH over-absorbed	1,35,000	
Dividend received not recorded in cost accounts	20,000	
Interest received not recorded in cost accounts	13,600	
Difference in valuation of opening stock	20,000	

Difference in valuation of closing stock	6,500	
Notional rent not recorded in financial books	60,000	2,55,100
Less: Minus items:		
Admin OH under-absorbed	25,500	
Difference in depreciation	26,000	
Loss due to obsolescence not recorded in cost books	16,800	
Income tax not recorded in cost books	43,600	
Goodwill written off not recorded in cost books	25,000	
Provision for doubtful debts not recorded in cost books	15,000	-1,51,900
Profit as per financial book		**67,800**

11. **Reconciliation of profits**

You are given the following information of the cost department of a manufacturing company:

Particulars	(Rs.)
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:

Particulars	(Rs.)
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:

- a) Stores control account;
- b) Work-in-progress control account;
- c) Costing Profit and Loss account;
- d) Profit and Loss account and
- e) Reconciliation statement

Answer:

Ledger Account:

Dr	Stores Ledger Control A/c		Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Balance b/d	12,60,000	By WIP Control A/c	67,20,000
To Cost Ledger Control A/c	67,20,000	By Factory Overhead Control A/c	8,40,000
To WIP Control A/c	33,60,000	By Factory Overhead Control A/c (Normal loss)	2,52,000
		By Balance c/d (b/f)	**35,28,000**
Total	**1,13,40,000**	**Total**	**1,13,40,000**

Dr	Work-in-progress Control A/c		Cr
Particulars	**Amount**	**Particulars**	**Amount**

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 (Cost of Sales)**	**1,58,88,000**
To Wages Control A/c	25,20,000	By balance c/d	15,20,000
To Factory Overhead Control A/c	90,08,000		
Total	**2,07,68,000**	**Total**	**2,07,68,000**

Dr		Costing Profit and Loss Account	Cr
Particulars	Amount	Particulars	Amount
To Cost of Sales	1,58,88,000	By sales (1,58,88,000 + 12%)	1,77,94,560
To Cost Ledger Control (Profit for the year)	**19,06,560**		
Total	**1,77,94,560**	**Total**	**1,77,94,560**

Dr		Profit and Loss Account	Cr
Particulars	Amount	Particulars	Amount
To opening RM	12,60,000	By Sales	1,77,94,560
To opening WIP	25,20,000	By Closing RM	35,28,000
To Purchases	67,20,000	By Closing WIP	15,20,000
To Wages	29,40,000	By Income from investment	4,00,000
To Overheads	95,50,000	**By Loss for the year**	**5,87,440**
To Loss on sale of fixed assets	8,40,000		
Total	**2,38,30,000**	**Total**	**2,38,30,000**

Dr		Factory Overhead Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Stores Ledger Control A/c	8,40,000	By WIP Control A/c	90,08,000
To Stores Ledger Control A/c	2,52,000	**By Balance c/d (carry forward to next year – under absorption)**	**20,54,000**
To Cost Ledger Control A/c	95,50,000		
To Wages Control A/c	4,20,000		
	1,10,62,000		**1,10,62,000**

Dr		Wages Control Account	Cr
Particulars	Amount	Particulars	Amount
To Cost Ledger Control A/c	29,40,000	By WIP Control A/c	25,20,000
		By Factory overhead control A/c	**4,20,000**
Total	**29,40,000**		**29,40,000**

Note: It is assumed that under-absorbed overheads are carried forward to next year.

WN 2: Identification of plus and minus items:

S.No	Item	Figures as per financial book	Figure as per Cost book	Difference	Dr/cr -/+	Action	Amount
1	Factory Overheads	0	-20,54,000	+	-	-	20,54,000
2	Loss on sale of fixed assets	8,40,000	0	+	-	-	8,40,000
3	Income from investment	4,00,000	0	+	+	+	4,00,000

WN 3: Reconciliation statement:

Particulars	Amount	Amount
Profit as per Cost books		**19,06,560**
Add:		
Income from investment not recorded in cost books		4,00,000
Less:		
Loss on sale of fixed assets not recorded in cost books	8,40,000	
Factory overheads under-absorbed	20,54,000	-28,94,000

Loss as per financial books		5,87,440

12. Reconciliation of profits

The financial books of a company reveal the following data for the year ended 31st March, 2014:

Particualrs	(Rs.)
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 Rs. 4 per unit sold.
- Opening Stock of finished goods is valued at Rs. 104 per unit.
- The company values work-in-process at factory cost for both Financial and Cost Profit Reporting.

Required:
a) Prepare statements for the year ended 31st March, 2014 show
   - the profit as per financial records
   - the profit as per costing records.
b) Present a statement reconciling the profit as per costing records with the profit as per Financial Records.

Answer:
WN 1: Computation of profit as per financial books:

Dr		Profit and Loss Account	Cr
Particulars	Amount	Particulars	Amount
To Opening FG	74,375	By Sales	20,80,000
To Opening WIP	32,000		
To Raw materials consumed	7,80,000	By Interest received	45,000
To Direct Labour	4,50,000	By Rent received	18,000
To Factory Overheads	3,00,000	By Closing FG	41,250
To Goodwill written off	1,00,000	By Closing WIP	38,667
To Admin Overheads	2,95,000		
To Dividends	85,000		
To Bad debts	12,000		
To Selling and distribution overheads	61,000		
To Net profit as per financial books	**33,542**		
Total	22,22,917	Total	22,22,917

WN 2: Computation of profit as per costing books:

Particulars	Calculation	Amount
Direct Material		7,80,000
Direct Labour		4,50,000
Direct expenses		0
Prime cost		**12,30,000**
Factory Overheads	60% x 4,50,000	2,70,000
Gross Works Cost		**15,00,000**
Add: Opening WIP		32,000
Less: Closing WIP		(38,667)
Net Works Cost (Factory Cost)		**14,93,333**
Admin OH relating to production (Note 1)	14,93,333 x 20%	2,98,667
Cost of Production (14,000)		**17,92,000**
Add: Opening FG (875)	875 x 104	91,000
Less: Closing FG (375) (Note 2)	$\dfrac{17,92,000}{14,000} \times 375$	(48,000)
Cost of goods sold (14,500)		**18,35,000**
Selling and distribution Overheads	14,500 x 4	58,000
Cost of Sales		**18,93,000**
Profit (balancing figure)		**1,87,000**
Sales		**20,80,000**

Notes:
- **Note 1:** It is assumed that administration overhead is related to production
- **Note 2:** It is assumed that company follows FIFO method for inventory valuation.

WN 3: Identification of plus and minus items:

S.No	Item	Figures as per financial book	Figure as per Cost book	Difference	Dr/cr -/+	Action	Amount
1	Opening FG	74,375	91,000	-	-	+	16,625
2	Factory OH	3,00,000	2,70,000	+	-	-	30,000
3	Goodwill	1,00,000	0	+	-	-	1,00,000
4	Administration OH	2,95,000	2,98,667	-	-	+	3,667
5	Dividends	85,000	0	+	-	-	85,000
6	Bad debts	12,000	0	+	-	-	12,000
7	Selling and distribution OH	61,000	58,000	+	-	-	3,000
8	Interest received	45,000	0	+	+	+	45,000
9	Rent received	18,000	0	+	+	+	18,000
10	Closing stock	41,250	48,000	-	+	-	6,750

WN 4: Reconciliation statement:

Particulars	Amount	Amount
Profit as per cost book		**1,87,000**
Add: Plus items:		
Difference in valuation of opening stock	16,625	
Admin overheads over-absorbed	3,667	
Interest received not recorded in cost accounts	45,000	
Rent received not recorded in cost accounts	18,000	83,292
Less: Minus items:		
Factory OH under-absorbed	30,000	
Goodwill written off not recorded in cost books	1,00,000	
Dividends not recorded in cost books	85,000	
Bad debts not recorded in cost books	12,000	
Selling and distribution OH under-absorbed	3,000	
Difference in valuation of closing stock	6,750	-2,36,750

Profit as per financial book		33,542

13. Reconciliation of profits

Following are the figures extracted from the Cost Ledger of a manufacturing unit.

Particulars	(Rs.)
Stores :	
Opening balance	15,000
Purchases	80,000
Transfer from WIP	40,000
Issue to WIP	80,000
Issue to repairs and maintenance	10,000
Sold as a special case of cost	5,000
Shortage in the year	3,000
Work-in-Progress :	
Opening inventory	30,000
Direct labour cost charged	30,000
Overhead cost charged	1,20,000
Closing Balance	20,000
Finished Products :	
Entire output is sold at 10% profit on actual cost from work-in-process.	
Others :	
Wages for the period	35,000
Overhead Expenses	1,25,000

Ascertain the profit or loss as per financial account and cost accounts and reconcile them.

Answer:

Ledger Account:

Dr		Stores Ledger Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Balance b/d	15,000	By WIP Control A/c	80,000
To Cost Ledger Control A/c	80,000	By Overhead Control A/c	10,000
To WIP Control A/c	40,000	By Overhead Control A/c (assumed to be normal loss)	3,000
		By Cost Ledger Control A/c	5,000
		By Balance c/d (b/f)	**37,000**
Total	**1,35,000**	**Total**	**1,35,000**

Dr		Work-in-progress Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Balance b/d	30,000	By Stores Ledger Control A/c	40,000
To Stores Ledger Control A/c	80,000	**By Costing P&L (Cost of Sales)**	**2,00,000**
To Wages Control A/c	30,000	By balance c/d	20,000
To Overhead Control A/c	1,20,000		
Total	**2,60,000**	**Total**	**2,60,000**

Dr		Costing Profit and Loss Account	Cr
Particulars	Amount	Particulars	Amount
To Cost of Sales	2,00,000	By sales (2,00,000 + 10%)	2,20,000
To Cost Ledger Control (Profit for the year)	**20,000**		
Total	**2,20,000**	**Total**	**2,20,000**

Dr		Profit and Loss Account	Cr
Particulars	Amount	Particulars	Amount

To opening RM	15,000	By Sales	2,20,000
To opening WIP	30,000	By Closing RM	37,000
To Purchases	80,000	By Closing WIP	20,000
To Wages	35,000	By sale of material	5,000
To Overheads	1,25,000	**By loss for the year**	**3,000**
Total	**2,85,000**	**Total**	**2,85,000**

Dr		Overhead Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Stores Ledger Control A/c	10,000	By WIP Control A/c	1,20,000
To Stores Ledger Control A/c	3,000	**By Balance c/d (carry forward to next year – under absorption)**	**23,000**
To Cost Ledger Control A/c	1,25,000		
To Wages Control A/c	5,000		
	1,43,000		**1,43,000**

Dr		Wages Control Account	Cr
Particulars	Amount	Particulars	Amount
To Cost Ledger Control A/c	35,000	By WIP Control A/c	30,000
		By overhead control A/c	**5,000**
Total	**35,000**		**35,000**

Note: It is assumed that under-absorbed overheads are carried forward to next year.

WN 2: Reconciliation statement:

Particulars	Amount	Amount
Profit as per Cost books		**20,000**
Less:		
Factory overheads under-absorbed		-23,000
Loss as per financial books		**-3,000**

Additional Problems for Practice

14. **Non-integrated system – Ledger Accounts and Trial Balance**

Acme Manufacturing Co. Ltd. opens the costing records, with the balances as on 1st July, 2012 as follows:

Particulars	(Rs.)	(Rs.)
Material control A/c	1,24,000	
Work-in-progress A/c	62,500	
Finished Goods A/c	1,24,000	
Production Overheads A/c	8,400	
Administration Overhead		12,000
Selling and Distribution Overhead A/c	6,250	
General Ledger Control A/c		3,13,150
	3,25,150	3,25,150

The following are the transactions for the quarter ended 30th September 2012:

Particulars	(Rs.)
Materials purchased	4,80,100
Materials issued to jobs	4,77,400
Materials to works maintenance	41,200
Materials to administration office	3,400
Materials to selling department	7,200
Wages direct	1,49,300

Wages indirect	65,000
Transportation for incoming materials	8,400
Production overheads	2,42,250
Absorbed overheads production	3,59,100
Administration overheads	74,000
Administration allocation to production	52,900
Administration allocation to sales	14,800
Sales overheads	64,200
Sales overheads absorbed	82,000
Finished goods produced	9,58,400
Finished goods sold	9,77,300
Sales Realisation	14,43,000

Make up the various accounts as you envisage in the Cost Ledger and prepare a Trial Balance as at 30th September, 2012.

Answer:
Discussion points:
- General Ledger Control Account is available in the question and hence the company follows non-integrated method of accounting
- Overheads accounts have opening balances and hence it can be inferred that the company is carrying forward under/over absorption of overheads

Ledger Accounts in the books of Acme Manufacturing Company Limited:

Dr		Material Control Account	Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Balance b/d	1,24,000	By Work in progress A/c	4,77,400
To GL Control A/c	4,80,100	By Production overheads A/c	41,200
		By Administration overheads A/c	3,400
		By selling and distribution overheads A/c	7,200
		By balance c/d (b/f)	74,900
Total	**6,04,100**		**6,04,100**

Dr		Wages Control Account	Cr
To GL Control A/c (1,49,300 + 65,000)	2,14,300	By Work in Progress A/c	1,49,300
		By Production overheads A/c	65,000
Total	**2,14,300**	**Total**	**2,14,300**

Dr		Production Overheads Account	Cr
To Balance b/d	8,400	By Work in Progress A/c	3,59,100
To GL Control A/c (Transportation)	8,400	By Production overheads A/c	65,000
To GL Control A/c (Production OH)	2,42,250	**By Balance C/d (b/f)**	**6,150**
To wages control A/c	65,000		
To Material Control A/c	41,200		
Total	**2,14,300**	**Total**	**2,14,300**

Note: Transportation of incoming materials should be recorded in material control account. However, in ICAI solution it has been recorded in production overheads account and to ensure consistency we follow the same approach.

Dr		Work in Progress Account	Cr
To Balance b/d	62,500	By Finished Goods Account	9,58,400
To Material Control A/c	4,77,400	**By Balance c/d (b/f)**	**89,900**
To Wages Control A/c	1,49,300		

To Production Overheads A/c	3,59,100		
Total	**10,48,300**	**Total**	**10,48,300**

Dr		Administration Overheads Account	Cr
To GL Control A/c	74,000	By balance b/d	12,000
To Material Control A/c	3,400	By FG Control A/c	52,900
To Balance c/d (b/f)	**2,300**	By Cost of sales A/c	14,800
	79,700		**79,700**

Note:
- Administration overheads allocated to production has been transferred to FG control Account as the same is in the nature of administrative overheads relating to production.
- Administrative overheads allocated to sales has been transferred to cost of sales Account. This would be similar to General and Administrative Overheads and would get added to Cost of sales

Dr		Finished Goods Account	Cr
To Balance b/d	1,24,000	By Cost of Sales A/c	9,77,300
To Work in Progress A/c	9,58,400	**By Balance c/d (b/f)**	**1,58,000**
To Administration Overheads A/c	52,900		
Total	**11,35,300**	**Total**	**11,35,300**

Dr		Selling and Distribution Overheads A/c	Cr
To Balance b/d	6,250	By Cost of Sales A/c	82,000
To GL Control A/c	64,200		
To Material Control A/c	7,200		
To Balance c/d (b/f)	**4,350**		
Total	**82,000**	**Total**	**82,000**

Dr		Cost of Sales Account	Cr
To Finished Goods A/c	9,77,300	By Costing P&L A/c	10,74,100
To Administration Overheads A/c	14,800		
To Selling & distribution overheads A/c	82,000		
Total	**10,74,100**	**Total**	**10,74,100**

Dr		Sales Account	Cr
To Costing P&L A/c	14,43,000	By GL Control A/c	14,43,000
Total	**10,74,100**	**Total**	**10,74,100**

Dr		Costing P&L A/c	Cr
To Cost of Sales A/c	10,74,100	By Sales A/c	14,43,000
To GL Control A/c (Profit)	3,68,900		
Total	**14,43,000**	**Total**	**14,43,000**

Dr		General Ledger Control A/c		Cr
To Sales A/c	14,43,000	By Balance b/d		3,13,150
To Balance c/d (b/f)	3,22,300	By Material Control A/c		4,80,100
		By Wages Control A/c		2,14,300
		By Production Overhead A/c		2,50,650
		By Administration Overhead A/c		74,000
		By Selling and distribution overhead A/c		64,200

		By Costing P&L A/c (profit)	3,68,900
Total	17,65,300	Total	17,65,300

Trial Balance as on 30th September 2012:

Particulars	Amount (Dr)	Amount (Cr)
Material Control A/c	74,900	
Production overhead A/c	6,150	
Administration overhead a/c		2,300
Selling and distribution overhead a/c		4,350
Work-in-progress A/c	89,900	
Finished goods A/c	1,58,000	
GL Control A/c		3,22,300
Total	3,28,950	3,28,950

15. **Journal entries under integrated system**

Dutta Enterprises operates an integral system of accounting. You are required to pass the Journal Entries for the following transactions that took place for the year ended 30th June, 2012.(Narrations are not required.)

Particulars	(Rs.)
Raw materials purchased (50% on Credit)	6,00,000
Materials issued to production	4,00,000
Wages paid (50% Direct)	2,00,000
Wages charged to production	1,00,000
Factory overheads incurred	80,000
Factory overheads charged to production	1,00,000
Selling and distribution overheads incurred	40,000
Finished goods at cost	5,00,000
Sales (50% Credit)	7,50,000
Closing stock	Nil
Receipts from debtors	2,00,000
Payments to creditors	2,00,000

Answer:

Stores Ledger Control A/c Dr	6,00,000	
To Creditors A/c		3,00,000
To Bank A/c		3,00,000
(Purchase of raw material)		
WIP Control A/c Dr	4,00,000	
To Stores Ledger Control A/c		4,00,000
(Issue of RM to Production)		
Wages Control A/c Dr	2,00,000	
To Bank A/c		2,00,000
(Wages Paid)		
WIP Control A/c Dr	1,00,000	
Manufacturing OH Control A/c Dr	1,00,000	
To Wages Control A/c		2,00,000
(Analysis of wages into direct and indirect)		
Manufacturing OH Control A/c Dr	80,000	
To Bank A/c		80,000
(Incurrence of manufacturing OH)		
WIP Control A/c Dr	1,00,000	
To Manufacturing OH Control A/c		1,00,000
(Absorption of manufacturing OH)		
Selling and Distribution OH Control A/c Dr	40,000	

To Bank A/c (Incurrence of SOH)		40,000
Cost of sales A/c Dr To Selling and Distribution OH Control A/c (Absorption of SOH)	40,000	40,000
FG Control A/c Dr To WIP Control A/c (Production during the year)	5,00,000	5,00,000
Debtors A/c Dr Bank A/c Dr To Sales A/c (Sales during the year)	3,75,000 3,75,000	7,50,000
Closing stock – No entry – This would mean full production is sold Cost of Sales A/c Dr To FG Control A/c	5,00,000	5,00,000
Bank A/c Dr To Debtors A/c (Money collected from debtors)	2,00,000	2,00,000
Creditors A/c Dr To Bank A/c (Money paid to creditors)	2,00,000	2,00,000

16. Financial and costing Profit - Reconciliation

The following information is available from the financial books of a company having a normal production capacity of 60,000 units for the year ended 31st March, 2013:

   a) Sales Rs. 10,00,000 (50,000 units).
   b) There was no opening and closing stock of finished units.
   c) Direct material and direct wages cost were Rs. 5,00,000 and Rs. 2,50,000 respectively.
   d) Actual factory expenses were Rs. 1,50,000 of which 60% are fixed.
   e) Actual administrative expenses were Rs. 45,000 which are completely fixed.
   f) Actual selling and distribution expenses were Rs. 30,000 of which 40% are fixed.
   g) Interest and dividends received Rs. 15,000.

You are required to:

   i. Find out profit as per financial books for the year ended 31st March,2013;
   ii. Prepare the cost sheet and ascertain the profit as per cost accounts for the year ended 31st March, 2013 assuming that the indirect expenses are absorbed on the basis of normal production capacity; and
   iii. Prepare a statement reconciling profits shown by financial and cost books.

Answer:

WN 1: Computation of profit as per financial books:

Dr		Profit and Loss Account	Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Direct Material	5,00,000	By Sales	10,00,000
To Direct Wages	2,50,000	By Interest and dividends	15,000
To Factory expenses	1,50,000		
To Administrative expenses	45,000		
To Selling and distribution overheads	30,000		
To Profit for the year	**40,000**		
	4,68,160		**4,68,160**

WN 2: Computation of profit as per costing records:

Particulars	Calculation	Amount
Direct Material		5,00,000
Direct Wages		2,50,000
Prime Cost		**7,50,000**

Factory OH:		
Variable	1,50,000 x 40%	60,000
Fixed	1,50,000 x 60% x $\frac{50,000}{60,000}$	75,000
Gross Works Cost/ Net Works cost/ Cost of Production/ Cost of Goods sold		**8,85,000**
Administrative OH	45,000 x $\frac{50,000}{60,000}$	37,500
Selling and distribution OH:		
Variable	30,000 x 60%	18,000
Fixed	30,000 x 40% x $\frac{50,000}{60,000}$	10,000
Cost of Sales		**9,50,500**
Profit (balancing figure)		**49,500**
Sales		**10,00,000**

WN 3: Identification of plus and minus items:

S.No	Item causing the difference	Figure as per end book (Financial Book)	Figure as per start book (Cost Book)	Difference (+/-)	Dr/Cr (-/+)	Action	Amount
1	Factory OH	1,50,000	1,35,000	+	-	-	15,000
2	Admin OH	45,000	37,500	+	-	-	7,500
3	Selling OH	30,000	28,000	+	-	-	2,000
4	Interest	15,000	0	+	+	+	15,000

WN 4: Statement of Reconciliation:

Particulars	Amount	Amount
Profit as per cost books		49,500
Add:		
Income from investment	15,000	15,000
Less:		
Factory OH	(15,000)	
Admin OH	(7,500)	
Selling OH	(2,000)	(24,500)
Profit as per financial books		**40,000**

17. **Costing Profit and Financial Profit - Reconciliation**

The following figures have been extracted from the cost records of a manufacturing unit:

Particulars	(Rs.)
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 Rs. 70,000, overhead incurred Rs. 2,50,000.

Items not included in cost records: Income from investment Rs. 10,000, Loss on sale of capital assets Rs. 20,000.

Draw up Store Control account, Work-in-progress Control account, Costing Profit and Loss account, Profit and Loss account and Reconciliation statement.

Answer:

Ledger Account:

Dr		Stores Ledger Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Balance b/d	32,000	By WIP Control A/c	1,60,000
To Cost Ledger Control A/c	1,58,000	By Overhead Control A/c	20,000
To WIP Control A/c	80,000	By Overhead Control A/c (Deficiency assumed to be normal)	6,000
		By Balance c/d (b/f)	**84,000**
Total	**2,70,000**	**Total**	**2,70,000**

Dr		Work-in-progress Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Balance b/d	60,000	By Stores Ledger Control A/c	80,000
To Stores Ledger Control A/c	1,60,000	**By Costing P&L (Cost of Sales)**	**4,00,000**
To Wages Control A/c	65,000	By balance c/d	45,000
To Overhead Control A/c	2,40,000		
Total	**5,25,000**	**Total**	**5,25,000**

Dr		Costing Profit and Loss Account	Cr
Particulars	Amount	Particulars	Amount
To Cost of Sales	4,00,000	By sales (4,00,000 + 10%)	4,40,000
To Cost Ledger Control (Profit for the year)	**40,000**		
Total	**4,40,000**	**Total**	**4,40,000**

Dr		Profit and Loss Account	Cr
Particulars	Amount	Particulars	Amount
To opening RM	32,000	By Sales	4,40,000
To opening WIP	60,000	By Closing RM	84,000
To Purchases	1,58,000	By Closing WIP	45,000
To Wages	70,000	By Income from investment	10,000
To Overheads	2,50,000	**By Loss for the year**	**11,000**
To Loss on sale of fixed assets	20,000		
Total	**5,90,000**	**Total**	**5,90,000**

Dr		Overhead Control A/c	Cr
Particulars	Amount	Particulars	Amount
To Stores Ledger Control A/c	20,000	By WIP Control A/c	2,40,000
To Stores Ledger Control A/c	6,000	**By Balance c/d (carry forward to next year – under absorption)**	**41,000**
To Cost Ledger Control A/c	2,50,000		
To Wages Control A/c	5,000		
	2,81,000		**2,81,000**

Dr		Wages Control Account	Cr
Particulars	Amount	Particulars	Amount
To Cost Ledger Control A/c	70,000	By WIP Control A/c	65,000
		By overhead control A/c	**5,000**
Total	**70,000**		**70,000**

Note: It is assumed that under-absorbed overheads are carried forward to next year.

WN 2: Identification of plus and minus items:

S.No	Item	Figures as per financial book	Figure as per Cost book	Difference	Dr/cr -/+	Action	Amount
1	Factory Overheads	0	-41,000	+	-	-	41,000
2	Loss on sale of fixed assets	20,000	0	+	-	-	20,000
3	Income from investment	10,000	0	+	+	+	10,000

WN 3: Reconciliation statement:

Particulars	Amount	Amount
Profit as per Cost books		**40,000**
Add:		
Income from investment not recorded in cost books		10,000
Less:		
Loss on sale of fixed assets not recorded in cost books	20,000	
Factory overheads under-absorbed	41,000	-61,000
Loss as per financial books		**-11,000**

18. Costing Profit and Financial Profit - Reconciliation

The following figures are available from the financial records of ABC Manufacturing Co. Ltd. for the year ended 31-3-2013.

Particulars	(Rs.)
Sales (20,000 units)	25,00,000
Materials	10,00,000
Wages	5,00,000
Factory Overheads	4,50,000
Office and administrative Overhead	2,60,000
Selling and distribution Overheads	1,80,000
Finished goods (1,230 units)	1,50,000

Particulars	(Rs.)	
Work-in-Progress :		
Materials	30,000	
Labour	20,000	
Factory overheads	20,000	70,000
Goodwill written off		2,00,000
Interest on capital		20,000

In the Costing records, factory overhead is charged at 100% wages, administration overhead at 10% of factory cost and selling and distribution overhead at the rate of Rs. 10 per unit sold.

Prepare a statement reconciling the profit as per cost records with the profit as per financial records.

Answer:

WN 1: Computation of profit as per financial books:

Dr		Profit and Loss Account	Cr
Particulars	Amount	Particulars	Amount
To Direct Material	10,00,000	By Sales	25,00,000
To Direct Wages	5,00,000	By Closing stock	1,50,000
To Factory Overheads	4,50,000	By Closing WIP	70,000
To Office and Administrative OH	2,60,000		
To Selling and Distribution OH	1,80,000		
To Goodwill written off	2,00,000		
To Interest on capital	20,000		
To Profit for the year	**1,10,000**		
	27,20,000		**27,20,000**

WN 2: Computation of profit as per costing records:

Particulars	Calculation	Amount
Direct Material		10,00,000
Direct Wages		5,00,000
Prime Cost		**15,00,000**
Factory OH:	100% of wages	5,00,000
Gross Works Cost		**20,00,000**
Less: Closing WIP		(70,000)
Net Works cost		**19,30,000**
Office and Administrative OH (Note 1)	10% of 19,30,000	1,93,000
Cost of Production		**21,23,000**
Less: Closing stock of FG (Note 2)		(1,23,000)
Cost of Goods sold		**20,00,000**
Selling and distribution OH	10 x 20,000	2,00,000
Cost of Sales		**22,00,000**
Profit (balancing figure)		**3,00,000**
Sales		**25,00,000**

Notes:

- **Note 1:** It is assumed office and administrative Overheads is related to production and hence considered in cost of production computation.
- **Note 2: Valuation of closing stock:**

$$\text{Closing Stock} = \frac{\text{Cost of Production}}{\text{units produced}} \times \text{Closing stock (units)}$$

$$\text{Closing Stock} = \frac{21,23,000}{20,000 + 1,230} \times 1,230 = \text{Rs. } 1,23,000$$

WN 3: Identification of plus and minus items:

S.No	Item causing the difference	Figure as per end book (Financial Book)	Figure as per start book (Cost Book)	Difference (+/-)	Dr/Cr (-/+)	Action	Amount
1	Factory OH	4,50,000	5,00,000	-	-	+	50,000
2	Admin OH	2,60,000	1,93,000	+	-	-	67,000
3	Selling OH	1,80,000	2,00,000	-	-	+	20,000
4	Goodwill	2,00,000	0	+	-	-	2,00,000
5	Interest on capital	20,000	0	+	-	-	20,000
6	Closing stock	1,50,000	1,23,000	+	+	+	27,000

WN 4: Statement of Reconciliation:

Particulars	Amount	Amount
Profit as per cost books		3,00,000
Add:		
Difference in valuation in closing stock	27,000	
Over-absorption of factory OH	50,000	
Over-absorption of selling OH	20,000	97,000
Less:		
Under-absorption of office and admin OH	(67,000)	
Goodwill written off	(2,00,000)	
Interest on capital	(20,000)	(2,87,000)
Profit as per financial books		**1,10,000**

19. **Costing Profit and Financial Profit - Reconciliation**

The following figures, have been extracted from the Financial Accounts of a Manufacturing Firm for the first year of its operation:

Particulars	(Rs.)

Direct Material Consumption	50,00,000
Direct Wages	30,00,000
Factory Overhead	16,00,000
Administration Overheads	7,00,000
Selling and Distribution Overheads	9,60,000
Bad Debts	80,000
Preliminary Expenses written off	40,000
Legal Charges	10,000
Dividends Received	1,00,000
Interest Received on Deposits	20,000
Sales (1,20,000 units)	1,20,00,000
Closing Stock :	
Finished Goods (4,000 units)	3,20,000
Work-in-Progress	2,40,000

The cost accounts for the same period reveal that the direct material consumption was (Rs.) 56,00,000. Factory overhead is recovered at 20% on prime cost. Administration overhead is recovered at Rs. 6 per unit of production. Selling and distribution overheads are recovered at Rs. 8 per unit sold. Prepare the Profit and Loss Accounts both as per financial records and as per cost records. Reconcile the profits as per the two records.

Answer:

WN 1: Computation of profit as per financial books:

Dr		Profit and Loss Account	Cr	
Particulars	**Amount**	**Particulars**		**Amount**
To Direct Material	50,00,000	By Sales (1,20,000 units)		1,20,00,000
To Direct Wages	30,00,000	By Closing stock (4,000 units)		3,20,000
To Factory Overheads	16,00,000	By Closing WIP		2,40,000
To Office and Administrative OH	7,00,000	By Dividends		1,00,000
To Selling and Distribution OH	9,60,000	By Interest		20,000
To Bad debts	80,000			
To Preliminary expenses	40,000			
To Legal Charges	10,000			
To Profit for the year	**12,90,000**			
	1,26,80,000			**1,26,80,000**

WN 2: Computation of profit as per costing records:

Particulars	Calculation	Amount
Direct Material		56,00,000
Direct Wages		30,00,000
Prime Cost		**86,00,000**
Factory OH	20% x 86,00,000	17,20,000
Gross Works Cost		**1,03,20,000**
Less: Closing WIP		(2,40,000)
Net Works cost		**1,00,80,000**
Office and Administrative OH (Note 1)	1,24,000 x 6	7,44,000
Cost of Production		**1,08,24,000**
Less: Closing stock of FG (Note 2)		(3,49,160)
Cost of Goods sold		**1,04,74,840**
Selling and distribution OH	1,20,000 x 8	9,60,000
Cost of Sales		**1,14,34,840**
Profit (balancing figure)		**5,65,160**
Sales		**1,20,00,000**

Notes:

- **Note 1:** It is assumed office and administrative Overheads is related to production and hence considered in cost of production computation.

- **Note 2: Valuation of closing stock:**

$$\text{Closing Stock} = \frac{\text{Cost of Production}}{\text{units produced}} \times \text{Closing stock (units)}$$

$$\text{Closing Stock} = \frac{1,08,24,000}{1,20,000 + 4,000} \times 4,000 = \text{Rs. } 3,49,160$$

WN 3: Identification of plus and minus items:

S.No	Item causing the difference	Figure as per end book (Financial Book)	Figure as per start book (Cost Book)	Difference (+/-)	Dr/Cr (-/+)	Action	Amount
1	Material	50,00,000	56,00,000	-	-	+	6,00,000
2	Factory OH	16,00,000	17,20,000	-	-	+	1,20,000
3	Admin OH	7,00,000	7,44,000	-	-	+	44,000
4	Bad debts	80,000	0	+	-	-	80,000
5	Preliminary expenses	40,000	0	+	-	-	40,000
6	Dividend	1,00,000	0	+	+	+	1,00,000
7	Interest	20,000	0	+	+	+	20,000
8	Legal charges	10,000	0	-	+	-	10,000
9	Closing stock	3,20,000	3,49,160	-	+	-	29,160

WN 4: Statement of Reconciliation:

Particulars	Amount	Amount
Profit as per cost books		5,65,160
Add:		
Difference in material consumption	6,00,000	
Over-absorption of factory OH	1,20,000	
Over-absorption of Admin OH	44,000	
Dividend received	1,00,000	
Interest received	20,000	**8,84,000**
Less:		
Bad debts	(80,000)	
Preliminary expenses written off	(40,000)	
Legal charges	(10,000)	
Difference in valuation of closing stock	(29,160)	(1,59,160)
Profit as per financial books		**12,90,000**

20. **Costing Profit and Financial Profit - Reconciliation**

ABC Ltd. has furnished the following information from the financial books for the year ended 31st March, 2014:

Profit & Loss Account

Particulars	(Rs.)	Particulars	(Rs.)
To Opening stock (500 units at Rs. 140 each)	70,000	By Sales (10,250 units)	28,70,000
To Material consumed	10,40,000	By Closing stock (250 units at Rs. 200 each)	50,000
To Wages	6,00,000		
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 Rs. 104 per unit and the labour cost at Rs. 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 Rs. 24 per unit. The opening stock of finished goods is valued at Rs. 180 per unit.

You are required to prepare:
   a) A statement showing profit as per Cost accounts for the year ended 31st March, 2014; and
   b) A statement showing the reconciliation of profit as disclosed in Cost accounts with the profit shown in Financial accounts.

Answer:

WN 1: Computation of profit as per costing records:

Particulars	Calculation	Amount
Direct Material	10,000 x 104	10,40,000
Direct Wages	10,000 x 60	6,00,000
Prime Cost		**16,40,000**
Factory OH	6,00,000 x 60%	3,60,000
Gross Works Cost/Net works cost		**20,00,000**
Office and Administrative OH (Note 2)	20% x 20,00,000	4,00,000
Cost of Production (10,000 units)		**24,00,000**
Add: Opening FG	500 x 180	90,000
Less: Closing stock of FG (Note 3)		(60,000)
Cost of Goods sold		**24,30,000**
Selling and distribution OH	10,250 x 24	2,46,000
Cost of Sales		**26,76,000**
Profit (balancing figure)		**1,94,000**
Sales		**28,70,000**

Notes:

- **Note 1:** Units produced = Sales + Closing stock – opening stock; Production = 10,250 + 250 – 500 = 10,000 units.
- **Note 2:** It is assumed office and administrative Overheads is related to production and hence considered in cost of production computation.
- **Note 3: Valuation of closing stock:**
- It is assumed that company follows FIFO method for inventory valuation

$$\text{Closing Stock} = \frac{\text{Cost of Production}}{\text{units produced}} \text{ x Closing stock (units)}$$

$$\text{Closing Stock} = \frac{24,00,000}{10,000} \text{ x } 250 = Rs. \, 60,000$$

WN 3: Identification of plus and minus items:

S.No	Item causing the difference	Figure as per end book (Financial Book)	Figure as per start book (Cost Book)	Difference (+/-)	Dr/Cr (-/+)	Action	Amount
1	Factory OH	3,79,000	3,60,000	+	-	-	19,000
2	Admin OH	4,24,000	4,00,000	+	-	-	24,000
3	Selling OH	2,20,000	2,46,000	-	-	+	26,000
4	Bad debts	16,000	0	+	-	-	16,000
5	Preliminary expenses	20,000	0	+	-	-	20,000
6	Interest	1,000	0	+	+	+	1,000
7	Rent	40,000	0	+	+	+	40,000
8	Closing stock	50,000	60,000	-	+	-	10,000
9	Opening stock	70,000	90,000	-	-	+	20,000

WN 4: Statement of Reconciliation:

Particulars	Amount	Amount

Profit as per cost books		1,94,000
Add:		
Interest income not recorded in cost books	1,000	
Rental income not recorded in cost books	40,000	
Difference in valuation of opening stock	20,000	
Over-recovery of selling OH	26,000	**87,000**
Less:		
Bad debts not recorded in cost book	(16,000)	
Preliminary expenses written off not recorded in cost book	(20,000)	
Under absorption of factory OH	(19,000)	
Under absorption of admin OH	(24,000)	
Difference in valuation of closing stock	(10,000)	(89,000)
Profit as per financial books		**1,92,000**

CHAPTER 8: UNIT & BATCH COSTING

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                    ┌──────────────────┐
                    │   Methods of     │
                    │    costing       │
                    └────────┬─────────┘
          ┌──────────────────┴──────────────────┐
  ┌───────────────┐                   ┌────────────────────┐
  │   Industry    │                   │  Continuous and    │
  │  doing job    │                   │  process type of   │
  │     work      │                   │    industries      │
  └───────┬───────┘                   └─────────┬──────────┘
  ┌───────────────────────┐          ┌───────────────────────┐
  │ Job costing, Contract │          │ Process costing, Single│
  │ Costing and Process   │          │ Ouput costing and      │
  │      costing          │          │  Operating costing     │
  └───────────────────────┘          └───────────────────────┘
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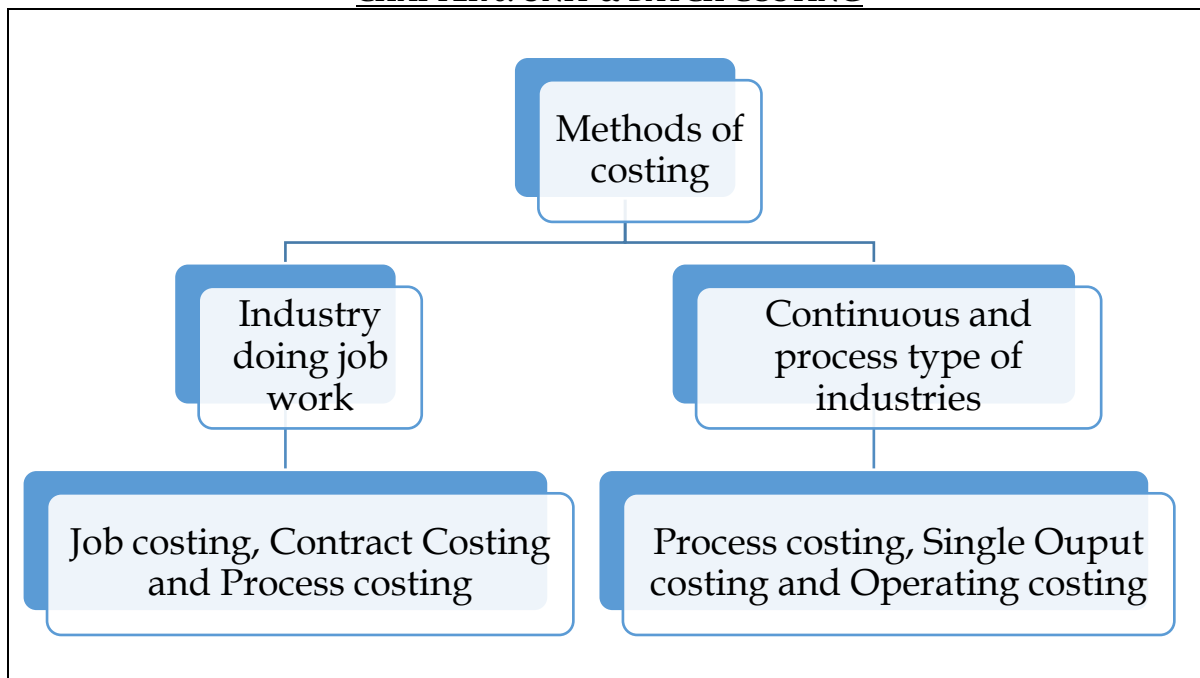
1. What is unit costing and explain in which industry it is used? **[Category B]**
   ❖ Unit costing is a method of costing used where the output produced by an entity is identical and each unit of output require identical cost.
   ❖ Unit costing is synonymously known as single or output costing but these are sub-divisions of unit costing method
   ❖ Used in an industry which produces single output or variant of a single output

Cost per unit = Total cost of production / No. of units produced

2. What is Batch costing and explain where it is used? **[Category B]**
   ❖ Batch costing is a type of specific order costing where articles are manufactured in predetermined lots known as batch
   ❖ Under this method the cost object for cost determination is a batch for production rather output as seen in unit costing method

3. What is Economic Batch Quantity? **[Category A]**
   ❖ Product is produced in batches or lots and hence the lot size will be critical for least cost operation
   ❖ Total production cost under batch costing comprise two costs namely
     o Machine set-up costs and
     o Inventory holding costs
   ❖ Economic batch quantity is the optimum quantity to be produced in any batch and the one which minimizes the sum of set-up and carrying cost

$$EBQ = \sqrt{(2AB) \div CS}$$
Where **A** = Annual Production; **B** = Set-up cost per set-up   **CS** = Carrying cost per unit of production
Number of orders to be placed = **A ÷ EBQ**
Time lag between two orders = 365 / No. of orders
Total set-up cost = Number of orders * Set-up cost/order
Total Carrying cost = Average Inventory * Carrying cost/unit/annum
Average inventory = Quantity per order / 2

4. Differentiated between Job costing and batch costing? **[Category A]**

Job costing	Batch costing

Method of costing used for non-standard and non-repetitive products produced as per customer specifications	Homogenous products produced in a continuous production flow in lots
Cost determined for each job	Cost determined in aggregate for the entire batch and then arrived on per unit basis
Each job is unique and different from each other	Produced are homogenous and lack individuality

1. Batch costing

A jobbing factory has undertaken to supply 200 pieces of a component per month for six months. Every month a batch is opened against which materials and labour hours are booked at actual. Overhead is levied at a rate per labour hour. The selling price contracted is Rs.8 per piece. From the following data present the cost and profit per piece of each batch order and overall position of the order for 1,200 pieces.

Month	Batch output units	Materials (Rs.)	Labour (Rs.)	Labour Hours	Overheads	Total labour hours
January	210	650	120	240	12,000	4,800
February	200	640	140	280	10,500	4,400
March	220	680	150	280	12,000	5,000
April	180	630	140	270	10,580	4,600
May	200	700	150	300	13,000	5,000
June	220	720	160	320	12,000	4,800

Answer:

WN 1: Computation of Overhead Absorption Rate (OAR):

Particulars	Jan	Feb	Mar	Apr	May	Jun
Budgeted overheads	12,000	10,500	12,000	10,580	13,000	12,000
Suitable base	DLH	DLH	DLH	DLH	DLH	DLH
Budgeted suitable base	4,800	4,400	5,000	4,600	5,000	4,800
OAR	**2.50**	**2.39**	**2.40**	**2.30**	**2.60**	**2.50**

WN 2: Computation of cost and profit per piece of each batch order:

Particulars	Jan	Feb	Mar	Apr	May	Jun	Total
Direct material	650	640	680	630	700	720	4,020
Direct labour	120	140	150	140	150	160	860
Overheads	600	669	672	621	780	800	4,142
Total cost	**1,370**	**1,449**	**1,502**	**1,391**	**1,630**	**1,680**	**9,022**
No of units	210	200	220	180	200	220	1,230
Cost per unit	**6.52**	**7.25**	**6.83**	**7.73**	**8.15**	**7.64**	**7.33**
Selling price	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Profit per unit	**1.48**	**0.75**	**1.17**	**0.27**	**(0.15)**	**0.36**	**0.67**

WN 3: Profit for overall order of 1,200 pieces:

Particulars	Calculation	Amount
Sales	1,200 x 8.00	9,600
Less: Costs	1,200 x 7.33	(8,796)
Profit		**804**

2. Calculation of Economic Batch Quantity:

A company has an annual demand from a single customer of 50,000 litres of a paint product. The total demand can be made up of a range of colour to be produced in a continuous production run after which a set-up of the machinery will be required to accommodate the colour change. The total output of each colour will be stored and then delivered to the customer as a single load immediately before the production of the next colour commences.

The set up costs are Rs.100 per set up. The service is supplied by an outside company as required. The holding costs are incurred on rented storage space which costs Rs.50 per square metre per annum. Each square meter can hold 250 litres suitably stacked.

You are required to calculate:
- ❖ Calculate the total cost per year where batches may range from 4,000 to 10,000 litres in multiples of 1,000 litres and hence choose the production batch size which will minimize the cost
- ❖ Use the economic batch size formula to calculate the batch size which will minimize the total cost

Answer:
WN 1: Total cost computation for different batch quantity:
: Cost calculation at difference quantity:

Particulars	4,000	5,000	6,000	7,000	8,000	9,000	10,000
1. Annual Production	50,000	50,000	50,000	50,000	50,000	50,000	50,000
2. Quantity per production run	4,000	5,000	6,000	7,000	8,000	9,000	10,000
3. Number of production runs (1/2)	12.50	10.00	8.33	7.14	6.25	5.55	5.00
4. Set-up cost per production run	100	100	100	100	100	100	100
5. Total set-up cost (3 x 4)	**1,250**	**1,000**	**833**	**714**	**625**	**555**	**500**
6. Average inventory (QPD/2)	2,000	2,500	3,000	3,500	4,000	4,500	5,000
7. Carrying cost per unit per annum	0.20	0.20	0.20	0.20	0.20	0.20	0.20
8. Total carrying cost (6 x 7)	**400**	**500**	**600**	**700**	**800**	**900**	**1,000**
9. Total of Set-up cost and carrying cost (5+8)	**1,650**	**1,500**	**1,433**	**1,414**	**1,425**	**1,455**	**1,500**

Most economical quantity per production run = 7,000 litres

WN 2: Computation of EBQ through formula:
Base data:

Annual production	50,000 litres
Set-up cost per run	Rs.100
Carrying cost per unit per annum	Rs. 50 per square metre 1 square metre = 250 litres Rs. 50 per 250 litres Rs.0.20 per litre

EBQ Calculation

EBQ	=	$\sqrt{\dfrac{2 \times \text{Annual production} \times \text{Set} - \text{up cost per run}}{\text{Carrying cost per unit per annum}}}$
EBQ	=	$\sqrt{\dfrac{2 \times 50,000 \times 100}{0.20}}$
EBQ	=	7,071 litres

3.   Economic batch quantity

X Limited is committed to supply 24,000 bearings per annum to Y Limited on a steady basis. It is estimated that it costs 10 paise as inventory holding cost per bearing per month and that the set-up cost per run of bearing manufacture is Rs.324.
- What would be the optimum run size for bearing manufacture?
- Assuming that the company has a policy of manufacturing 6,000 bearings per run, how much extra costs the company would be incurring as compared to the optimum run suggested above?
- What is the minimum inventory holding cost?

Answer:
WN 1: Computation of EBQ:
Base data:

Annual production	24,000 bearings
Set-up cost per run	Rs.324 per run
Carrying cost per unit per annum	10 paise x 12 = Rs.1.20 per unit

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EBQ Calculation

EBQ	=	$\sqrt{\dfrac{2 \text{ x Annual production x Set} - \text{up cost per run}}{\text{Carrying cost per unit per annum}}}$
EBQ	=	$\sqrt{\dfrac{2 \text{ x } 24{,}000 \text{ x } 324}{1.20}}$
EBQ	**=**	**3,600 bearings**

WN 2: Comparison of EBQ and existing Lot size:

Particulars	EBQ	Existing lot size
1. Annual Production	24,000	24,000
2. Quantity per production run	3,600	6,000
3. Number of production runs (1/2)	6.6667	4
4. Set-up cost per production run	324	324
5. Total set-up cost (3 x 4)	**2,160**	**1,296**
6. Average inventory (QPD/2)	1,800	3,000
7. Carrying cost per unit per annum	1.20	1.20
8. Total carrying cost (6 x 7)	**2,160**	**3,600**
9. Total of Set-up cost and carrying cost (5+8)	**4,320**	**4,896**
10. Extra cost due to lot size of 6,000 units		**576**

- **Minimum holding cost = Minimum of (2,160 and 3,600) = Rs.2,160**

4. **Economic batch quantity:**

A Limited manufactures piston 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. A Limited 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 Rs.1.50 as inventory holding cost per piston per month and that the set-up cost per run of piston manufacture is Rs.3,500

   i.   Compute the optimum run size for piston manufacturing?
   ii. Assuming that the company has a policy of manufacturing 40,000 pistons per run, calculate how much extra costs the company would be incurring as compared to the optimum run suggested in (i) above?

Answer:
WN 1: Computation of EBQ:
Base data:

Annual production	80 million x 1.15% = 9,20,000 units
Set-up cost per run	Rs.3,500 per run
Carrying cost per unit per annum	1.50 x 12 = Rs.18 per unit

EBQ Calculation

EBQ	=	$\sqrt{\dfrac{2 \text{ x Annual production x Set} - \text{up cost per run}}{\text{Carrying cost per unit per annum}}}$
EBQ	=	$\sqrt{\dfrac{2 \text{ x } 9{,}20{,}000 \text{ x } 3{,}500}{12}}$
EBQ	**=**	**19,915 units**

WN 2: Comparison of EBQ and existing Lot size:

Particulars	EBQ	Existing lot size
1. Annual Production	9,20,000	9,20,000
2. Quantity per production run	18,915	40,000
3. Number of production runs (1/2)	49	23
4. Set-up cost per production run	3,500	3,500
5. Total set-up cost (3 x 4)	**1,71,500**	**80,500**

6. Average inventory (QPD/2)		9,457.50	20,0000
7. Carrying cost per unit per annum		18.00	18.00
8. Total carrying cost (6 x 7)		**1,70,235**	**3,60,000**
9. Total of Set-up cost and carrying cost (5+8)		**3,41,735**	**4,40,500**
10. Extra cost due to lot size of 40,000 units			**98,765**

5. Computation of total cost per batch:

Star study centre provides coaching classes to school students. The study centre has taken an auditorium of 250 seat capacity on rent of Rs.3,75,000 per month. It has also hired some renowned teachers for taking classes. A teacher takes Rs.3,000 per hour. The study centre has decided to conduct a batch of 2-hour per day for 3 days a week for 4 months.

  i.   Calculate the total cost per batch
 ii.   Compute the minimum fee to be charged per student in a batch, if the centre operates at 60% capacity
iii.   Determine the fee per student if the study centre designs to earn a profit of 50% and study centre operates at 50% capacity

Answer:
WN 1: Computation of total cost per batch:

Particulars	Calculation	Amount
Fixed charges	3,75,000 x 4 months	15,00,000
Variable charges	3,000 x 2 hours x 3 days x 4 weeks x 4 months	2,88,000
Total cost		**17,88,000**

WN 2: Computation of fee to be charged if centre operates at 60% capacity:

Particulars	Calculation	Amount
Total cost		17,88,000
No of students	250 seats x 60%	150
Minimum fees	17,88,000/150	11,920

WN 3: Computation of fee to be charged for profit of 50%:

Particulars	Calculation	Amount
Total cost		17,88,000
Add: Profit	50% x 17,88,000	8,94,000
Total collections		26,82,000
No of students	250 x 50%	125
Fee per student		21,456

• It is assumed that given profit margin of 50 percent is on cost.

Additional Home Work Problems:
Question No.1
The following data relate to the manufacture of a standard product during the 4-week ended 28th February 2018:

Raw materials consumed	Rs.4,00,000
Direct wages	Rs.2,40,000
Machine hours worked	3,200 hours
Machine hour rate	Rs.40
Office overheads	10% of works cost
Selling overheads	Rs.20 per unit
Units produced and sold	10,000 units at Rs.120 per unit

You are required to find out the cost per unit and profit for the 4-week ended 28th February 2018.

Answer:

Particulars	Calculation	Total cost	Cost per Unit
Direct Material	Given	4,00,000	40.00
Direct wages	Given	2,40,000	24.00
Machine cost	3,200 x 40	1,28,000	12.80
Works cost		**7,68,000**	**76.80**
Office overheads	10% x 7,68,000	76,800	7.68

Selling overheads	20 x 10,000	2,00,000	20.00
Cost of sales		**10,44,800**	**104.48**
Profit	Balancing figure	1,55,200	15.52
Sales		**12,00,000**	**120.00**

Question No.2

Atharva Pharmacare Limited produced a uniform type of product and has a manufacturing capacity of 3,000 units per week of 48 hours. From the records of the company, the following data are available relating to output and cost of 3 consecutive weeks

Week Number	Units Manufactured	Direct Material	Direct Wages	Factory Overheads
1	1,200	9,000	3,600	31,000
2	1,600	12,000	4,800	33,000
3	1,800	13,500	5,400	34,000

Assuming that the company charges a profit of 20% on selling price, find out the selling price per unit when the weekly output is 2,000 units

Answer:

Computation of selling price if the weekly output is 2,000 units

Particulars	Calculation	Amount
Direct Material	$\frac{9,000}{1,200}$ x 2,000	15,000
Direct Labour	$\frac{3,600}{1,200}$ x 2,000	6,000
Factory Overheads		35,000
Total cost		**56,000**
Profit	56,000 x $\frac{20}{80}$	14,000
Total sales		**70,000**
No of units		2,000
Selling Price		**35.00**

Note:

- Direct material and Direct Labour per unit cost remains same for all three weeks and hence the same is a variable cost
- Factory overheads is a semi-variable cost as neither per unit nor overall cost remain same

Computation of factory overheads for 2,000 units:

Variable factory overheads per unit $= \frac{\text{Change in cost}}{\text{Change in units}} = \frac{33,000 - 31,000}{1,600 - 1,200} = $ Rs. 5 per unit

Fixed factory overheads $= 31,000 - (5 \times 1,200) = $ Rs. 25,000

Factory overheads for 2,000 units = 25,000 + (5 x 2,000) = Rs.35,000

Question No.3

Arnav Confectioners (AC) owns a bakery which is used to make bakery items like pastries, cakes and muffins. AC used to bake at least 50 units of any item at a time. A customer has given an order for 600 muffins. To process a batch of 50 muffins, the following cost would be incurred

Direct materials	Rs.500
Direct Wages	Rs.50
Oven set-up cost	Rs.150

AC absorbs production overheads at a rate of 20% of direct wages cost. 10% is added to the total production cost of each batch to allow for selling, distribution and administration overheads. AC requires a profit margin of 25% of sales value. Determine the selling price for 600 muffins

Answer:

Particulars	Calculation	Amount
Direct Material	500 x $\frac{600}{50}$	6,000
Direct wages	50 x $\frac{600}{50}$	600
Oven set-up cost	150 x $\frac{600}{50}$	1,800

Production overheads	20% x 600	120
Cost of Production		**8,520**
Selling, distribution and admin overheads	10% x 8,520	852
Cost of sales		**9,372**
Profit (25% on sales = 33.33% on cost)	9,372 x 33.33%	3,124
Sales		**12,496**
No of units		600
Selling price per muffin		**20.8267**

Question No.4

M/s. KBC Bearings Limited is committed to supply 48,000 bearings per annum to M/s. KMR Fans on a steady daily basis. It is estimated that it costs Rs.1 as inventory holding cost per bearing per month and that the set up cost per run of bearing manufacture is Rs.3,200.

i. What would be the optimum run size of bearing manufacture?
ii. What would be the interval between two consecutive optimum runs?
iii. Find out the minimum inventory cost

Answer:

WN 1: Computation of EBQ:

Base data:

Annual production	48,000 bearings
Set-up cost per run	Rs.3,200 per run
Carrying cost per unit per annum	Rs. 1 x 12 = Rs.12 per unit

EBQ Calculation

EBQ	=	$\sqrt{\dfrac{2 \text{ x Annual production x Set} - \text{up cost per run}}{\text{Carrying cost per unit per annum}}}$
EBQ	=	$\sqrt{\dfrac{2 \text{ x } 48{,}000 \text{ x } 3{,}200}{12}}$
EBQ	**=**	**5,060 units**

WN 2: Computation of interval between two runs and minimum holding cost

Particulars	Amount
1. Annual Production	48,000
2. Quantity per production run	5,060
3. Number of production runs (1/2)	9.49 ~ rounded off to 10
4. Interval between two production runs (365/10)	36.50 days
5. Average inventory (QPD/2)	2,530
6. Carrying cost per unit per annum	12
7. Minimum carrying cost (5 x 6)	**30,360**

Question No.5

Wonder Limited has a capacity of 1,20,000 units per annum as its optimum capacity. The production costs are as under:

- Direct Material – Rs.90 per unit
- Direct Labour – Rs.60 per unit
- Overheads
  - o Fixed – Rs.30,00,000 per annum
  - o Variable – Rs.100 per unit
- Semi-variable: Rs.20,00,000 per annum upto 50% capacity and an extra amount of Rs.4,00,000 for every 25% increase in capacity of part thereof

The production is made to order and not for stocks. If the production programme of the factory is as indicated below and the management desires a profit of Rs.20,00,000 for the year work out the average selling price at which each unit should be quoted.

First 3 months: 50% capacity; Remaining 9 months : 80% capacity

Ignore administration, selling and distribution overheads

Answer:

Particulars	First 3 months	Next 9 months	Total
100% capacity per month	10,000	10,000	
Capacity utliization	50%	80%	
Production per month	5,000	8,000	
No of months	3	92,2	
Total production	15,000	72,000	87,000
Direct Material	13,50,000	64,80,000	78,30,000
Direct Labour	9,00,000	43,20,000	52,20,000
Fixed overheads	7,50,000	22,50,000	30,00,000
Variable overheads	15,00,000	72,00,000	87,00,000
Semi-variable overheads	5,00,000	21,00,000	26,00,000
	$20,00,000 \times \left(\dfrac{3}{12}\right)$	$28,00,000 \times \left(\dfrac{9}{12}\right)$	
Total Cost	**50,00,000**	**2,23,50,000**	**2,73,50,000**
Add: Profit			20,00,000
Target sales			**2,93,50,000**
No of units			87,000
Selling Price			**337.36**

Question No.6

A customer has been ordering 90,000 special designs metal columns at the rate of 18,000 columns per order during the past years. The production cost comprises Rs.2,120 for material, Rs.60 for labour and Rs.20 for fixed overheads. It costs Rs.1,500 to set up for one run of 18,000 column and inventory carrying cost is 5%.

    i.   Find the most economic production run

    ii.   Calculate the extra cost that company incur due to processing of 18,000 columns in a batch

Answer:

WN 1: Computation of EBQ:

Base data:

Annual production	90,000 units
Set-up cost per run	1,500 per run
Carrying cost per unit per annum	5% x 2,200 (2,120+60+20) = 110

EBQ Calculation

EBQ	=	$\sqrt{\dfrac{2 \text{ x Annual production x Set} - \text{up cost per run}}{\text{Carrying cost per unit per annum}}}$
EBQ	=	$\sqrt{\dfrac{2 \text{ x } 90,000 \text{ x } 1,500}{110}}$
EBQ	**=**	**1,567 columns**

WN 2: Comparison of EBQ and existing Lot size:

Particulars	EBQ	Existing lot size
1. Annual Production	90,000	90,000
2. Quantity per production run	1,567	18,000
3. Number of production runs (1/2)	57.43 ~ 58	6
4. Set-up cost per production run	1,500	1,500
5. Total set-up cost (3 x 4)	**87,000**	**9,000**
6. Average inventory (QPD/2)	783.50	9,000
7. Carrying cost per unit per annum	110	110
8. Total carrying cost (6 x 7)	**86,185**	**9,90,000**
9. Total of Set-up cost and carrying cost (5+8)	**1,73,185**	**9,97,500**
10. Extra cost due to lot size of 15,000 units		**8,24,315**

CHAPTER 9: JOB AND CONTRACT COSTING

1. What is job costing? **[Category B]**
   - ❖ Job costing is used in an industry where the work consists of separate contracts, jobs or batches, each of which is authorized by specific order or contract
   - ❖ Each job or unit of production is treated as a separate entity for the purpose of costing
   - ❖ Batch production basically is of the same character as the job order production, the difference being mainly one in the size of different orders

2. Explain when job costing is used? **[Category B]**
   - ❖ When jobs are executed for different customers according to their specifications
   - ❖ When no two orders are alike and each order/job needs special treatment
   - ❖ Where the work-in-progress differs from period to period on the basis of the number of orders in hand

3. Write the format of job cost sheet? **[Category A]**

Particulars	Amount
Direct Materials	XXX
Direct wages	XXX
Production overhead	XXX
Production cost	**XXX**
Administration overhead	XXX
Selling & Distribution overhead	XXX
Total Cost	**XXX**
Profit/Loss	XXX
Selling Price	**XXX**

4. What are the advantages and disadvantages of Job costing? **[Category C]**

Advantage	Disadvantages
Details of material, labour and overhead cost is available for control	Costly and laborious method
Profitability of each job can be derived	Lot of clerical process is involved and hence chance of errors is more
Facilitates production planning	Not suitable for inflationary condition
Budgetary control and standard costing can be applied in job costing	Previous records of costs will be meaningless if there is a change in market condition
Spoilage and defectives can be identified and responsibilities can be fixed accordingly	

5. Differentiate Job Costing and Process Costing? **[Category A]**

Job Costing	Process Costing
Used for specific and unique order	Used for products going through a series of processes
Costs are determined for each job	Cost are compiled for each process and on time basis
Each job is unique	Products manufactured are homogenous
Costs are computed when a job is completed	Costs are computed at the end of the cost period
Each job is unique and hence managerial control is required for effective control	Production process is usually standardized and hence the need for management control is limited

6. What is contract costing? **[Category B]**
   - ❖ Contract costing is a type of costing which is used in an industry where the job takes more than one year to complete. Example: Building construction, Road construction
   - ❖ Following are the key terms used in contract costing

Term	Meaning
Contract	Agreement between two parties to do a job
Contractor	Person who performs the job on contract
Contractee	Person who gives the job on contract

Architect	An external professional who is responsible for certifying the extent of work completed
Work certified	The value of work as certified by the architect. **Work certified is valued at contract price**
Contract Price	Amount agreed to be paid by the contractee to the contractor on completion of contract. This is the consideration for performing the contract
Work uncertified	The value of the work done but not certified by the architect
Degree of completion	Extent of work completed and certified by the architect
Progress payments	Progress payments represent money paid by the contractee to the contractor and expressed as a percentage of work certified
Retention ratio	Represents the amount of money held back and not paid to the contractor. This is expressed as a percentage of work certified
Materials at site	The value of materials issued to the work spot and lying unutilized
Notional profit	Represents the difference between debit and credit side of the contract account. This is not the actual profit
Estimated profit	Estimated profit is the difference between contract price and overall contract cost

7. What is a contract account? **[Category A]**
   ❖ A contract account is the equivalent of trading and P&L account of a contract
   ❖ Opening WIP and expenses related to the contract are debited and the closing WIP is credited to the contract account
   ❖ Notional profit is the difference between debit and credit side of the contract account

Contract Account for the period ended			
To Opening WIP Work certified Work uncertified	XXX XXX	By Closing material at site	XXX
To opening material at site	XXX	By closing plant at site	XXX
To Direct Material	XXX	By Cost incurred till date (B/F)	XXX
To Direct Labour	XXX		
To Direct Expenses	XXX		
To Plant and Machinery	XXX		
Total	**XXX**	**Total**	**XXX**
To cost incurred till date	XXX	By Closing WIP Work certified Work uncertified	XXX XXX
To Costing P& L A/c (Notional Profit (B/f)	XXX		
Total	**XXX**	**Total**	**XXX**

8. How to account for returns & damage (abnormal loss)? **[Category A]**
   ❖ When a material is returned from the contract in good condition it is credited to the contract account at the cost price
   ❖ When a material is returned from the contract in bad condition it is credited to the contract account at the cost price with a suitable debit to abnormal loss account

9. What is a Cost-Plus Contract? **[Category B]**
   ❖ Cost-plus contract is a contract where the value of contract is determined by adding an agreed percentage of profit to total cost
   ❖ The contractor is assured of fixed percentage of profit and hence there is no risk of loss. However the contractor may not be incentivized to avoid wastages and effect economy in production to reduce cost

10. Explain the use of escalation clause in a contract? **[Category B]**

- ❖ Escalation clause enables the contractor to raise the contract price to compensate for the increase in price of inputs
- ❖ A contract takes longer period to complete and the factors based on which price negotiation is done at the time of entering the contract may change till the contract completes

1. **Preparation of job cost sheet**

A shop floor supervisor of a small factory presented the following cost for Job No. 303, to determine the selling price.

Particulars	Per unit
Materials	70
Direct wages 18 hours @ 2.50	45
(Dept X – 8 hours; Dept Y – 6 hours; Dept Z – 4 hours)	
Chargeable expenses	5
Total Cost	**120**
Add: 33.33% for expenses cost	40
Selling price	**160**

Analysis of Profit and Loss Account:

Particulars	Amount	Particulars	Amount
Materials used	1,50,000	Sales less returns	2,50,000
Direct Wages:			
Department X	10,000		
Department Y	12,000		
Department Z	8,000		
Special stores items	4,000		
Overheads			
Department X	5,000		
Department Y	9,000		
Department Z	2,000		
Works cost	**2,00,000**		
Gross profit c/d	50,000		
Total	**2,50,000**	**Total**	**2,50,000**
Selling expenses	20,000	Gross profit b/d	50,000
Net Profit	30,000		
Total	**50,000**	**Total**	**50,000**

It is also noted that average hourly rates for the three Departments X, Y and Z are similar.

You are required to:

- Draw up a job cost sheet.
- Calculate the entire revised cost using 2005 actual figures as basis. Add 20% to total cost to determine selling price.

Answer:

WN 1: Computation of OAR based on Actual Data:

Particulars	OH of X	OH of Y	OH of Z	Selling expenses
Actual Overheads	5,000	9,000	2,000	20,000
Suitable base	DLH	DLH	DLH	COP
Actual suitable base	4,000	4,800	3,200	2,00,000
OAR	**1.25/DLH**	**1.875/DLH**	**0.625/DLH**	**10% of COP**

WN 2: Job Cost Sheet for Job No.303 based on actual OAR

Particulars	Calculation	Amount
Direct materials		70.00
Direct wages		45.00
Direct expenses		5.00
Prime Cost		**120.00**
Factory overheads		
Department X	1.25 x 8	10.00
Department Y	1.875 x 6	11.25
Department Z	0.625 x 4	2.50
GWC/NWC/COP/COGS		**143.75**
Selling and distribution overheads	10% x 143.75	14.38
Cost of Sales		**158.13**

Profit	20% x 158.13	31.63
Selling price		**189.76**

- **Selling price for Job No.303 = Rs.189.76**

2. Preparation of budgeted cost sheet

A factory incurred the following expenditure during the year 2007:

Particulars	Amount	Amount
Direct material consumed		12,00,000
Manufacturing wages		7,00,000
Manufacturing Overheads:		
Fixed	3,60,000	
Variable	2,50,000	6,10,000
Total		**25,10,000**

In the year 2008, 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.

Answer:

Cost sheet for 2007 and 2008:

Particulars	2007		2008	
	Per Unit	Total Cost	Per Unit	Total Cost
Direct material	12,000	12,00,000	11,280	16,24,320
Direct Labour	7,000	7,00,000	7,778	11,20,000
Fixed manufacturing OH	3,600	3,60,000	3,000	4,32,000
Variable manufacturing OH	2,500	2,50,000	4,000	5,76,000
Cost of Production/Cost of sales	**25,100**	**25,10,000**	**26,058**	**37,52,320**
Profit (1/10 on sales = 1/9 on cost)				4,16,924
Sales				**41,69,244**

Notes:

- Let us assume 100 units are produced in 2007
- Production in 2008 should increase by 60% due to more workers. However, there is an efficiency drop and hence the production for 2008 would be 144 units (100 x 1.60 x 0.90)

3. Job cost sheet:

A factory uses job costing. The following data are obtained from its books for the year ended 31st March 2018:

Particulars	Amount
Direct Materials	9,00,000
Direct wages	7,50,000
Selling and distribution overheads	5,25,000
Administration overheads	4,20,000
Factory overheads	4,50,000
Profit	6,09,000

i. Prepare a job cost sheet indicating the prime cost, cost of production, cost of sales and the sales value
ii. In 2018-19, the factory received an order for a job. It is estimated that direct materials required will be Rs.2,40,000 and direct labour will cost Rs.1,50,000. Determine what should be the price for the job if factory intends to earn the same rate of profit on sales assuming that the selling and distribution overheads have gone up by 15%. The factory recovers overheads as a percentage of cost of production, based on cost rates prevailing in the previous year.

Answer:

WN 1: Job cost sheet for the year ended March 31, 2018:

Particulars	Calculation	Amount
Direct materials		9,00,000

Direct wages		7,50,000
Direct expenses		0
Prime Cost		**16,50,000**
Factory overheads		4,50,000
GWC/NWC/COP/COGS		**21,00,000**
Administrative overheads	Assumed to be General	4,20,000
Selling and distribution overheads		5,25,000
Cost of Sales		**30,45,000**
Profit		6,09,000
Sales		**36,54,000**

WN 2: Computation of OAR:

Particulars	Factory OH	Admin OH	Selling OH
Budgeted Overheads	4,50,000	4,20,000	5,25,000
Suitable base	Direct wages	COP	COP
Budgeted suitable base	7,50,000	21,00,000	21,00,000
OAR	60% of DW	20% of COP	25% of COP

WN 3: Price to be quoted for new order:

Particulars	Calculation	Amount
Direct materials		2,40,000
Direct wages		1,50,000
Direct expenses		0
Prime Cost		**3,90,000**
Factory overheads	60% x 1,50,000	90,000
GWC/NWC/COP/COGS		**4,80,000**
Administrative overheads	20% x 4,80,000	96,000
Selling and distribution overheads	(25% x 4,80,000) + 15%	1,38,000
Cost of Sales		**7,14,000**
Profit	1/6 on sales = 1/5 on cost	1,42,800
Sales		**8,56,800**

- Price to be quoted for the order = RS.8,56,800.

4. **Computation of cost of job**

A furniture making business manufactures quality furniture to customers' order. It has three production departments (A, B and C) which have overhead absorption rates (per direct labour hour) of Rs.12.86, Rs.12.40 and Rs.14.03 respectively.

Two pieces of furniture are to be manufactured for customers. Direct costs are as follows:

Particulars	Job XYZ	Job MNO
Direct Material	154	108
Direct labour	20 hours Department A	16 hours Department A
	12 hours Department B	10 hours Department B
	10 hours Department C	14 hours Department C

Labour rates are as follows Rs.7.60 (A); Rs.7.00 (B) and Rs.6.80 (C)
The firm quotes prices to customers that reflect a required profit of 25% on selling price. Calculate the total cost and selling price of each job.
Answer:
Job Cost Sheet of XYZ and MNO:

Particulars	Job XYZ		Job MNO	
	Calculation	Amount	Calculation	Amount
Direct material	Given	154.00	Given	108.00
Direct labour				
Dept A	20 x 7.60	152.00	16 x 7.60	121.60
Dept B	12 x 7.00	84.00	10 x 7.00	70.00
Dept C	10 x 6.80	68.00	14 x 6.80	95.20

Prime cost		612.00		546.80
Factory OH				
Dept A	20 x 12.86	257.20	16 x 12.86	205.76
Dept B	12 x 12.40	148.80	10 x 12.40	124.00
Dept C	10 x 14.03	140.30	14 x 14.03	196.42
Factory cost/Total cost		**1,004.30**		**920.98**
Profit (1/4 on sales = 1/3 on cost)	1,004.30 x (1/3)	334.77	920.98 x (1/3)	306.99
Invoice Price		**1,339.07**		**1,227.97**

5. **Job cost sheet:**

M.L. Auto limited is a manufacturer of auto components and the details of its expenses for the year 2014 are given below:

Opening stock of material	1,50,000
Closing stock of material	2,00,000
Purchase of material	18,50,000
Direct Labour	9,50,000
Factory overhead	3,80,000
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 Rs.8,00,000 and Rs.4,50,000 respectively. M.L.Auto Limited 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 Rs.45,000

Required:
  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

Answer:

WN 1: Job cost sheet for the year ended 2014:

Particulars	Calculation	Amount
Direct materials	1,50,000 + 18,50,000 – 2,00,000	18,00,000
Direct wages		9,50,000
Direct expenses		0
Prime Cost		**27,50,000**
Factory overheads		3,80,000
GWC/NWC (Factory Cost)		**31,30,000**
Administrative OH relating to production		2,50,400
Cost of Production		**33,80,400**

WN 2: Computation of OAR:

Particulars	Factory OH	Admin OH
Budgeted Overheads	3,80,000	2,50,400
Suitable base	Direct wages	Factory cost
Budgeted suitable base	9,50,000	31,30,000
OAR	**40% of DW**	**8% of factory cost**

WN 3: Price to be quoted for new order:

Particulars	Calculation	Amount
Direct materials		8,00,000
Direct wages		4,50,000
Direct expenses		0
Prime Cost		**12,50,000**
Factory overheads	40% x 4,50,000	1,80,000
GWC/NWC (Factory Cost)		**14,30,000**
Administrative OH relating to production	8% x 14,30,000	1,14,400
Cost of Production		**15,44,400**
Selling and distribution overheads		45,000

Cost of sales		15,89,400
Profit	1/10 on sales = 1/9 on cost	1,76,600
Price to be quoted		17,66,000

- **Price to be quoted for the order = Rs.17,66,000**

6. Cost of job:

Ares Plumbing and Fitting Limited (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) @ Rs.600 each
- 20 mm GI Pipe, 10 units of (15 feet size) @ Rs.660 each
- Other fitting materials, 60 units @ Rs.26 each
- Stainless steel faucet, 6 units @ Rs.204 each
- Valve, 8 units @ Rs.404 each

Purchases on 16th August 2014:

- 20 mm GI Pipe, 30 units of (15 feet size) @ Rs.610 each
- 10 units of valve @ Rs.402 each

Purchases on 18th August 2014:

- Other fitting materials, 150 units @ Rs.28 each
- Stainless steel Faucet, 15 units @ Rs.209 each

Purchases on 27th August 2014:

- 15 mm GI Pipe, 35 units of (15 feet size) Rs.628 each
- 20 mm GI Pipe, 20 units of (15 feet size) @ Rs.660 each
- Valve, 14 units @ Rs.424 each

Issues for hostel job on 12th August 2014:

- 20mm GI Pipe, 2 units of (15 feet size)
- Other fitting materials, 18 units

Issues on 17th August 2014:

- 15mm GI Pipe, 8 units of (15 feet size)
- Other fitting materials, 30 units

Issues 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

Issues on 30th August 2014:

- Other fitting materials, 60 units
- Stainless steel Faucet, 15 units

Direct Labour:

- Plumber: 180 hours @ Rs.50 per hour (includes 12 hours overtime)
- Helper: 192 hours @ Rs.35 per hour (includes 24 hours overtime)
- Overtimes are paid at 1.5 times of the normal wage rate

Overheads:

- Overheads are applied @ Rs.13 per labour hour

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

Answer:
Job Cost Sheet:

Particulars	Calculation	Amount
Direct Material Cost:		
15mm GI Pipes	Note 1	11,051.30
20mm GI Pipes	Note 2	2,588.28
Other fitting materials	Note 3	3,865.90
Stainless steel faucet	Note 4	3,113.55
Valves	Note 5	2,472.78
Total Direct Material		**23,091.81**
Direct Labour		
Plumber	(180 x 50) + (12 x 25)	9,300.00
Helper	(192 x 35) + (24 x 17.50)	7,140.00
Total Direct Labour		**16,440.00**
Overheads	13 x (180 + 192)	4,836.00
Total Cost of Job		**44,367.81**
Profit	1/4 on sales = 1/3 on cost	14,789.27
Invoice Price		**59,157.08**

Notes:
Note 1: Computation of cost of 15mm GI Pipes:

Date	Receipts			Issues			Balance		
	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Aug 12 (op balance)							12	600	7,200.00
Aug 17 (Issue)				8	600	4,800.00	4	600	2,400.00
Aug 27 (Purchase)	35	628	21,980				39	625.13	24,380.00
Aug 28 (Issue)				10	625.13	6,251.30	29	625.13	18,128.70
Total issues						**11,051.30**			

Note 2: Computation of cost of 20mm GI Pipes:

Date	Receipts			Issues			Balance		
	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Aug 12 (op balance)							10	660	6,600.00
Aug 12 (issue)				2	660	1,320.00	8	660	5,280.00
Aug 16 (Purchase)	30	610	18,300				38	620.53	23,580.00
Aug 27 (Purchase)	20	660	13,200				58	634.14	36,780.00
Aug 28 (Issue)				2	634.14	1,268.28	56	634.14	35,511.72
Total issues						**2,588.28**			

Note 3: Computation of cost of other fitting materials:

Date	Receipts			Issues			Balance		
	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Aug 12 (op balance)							60	26	1,560.00
Aug 12 (issue)				18	26	468.00	42	26	1,092.00
Aug 17 (issue)				30	26	780.00	12	26	312.00
Aug 18 (Purchase)	150	28	4,200				162	27.85	4,512.00
Aug 28 (Issue)				34	27.85	946.90	128	27.85	3,565.10
Aug 30 (Issue)				60	27.85	1,671.00	68	27.85	1,894.10
Total issues						**3,865.90**			

Note 4: Computation of cost of stainless-steel faucet:

Date	Receipts			Issues			Balance		
	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Aug 12 (op balance)							6	204	1,224.00
Aug 18 (Purchase)	15	209	3,135.00				21	207.57	4,359.00
Aug 30 (issue)				15	207.57	3,113.55	6	207.57	1,245.45

Note 5: Computation of Valves:

Date	Receipts			Issues			Balance		
	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Aug 12 (op balance)							8	404	3,232.00
Aug 16 (Purchase)	10	402	4,020.00				18	402.89	7,252.00
Aug 27 (Purchase)	14	424	5,936.00				32	412.13	13,188.00
Aug 28 (issue)				6	412.13	2,472.78	26	412.13	10,715.22

7. Calculation of selling price

In a factory following the Job Costing Method, an abstract from the work-in-progress as on 30th September was prepared as under.

Job No.	Materials (Rs.)	Direct hrs.	Labour (Rs.)	Factory Overheads applied (Rs.)
115	1325	400 hrs.	800	640
118	810	250 hrs.	500	400
120	765	300 hrs.	475	380
	2900		1775	1420

Materials used in October were as follows:

Materials Requisition No.	Job No.	Cost (Rs.)
54	118	300
55	118	425
56	118	515
57	120	665
58	121	910
59	124	720
		3535

A summary for labour hours deployed during October is as under:

Job No.	Number of Hours	
	Shop A	Shop B
115	25	25
118	90	30
120	75	10
121	65	--
124	25	10
	275	75
Indirect Labour: Waiting of material	20	10
Machine breakdown	10	5
Idle time	5	6
Overtime premium	6	5
	316	101

A shop credit slip was issued in October, that material issued under Requisition No. 54 was returned back to stores as being not suitable. A material transfer note issued in October indicated that material issued under Requisition No. 55 for Job 118 was directed to Job 124. The hourly rate in shop A per labour hour is Rs. 3 per hour while at shop B, it is Rs. 2 per hour. The factory overhead is applied at the same rate as in September. Job 115, 118 and 120 were completed in October.

You are asked to compute the factory cost of the completed jobs. It is the practice of the management to put a 10% on the factory cost to cover administration and selling overheads and invoice the job to the customer on a total cost plus 20% basis. What would be the invoice price of these three jobs?

Answer:

WN 1: Computation of OAR:

- **Factory Overheads:**
  - Suitable base for factory overheads can either be Direct Labour Hours or Direct Labour cost
  - OAR based on DLH is not same for all three jobs and hence suitable base cannot be DLH
  - OAR based on DLC is same for all three jobs and the relevant OAR is 80 percent of Direct wages
- Admin and selling overheads OAR = 10% of factory cost

WN 2: Computation of invoice price of completed jobs:

Particulars	Job No.115		Job No.118		Job No.120	
	Calculation	Amount	Calculation	Amount	Calculation	Amount
Direct material	1,325 + 0	1,325	810 + 515	1,325	765 + 665	1,430
Direct labour	800 + (25 x 3) + (25 x 2)	925	500 + (90 x 3) + (30 x 2)	830	475 + (75 x 3) + (10 x 2)	720
Prime cost		**2,250**		**2,155**		**2,150**
Factory OH	80% x 925	740	80% x 830	664	80% x 720	576
Factory cost		**2,990**		**2,819**		**2,726**
Admin and selling OH	10% x 2,990	299	10% x 2,819	282	10% x 2,726	273
Total cost		**3,289**		**3,101**		**2,999**
Profit	20% x 3,289	658	20% x 3,101	620	20% x 2,999	600
Invoice Price		**3,947**		**3,721**		**3,599**

8. **Cost of the job:**

A company has been asked to quote for a job. The company aims to make a net profit of 30% on sales. The estimated cost for the job is as follows:

- Direct Materials – 10 Kg @ Rs.10 per kg
- Direct labour – 20 hours @ Rs.5 per hour
- Variable production overheads are recovered at the rate of Rs.2 per labour hour
- Fixed production overheads for the company are budgeted to be Rs.1,00,000 each year and are recovered on the basis of labour hour
- There are 10,000 budgeted labour hours each year. Other costs in relation to selling, distribution and administration are recovered at the rate of Rs.50 per job

Determine the quote for the job by the company.

Answer:

Job Cost Sheet:

Particulars	Calculation	Amount
Direct materials	10 kg x 10	100
Direct labour	20 x 5	100
Variable production overheads	20 x 2	40
Fixed production overheads	20 x (1,00,000/10,000)	200
Other costs		50
Total Cost (70)		**490**
Profit (30)	490 x (30/70)	210
Total Sales (100)		**700**

9. **Computation of conservative profit to be transferred**

Compute a conservative estimate of profit on a contract (which has been 90% complete) from the following particulars:

Particulars	Amount
Total expenditure to date	22,50,000
Estimated further expenditure to complete the contract	2,50,000
Contract price	32,50,000
Work certified	27,50,000
Work uncertified	1,75,000
Cash received	21,25,000

Answer:
Computation of Notional Profit:
- Notional Profit = Credit side of contract Account – Debit side of contract Account
- Notional Profit = (Work Certified + Work Uncertified) – Cost incurred till date
- **Notional Profit = (27,50,000 + 1,75,000) – 22,50,000 = Rs.6,75,000**

Computation of estimated profit:
- Estimated Profit = Contract Price – Estimated total costs
- Estimated Profit = 32,50,000 – (22,50,000 + 2,50,000)
- **Estimated Profit = Rs.7,50,000**

10. Simple contract account

The following expenses were incurred on a contract:

Particulars	Amount
Material Purchased	6,00,000
Material drawn from stores	1,00,000
Wages	2,25,000
Plant issued	75,000
Chargeable expenses	75,000
Apportioned indirect expenses	25,000

The contract was for Rs. 20,00,000 and it commenced on January 1, 2005. The value of the work completed and certified upto 30th November, 2005 was Rs. 13,00,000 of which Rs. 10,40,000 was received in cash, the balance being held back as retention money by the contractee. The value of work completed subsequent to the architect's certificate but before 31st December, 2005 was Rs. 60,000. There were also lying on the site materials of the value of Rs. 40,000. It was estimated that the value of plant as at 31st December, 2005 was Rs. 30,000. Prepare a contract account and arrive at the profit to be transferred to P&L.

Answer:
Contract Account for the period of Jan 2005 to December 2005

Dr			Cr
Particulars	Amount	Particulars	Amount
To Opening WIP	0	By Material at site	40,000
To Material purchased	6,00,000	By Plant at site	30,000
To Material drawn from stores	1,00,000	**By cost incurred till date (b/f)**	**10,30,000**
To Wages	2,25,000		
To Plant sent to site	75,000		
To Chargeable expenses	75,000		
To Apportioned indirect expenses	25,000		
Total	**11,00,000**	**Total**	**11,00,000**
To Cost incurred till date	10,30,000	By Work certified	13,00,000
To Profit & Loss A/c (Profit for the year)	**3,30,000**	By Work uncertified	60,000
Total	**13,60,000**		**13,60,000**

11. Valuation of work uncertified

A contractor commenced a contract on 1-7-2011. The costing records concerning the said contract reveal the following information as on 31-3-2012:

	Amount (Rs.)
Material Sent to site	7,74,300
Labour paid	10,79,000

Labour outstanding as on 31-03-2012	1,02,500
Salary to engineer	20,500 per month
Cost of plant sent to site (1-7-2011)	7,71,000
Salary to supervisor (3/4th 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 31-03-2012	75,800

Plant used for contract has an estimated life of 7 years with residual value at the end of life Rs.50,000. Some of material costing Rs.13,500 was found unsuitable and sold for Rs.10,000. Contract price was Rs.45,00,000. On 31-03-2012 two thirds of the contract was completed. The architect issued certificate covering 50% of the contract price and the contractor has been paid Rs.20,00,000 on account. Depreciation on plant has been charged on straight line basis. Prepare contract account.

Answer:
Contract Account for the period of July 2011 to March 2012:

Dr				Cr
Particulars	**Amount**	**Particulars**		**Amount**
To Materials	7,74,300	By Materials at site		75,800
To Labour (10,79,000 + 1,02,500)	11,81,500	By Plant at Site		6,93,750
To Engineer salary (20,500 x 9 months)	1,84,500	By Sale of material		10,000
To Plant sent to site	7,71,000	By P&L (loss on sale of material)		3,500
To Supervisor salary (9,000 x (3/4) x 9)	60,750	**By Cost incurred till date (b/f)**		**26,39,600**
To Admin expenses (4,60,600 – 10,000)	4,50,600			
Total	**34,22,650**	**Total**		**34,22,650**
To Cost incurred till date	26,39,600	By Work Certified (50% x 45,00,000)		22,50,000
To Profit and Loss A/c (Profit for the year)	**2,70,300**	By Work uncertified (Note 2)		6,59,900
Total	**29,09,900**	**Total**		**29,09,900**

Notes:
Note 1: Computation of Plant at Site
- Depreciation for one year = (7,71,000 – 50,000)/7 years = Rs.1,03,000
- Depreciation for nine months = 1,03,000 x (9/12) = Rs.77,250
- Value of Plant at Site as on March 2012 = (7,71,000 – 77,250) = 6,93,750

Note 2: Valuation of work uncertified:
- Cost incurred till date = 26,39,600
- Total contract cost = 26,39,600 x (3/2) = 39,59,400
- Work completed = 66.66666666%
- Work certified = 50%
- Work uncertified = 16.66666666666%
- **Value of work uncertified = 39,59,400 x 16.6666666% = Rs.6,59,900**

12. Contract Account:
XYZ LLP, contractors and civil engineers, are building a new wing to a school. The quoted fixed price for the contract is Rs.30,00,000. Work commenced on 1st January 2018 and is expected to be completed on schedule by June 30 2019. Data relating to the contract at the year ended March 31, 2019 is as follows:

Particulars	Amount
Plant sent to site at commencement of contract	2,40,000
Hire of plant and equipment	77,000
Materials sent to site	6,62,000
Materials returned from site	47,000
Direct wages paid	9,60,000
Wage related costs	1,32,000
Direct expenses incurred	34,000
Supervisory staff salaries – Direct	90,000

Supervisory staff salaries – Indirect	20,000
Regional office expenses apportioned to contract	50,000
Head office expenses apportioned to contract	30,000
Surveyor fees	27,000
Progress payments received from school	18,00,000

Additional information:
  i. Plant is to be depreciated at the rate of 25% per annum following straight line method with no residual value
  ii. Unused materials on site at 31st march are estimated at Rs.50,000
  iii. Wages owed to direct workers total Rs.40,000
  iv. No profit in respect of this contract was included in the year ended 31st March 2018
  v. Budgeted profit on the contract is Rs.8,00,000
  vi. Value of work certified by the surveyor is Rs.24,00,000
  vii. The surveyor has not certified the work costing Rs.1,80,000

You are required to prepare the account for the school contract for the fifteen months ended 31st March 2019 and calculate the notional profit to date.

Answer:

Contract Account for the period of Jan 2018 to March 2019

Dr				Cr
Particulars	**Amount**	**Particulars**		**Amount**
To Opening WIP	0	By Materials returned		47,000
To Plant	2,40,000	By Plant at site		1,65,000
To Hire Charges	77,000	By Material at site		50,000
To Materials sent to site	6,62,000	**By Cost Incurred till date**		**21,00,000**
To Direct Wages (9,60,000 + 40,000)	10,00,000			
To Wage related costs	1,32,000			
To Direct Expenses	34,000			
To Supervisory staff (Direct + Indirect)	1,10,000			
To Regional office expenses	50,000			
To Head office expenses	30,000			
To Surveyor fees	27,000			
Total	**23,62,000**	**Total**		**23,62,000**
To Cost incurred till date	21,00,000	By Work certified		24,00,000
To Profit & Loss A/c (Profit for the year)	**4,80,000**	By Work uncertified		1,80,000
Total	**13,60,000**			**13,60,000**

Note:
  • Value of plant sent to site = 2,40,000
  • Depreciation for 15 months = 2,40,000 x 25% x (15/12) = 75,000
  • Value of plant as on 31st March 2019 = 2,40,000 – 75,000 = 1,65,000

13. Calculation of estimated profit

RST Construction Ltd. commenced a contract on April 1, 2005. The total contract was for Rs. 49,21,875. Actual expenditure for the period April 1, 2005 to March 31, 2006 and estimated expenditure for April 1, 2006 to September 30, 2006 are given below:

Particulars	April 2005 to March 2006 (Actuals)	April 2006 to Sept 2006 Estimated
Materials issued	7,76,250	12,99,375
Labour: Paid	5,17,500	6,18,750
Prepaid	37,500	-
Outstanding	12,500	5,750
Plant purchased	4,00,000	-
Expenses: Paid	2,25,000	3,75,000
Outstanding	25,000	10,000
Prepaid	15,000	
Plant returns to store (historical cost)	1,00,000 (On Sept 30, 2005)	3,00,000 (on Sept 30, 2006)
Work certified	22,50,000	Full

Work uncertified	25,000	-
Cash received	18,75,000	-
Materials at site	82,500	42,500

The plant is subject to annual depreciation @ 25% on written down value method. The contract is likely to be completed on September 30, 2006.

Required:

Prepare the Contract A/c.

Answer:

Contract Account for the period of April 2005 to March 2006:

Dr				Cr
Particulars	**Amount**	**Particulars**		**Amount**
To Materials	7,76,250	By Plant returned (Note 1)		87,500
To Labour (5,17,500 – 37,500 + 12,500)	4,92,500	By Plant at Site (Note 2)		2,25,000
To Plant	4,00,000	By Materials at site		82,500
To Expenses (2,25,000 + 25,000 -15,000)	2,35,000	**By Cost incurred till date (b/f)**		**15,08,750**
Total	**19,03,750**	**Total**		**19,03,750**
To Cost incurred till date	15,08,750	By Work Certified		22,50,000
To Profit and Loss A/c (Profit for the year)	**7,66,250**	By Work uncertified		25,000
Total	**22,75,000**	**Total**		**22,75,000**

Notes:

Note 1: Value of Plant returned as on September 30, 2005:

Particulars	Amount
Historical cost	1,00,000
Less: Depreciation for 6 months (1,00,000 x 25% x (6/12)	12,500
Value of Plant returned	**87,500**

Note 2: Value of Plant at site as on March 31, 2006:

Particulars	Amount
Historical cost	3,00,000
Less: Depreciation for 12 months (3,00,000 x 25% x (12/12)	75,000
Value of Plant at site	**2,25,000**

Contract Account for the period of April 2005 to September 2006:

Dr			Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Materials (7,76,250 + 12,99,375)	20,75,625	By Plant returned (Sep 2005)	87,500
To Labour (5,17,500 + 6,18,750 + 5,750)	11,42,000	By Plant returned (Sep 2006)	1,96,875
To Plant	4,00,000	By Materials at site	42,500
To Expenses (2,25,000 + 3,75,000 + 10,000)	6,10,000	**By Estimated cost of contract**	**39,00,750**
Total	**42,27,625**	**Total**	**42,27,625**
To estimated cost of contract	39,00,750	By Work Certified	49,21,875
To estimated profit (b/f)	**10,21,125**		
Total	**49,21,875**	**Total**	**49,21,875**

Note 1: Value of Plant returned as on Sep 30, 2006:

Particulars	Amount
Plant at site as on March 31, 2006	2,25,000
Less: Depreciation for 6 months (2,25,000 x 25% x (6/12))	(28,125)
Value of Plant at site	**1,96,875**

14. Calculation of est. profit with opening WIP

A contractor commenced a building contract on October 1, 2004. The contract price is Rs. 4,40,000. The following data pertaining to the contract for the year 2005-2006 has been compiled from his books and is as under:

Date	Particulars	Amount
April 1, 2005	Work in progress not certified	55,000
	Materials at site	2,000
2005-06	**Expenses incurred:**	
	Materials issued	1,12,000
	Wages paid	1,08,000
	Hire of plant	20,000
	Other expenses	34,000
March 31, 2006	Materials at site	4,000
	Work-in-progress: Not certified	8,000
	Work-in-progress: Certified	4,05,000

The cash received represents 80% of work certified. It has been estimated that further costs to complete the contract will be Rs. 23,000 including the materials at site as on March 31, 2006. You are required to prepare Contract Account, Contractee Account and compute estimated profit.

Answer:

Contract Account for the period of April 2005 to March 2006:

Dr			Cr
Particulars	Amount	Particulars	Amount
To Opening work uncertified	55,000	By materials at site	4,000
To Opening materials at site	2,000	By cost incurred till date	3,27,000
To Materials	1,12,000		
To wages	1,08,000		
To Hire of Plant	20,000		
To Other expenses	34,000		
Total	**3,31,000**	**Total**	**3,31,000**
To cost incurred till date	3,27,000	By work certified	4,05,000
To P&L A/c (Profit for the year)	**86,000**	By work uncertified	8,000
Total	**4,13,000**	**Total**	**4,13,000**

Contractee Account:

Dr			Cr
Particulars	Amount	Particulars	Amount
To Balance c/d	3,24,000	By Bank A/c (80% x 4,05,000)	3,24,000
Total	**3,24,000**		**3,24,000**

Computation of estimated Profit:

Particulars	Amount
Cost incurred till date	3,27,000
Add: Estimated further costs	23,000
Estimated total cost of contract	**3,50,000**
Contract Price	4,40,000
Estimated Profit	**90,000**

15. Contract account for multiple years

M/s. Bansals Construction Company Ltd. took a contract for Rs. 60,00,000 expected to be completed in three years. The following particulars relating to the contract are available:

	2004	2005	2006
	Rs.	Rs.	Rs.
Materials	6,75,000	10,50,000	9,00,000
Wages	6,20,000	9,00,000	7,50,000
Cartage	30,000	90,000	75,000
Other expenses	30,000	75,000	24,000
Cumulative work certified	13,50,000	45,00,000	60,00,000
Cumulative work uncertified	15,000	75,000	–

Plant costing Rs. 3,00,000 was bought at the commencement of the contract. Depreciation was to be charged at 25% per annum, on the written down value method. The contractee pays 75% of the value of work certified as and when certified, and makes the final payment on completion of the contract.

You are required to make a contract account and show the total/estimated profit from the contract? You are also required to prepare Contractee Account and show Balance Sheet Abstract of relevant items.

Answer:

Contract Account for the year 2004:

Dr			Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Materials	6,75,000	By Plant at site	2,25,000
To Wages	6,20,000	By cost incurred till date	14,30,000
To Cartage	30,000		
To Other expenses	30,000		
To Plant sent to site	3,00,000		
Total	**16,55,000**	**Total**	**16,55,000**
To cost incurred till date	14,30,000	By work certified	13,50,000
		By work uncertified	15,000
		By P&L A/c (Loss for the year)	**65,000**
Total	**14,30,000**	**Total**	**14,30,000**

Contract Account for the year 2005:

Dr			Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Opening work certified	13,50,000	By Plant at site (2,25,000 – 25% depreciation)	1,68,750
To Opening work uncertified	15,000	By Work certified	45,00,000
To Opening Plant at site	2,25,000	By Work uncertified	75,000
To Materials	10,50,000		
To Wages	9,00,000		
To Cartage	90,000		
To Other expenses	75,000		
To P&L A/c (Profit for the year)	**10,38,750**		
Total	**47,43,750**	**Total**	**47,43,750**

Contract Account for the year 2006:

Dr			Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Opening work certified	45,00,000	By Contractee A/c	60,00,000
To Opening work uncertified	75,000	By Plant returned (1,68,750 – 25%)	1,26,563
To Opening Plant at Site	1,68,750	**By P&L A/c (Loss for the year)**	**3,66,187**
To Materials	9,00,000		
To Wages	7,50,000		
To Cartage	75,000		
To Other expenses	24,000		
Total	**64,92,750**	**Total**	**64,92,750**

- **Estimated profit of total contract = -65,000 + 10,38,750 – 3,66,187 = Rs.6,07,563**

Contractee Account

Dr			Cr
Particulars	**Amount**	**Particulars**	**Amount**
2004:		**2004:**	
To Balance c/d	10,12,500	By Bank A/c (13,50,000 x 75%)	10,12,500
Total	**10,12,500**	**Total**	**10,12,500**
2005:		**2005:**	

To Balance c/d	33,75,000	By Balance b/d	10,12,500
		By Bank A/c (31,50,000 x 75%)	23,62,500
Total	**33,75,000**	**Total**	**33,75,000**
2006		**2006**	
To Contract A/c	60,00,000	By Balance c/d	33,75,000
		By Bank A/c	26,25,000
Total	**60,00,000**	**Total**	**60,00,000**

Balance sheet abstract of year 2004:

Liabilities	Amount	Assets		Amount
		Plant at site		2,25,000
Reserves & Surplus:				
		Contract WIP:		
Less: Contract loss for the year	(65,000)	Work certified	13,50,000	
		Work uncertified	15,000	
		Less: Contractee A/c (10,12,500)		3,52,500

Balance sheet abstract of year 2005:

Liabilities	Amount	Assets		Amount
		Plant at site		1,68,750
Reserves & Surplus:				
		Contract WIP:		
Add: Contract Profit for the year	10,38,750	Work certified	45,00,000	
		Work uncertified	75,000	
		Less: Contractee A/c (33,75,000)		12,00,000

Balance sheet abstract of year 2006:

Liabilities	Amount	Assets	Amount
		Plant	1,26,563
Reserves & Surplus:			
Less: Contract loss for the year	(3,66,187)		

16. **Contract account**

Modern Construction Ltd. obtained a contract No.B-37 for Rs.40 lakhs. The following balances and information relate to the contract for the year ended 31st March, 2008:

	1.4.2007 Rs.	31.3.2008 Rs.
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 2007-2008 is:

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 the Contract Account and Contractee Account.

Answer:

Contract Account for the period of Apr 2007 to March 2008:

Dr			Cr
Particulars	Amount	Particulars	Amount
To Opening work certified	9,40,000	By materials returned to store	25,000
To Opening work uncertified	11,200	By materials returned to supplier	15,000
To Opening Materials at Site	8,000	By work certified	30,00,000
To Materials	4,00,000	By Work uncertified	32,000
To Materials directly purchased	1,50,000	By materials at site	20,000
To Wages (6,00,000 + 3,000 – 5,000)	5,98,000		
To Architect fees	51,000		
To Plant Hire Charges	50,000		
To Indirect expenses	10,000		
To share of general overheads	18,000		
To P&L (Profit for the year)	**8,55,800**		
Total	**30,92,000**	**Total**	**30,92,000**

- Fines and Penalties is an abnormal expenditure and same would not form part of contract Account

Contractee Account for the period of Apr 2007 to March 2008:

Dr			Cr
Particulars	Amount	Particulars	Amount
To Balance c/d	24,00,000	By Balance b/d (9,40,000 x 80%)	7,52,000
		By Bank A/c (20,60,000 x 80%)	16,48,000
Total	**24,00,000**	**Total**	**24,00,000**

17. Computation of profit and loss

Paramount Engineers are engaged in construction and erection of a bridge under a long-term contract. The cost incurred upto 31.03.2001 was as under:

Particulars	Amount in lacs
Fabrication:	
Direct Material	280
Direct Labour	100
Overheads	60
Total Fabrication costs	**440**
Erection costs to date	110
Total Costs	**550**

The contract price is Rs. 11 crores and the cash received on account till 31.03.2001 was Rs.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 Profit and Loss Account against this partly completed contract as at 31.03.2001.

Answer:

Contract Account for the period ended March 31, 2001:

Dr			Cr
Particulars	Amount (in lacs)	Particulars	Amount (in lacs)
To Direct materials	280	**By Cost incurred till date**	**550**
To Direct Labour	100		
To Overheads	60		
To erection costs	110		
Total	**550**	**Total**	**550**
To Cost incurred till date	550	By Work certified (1,100 x 58.40%)	642.40
To P&L A/c (Profit for the year)	**92.40**	By Work uncertified	0
Total	**642.40**	**Total**	**642.40**

Note:

- It is assumed that entire amount of work completed is certified and hence value of work uncertified is zero.

Note 1: Computation of degree of completion:

Particulars	Cost incurred	Degree of completion	Total Costs (Col 2/ Col 3)
Direct material	280	70%	400.00
Direct Labour	100	60%	166.67
Overheads	60	60%	100.00
Erection costs	110	40%	275.00
Total	**550**	**58.40%**	**941.67**

Degree of completion $= \dfrac{550}{941.67} \times 100 = 58.40\%$

18. **Escalation claim**

Deluxe Limited undertook a contract for Rs.5,00,000 on 1st July, 1986. On 30th June, 1987 when the accounts were closed, the following details about the contract were gathered:

Particulars	Amount
Materials purchased	1,00,000
Wages paid	45,000
General expenses	10,000
Plant Purchased	50,000
Materials on hand 30.06.87	25,000
Wages accrued 30.06.87	5,000
Work certified	2,00,000
Cash received	1,50,000
Work uncertified	15,000
Depreciation of Plant	5,000

The above contract contained an escalator clause which read as follows: "In the event of prices of materials and rates of wages increase by more than 5% the contract price would be increased accordingly by 25% of the rise in the cost of materials and wages beyond 5% in each case." It was found that since the date of signing the agreement the prices of materials and wage rates increased by 25%. The value of the work certified does not take into account the effect of the above clause. Prepare the contract account. Workings should form part of the answer.

Answer:

Contract Account for the period of July 1986 to June 1987:

Dr			Cr
Particulars	Amount	Particulars	Amount
To Materials	1,00,000	By materials at site	25,000
To wages (45,000 + 5,000)	50,000	By Plant at site	45,000
To General expenses	10,000	**By Cost incurred till date**	**1,40,000**
To Plant	50,000		
Total	**2,10,000**	**Total**	**2,10,000**
To Cost incurred till date	1,40,000	By Work certified	2,00,000
To P&L A/c (Profit for the year)	**80,000**	By Work uncertified	15,000
		By Escalation claim (Note 1)	**5,000**
Total	**2,20,000**	**Total**	**2,20,000**

Note 1: Computation of escalation claim:

Particulars	Calculation	Amount
Material cost incurred	1,00,000 – 25,000	75,000
Labour cost incurred		50,000
Total Cost incurred		**1,25,000**
Base cost	1,25,000/125%	1,00,000
Increase in cost		25,000
Increase upto 5%	1,00,000 x 5%	5,000
Increase beyond 5% (admissible claim)	25,000 – 5,000	20,000

Escalation claim	20,000 x 25%	5,000

19. Escalation claim:

Cimtech constructions Limited has entered into a big contract at an agreed price of Rs.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	Rate per Ton	Quantity	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	Rate	Hours	Rate
L1	60,000	15	56,000	18
L2	40,000	30	38,000	35

You are required to:
   i.   Analyze admissible escalation claim and determine the final contract price payable
   ii.   Prepare the contract account, if all expenses other than material and labour related to the contract are Rs.13,45,000

Answer:
WN 1: Computation of admissible escalation claim:
Material cost:
   - Claim will be allowed only to the extent of variation in rate. This claim will be allowed only standard quantity (this was agreed quantity) and any variation in actual quantity will not be allowed for escalation claim

Material	Standard Qty	Standard Rate	Actual Rate	Variation in rate	Total
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
Escalation claim					1,60,000

Labour cost:
   - Claim will be allowed only to the extent of variation in rate. This claim will be allowed only standard hours (this was agreed quantity) and any variation in actual hours will not be allowed for escalation claim

Labour	Standard Time	Standard Rate	Actual Rate	Variation in rate	Total
L1	60,000	15	18	+3	+1,80,000
L2	40,000	30	35	+5	+2,00,000
Escalation claim					3,80,000

   - **Total escalation claim = 1,60,000 + 3,80,000 = Rs.5,40,000**

WN 2: Contract Account

Dr			Cr
Particulars	Amount	Particulars	Amount
To Material A (3,400 x 1,100)	37,40,000	By Contractee A/c (1,50,00,000 + 5,40,000)	1,55,40,000
To Material B (2,300 x 700)	16,10,000		
To Material C (600 x 3,900)	23,40,000		
To Material D (90 x 31,500)	28,35,000		
To Labour L1 (60,000 x 18)	10,08,000		
To Labour L2 (38,000 x 35)	13,30,000		
To Other expenses	13,45,000		
To estimated profit	**13,32,000**		
Total	**1,55,40,000**	**Total**	**1,55,40,000**

Additional Homework problems:
   ### 20. Contract Account:

AKP Builders Ltd. commenced a contract on April 1, 2012. The total contract was for **Rs.** 5,00,000. Actual expenditure for the period April 1, 2012 to March 31, 2013 and estimated expenditure for April 1, 2013 to December 31, 2013 are given below:

Particulars	2012-13 (Actual)	2013-14 (9 months) (estimated)
Materials issued	90,000	85,750
Labour: Paid	75,000	87,325
Outstanding at the end	6,250	8,300
Plant	25,000	-
Sundry expenses: Paid	7,250	6,875
Prepaid at the end	625	-
Establishment charges	14,625	-

A part of the material was unsuitable and was sold for **Rs.**18,125 (cost being **Rs.**15,000) and a part of plant was scrapped and disposed of for **Rs.**2,875. The value of plant at site on 31 March, 2013 was **Rs.** 7,750 and the value of material at site was **Rs.** 4,250. Cash received on account to date was **Rs.** 1,75,000, representing 80% of the work certified. The cost of work uncertified was valued at **Rs.** 27,375.

The contractor estimated further expenditure that would be incurred in completion of the contract:

- The contract would be completed by 31st December, 2013.
- A further sum of **Rs.**31,250 would have to be spent on the plant and the residual value of the plant on the completion of the contract would be **Rs.**3,750.
- Establishment charges would cost the same amount per month as in the previous year.
- **Rs.**10,800 would be sufficient to provide for contingencies.

Required: Prepare Contract Account and calculate estimated total profit on this contract.

Contract Account for the year of 2012-13:

Dr				Cr
Particulars	Amount	Particulars		Amount
To Materials	90,000	By material sold		18,125
To Labour (75,000 + 6,250)	81,250	By Plant sold		2,875
To Plant	25,000	By Plant at site		7,750
To Expenses (7,250 - 625)	6,625	By materials at site		4,250
To Establishment Charges	14,625	**By cost incurred till date**		**1,87,625**
To Profit on sale of material	3,125			
Total	**2,20,625**	**Total**		**2,20,625**
To Cost incurred till date	1,87,625	By Work Certified		2,18,750
To Profit and Loss A/c (Profit for the year)	**58,500**	By Work uncertified		27,375
Total	**22,75,000**	**Total**		**22,75,000**

Contract Account for the period of April 2012 to December 2013:

Dr			Cr
Particulars	Amount	Particulars	Amount
To Materials (90,000 + 85,750)	1,75,750	By material sold	18,125
To Labour (75,000 + 87,325 + 8,300)	1,70,625	By Plant sold	2,875
To Plant (25,000 + 31,250)	56,250	By Plant at site	3,750
To Sundry Expenses (7,250 + 6,875)	14,125	**By Estimated cost**	**4,31,519**
To establishment charges (14,625 x (21/12)	25,594		
To reserve for contingencies	10,800		
To Profit on sale of material	3,125		
Total	**4,56,269**	**Total**	**4,56,269**
To estimated cost of contract	4,31,519	By Contractee Account	5,00,000
To estimated profit (b/f)	**68,481**		
Total	**49,21,875**	**Total**	**49,21,875**

21. Contract Account:

A construction company undertook a contract at an estimated price of **Rs.** 108 lakhs, which includes a budgeted profit of **Rs.** 18 lakhs. The relevant data for the year ended 31.03.2014 are as under:

Particulars	Amount ('000s)

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 payments received	7,200

A special plant was purchased specifically for this contract at **Rs.** 8,00,000 and after use on this contract till the end of 31.02.2014, it was valued at **Rs.** 5,00,000. This cost of materials at site at the end of the year was estimated at **Rs.** 18,00,000. Direct wages accrued as on 31.03.2014 was **Rs.** 1,10,000.

Required

Prepare the Contract Account for the year ended 31st March, 2014

Answer:

Contract Account for the year ended March 31, 2014:

(in '000s)

Dr			Cr
Particulars	Amount	Particulars	Amount
To Opening WIP	0	By materials returned	100
To Material sent to site	5,000	By Plant at site	500
To Plant hired	700	By Materials at site	1,800
To Site office costs	270	**By Cost incurred till date**	**8,780**
To Direct expenses	500		
To Special plant	800		
To Direct wages (3,800 + 110)	3,910		
Total	**11,180**	**Total**	**11,00,000**
To Cost incurred till date	8,780	By Work certified	10,000
To Profit & Loss A/c (Profit for the year)	**1,220**	By Work uncertified	0
Total	**13,60,000**		**13,60,000**

22. **Contract Account:**

Dream House (P) Limited is engaged in building two residential housing projects in the city. Particulars related to two housing projects are as below:

Particulars	HP-1	HP-2
Work in progress as on April 1, 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 April 1 2013	72,000	57,000
Value of materials at site as on March 31, 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 April 1, 2013 for Rs.8,20,000 and used for 180 days in HP-1 and for 100 days in HP-2. Depreciation is provided at 15% p.a. (this machine can be used for any other projects). As per the contract agreement contracte shall retain 20% of work certified as retention money. Prepare contract account for the two housing projects showing the profit os loss on each project for the year ended 31st March, 2014.

Answer:

Contract Account for the year ended 31st March ,2014

Dr					Cr
Particulars	HP-1	HP-2	Particulars	HP-1	HP-2
To Opening WIP	7,80,000	2,80,000	By material at site	47,000	52,000

To Materials	6,20,000	8,10,000	By Cost incurred till date	15,39,658	11,63,599
To wages (incl outstanding)	97,000	70,400			
To Plant hire (Cost/3 years)	24,000	19,000			
To Depreciation (Note 1)	60,658	33,699			
To Donation (Note 2)	5,000	2,500			
Total	**15,86,658**	**12,15,599**	**Total**	**15,86,658**	**12,15,599**
To Cost incurred till date	15,39,658	11,63,599	By Work certified	20,50,000	16,10,000
To Costing P&L A/c (Profit for the year)	7,00,342	5,86,401	By work not certified	1,90,000	1,40,000
Total	**22,40,000**	**17,50,000**	**Total**	**22,40,000**	**17,50,000**

Note:

Note 1: Depreciation:
- Plant at site has not been recorded in this question as the same plant is used for multiple contracts. Hence, we have directly computed depreciation
- **Depreciation for HP -1 = 8,20,000 x 15% x (180/365) = Rs.60,658**
- **Depreciation for HP -2 = 8,20,000 x 15% x (100/365) = Rs.33,699**

Note 2: Donation:
- It is assumed that donation is exclusively related to contract and hence considered as part of contract cost. We can alternatively remove it from contract account and directly record in profit and loss account

Note 3: Other items:
- Land purchased, brokerage, registration fees cannot be charged to contract account as they are not exclusively related to contract.

CHAPTER 10: PROCESS & OPERATION COSTING

1. What is process costing and explain its application? **[Category B]**
   - ❖ Process costing is a type of costing under which the basic raw material goes through a series of distinctively identifiable process before emerging as finished product
   - ❖ At the end of each process a distinctively identifiable new product emerges. The output of the first process becomes the input of the subsequent process
   - ❖ Process costing involves finding out the cost of each of these processes. Process costing is used in the manufacturing of products like steel, paper, medicines, soaps, chemicals, rubber among others

Example:

Process	Input	Output
1	**Raw Cotton**	**Ginned Cotton**
2	**Ginned Cotton**	**Cotton Yarn**
3	**Cotton Yarn**	**Fabric**
4	**Fabric**	**Readymade Garment**

2. What are the steps to be followed in process costing without equivalent units? **[Category A]**

Step 1: Prepare Input-Output Statement:

Particulars	Units
Opening stock	XXX
Add: Input/transfer from previous process	XXX
Total Input	XXX
Less: Closing Stock	(XXX)
Processed Production	XXX
Less: Normal loss	(XXX)
Expected output (A)	XXX
Actual output (B)	XXX
Abnormal loss/gain (B-A)	XXX

Note:

❖ Normal loss is a scientifically determined loss. It is unavoidable and is part & parcel of each manufacturing process. It is computed either as a percentage of
  o Input
  o Total input
  o Processed Production
❖ Cost of normal loss is absorbed by good units produced under the process. The amount realized by the sale of normal process loss units should be credited to the process account
❖ Abnormal loss is the loss which is in excess of normal loss. It arises when the actual output is less than the expected output
❖ Cost of abnormal loss is equal to the cost of a good unit. Total cost of abnormal loss is credited to the process account and the net abnormal loss is then transferred directly to costing profit & loss account
❖ Abnormal gain is the extent to which the actual loss is less than the normal loss

Step 2: Proforma of Process Account:

Particulars	Units	Amount	Particulars	Units	Amount
To Material	XXX	XXX	By Normal loss	XXX	XXX
To Direct Labour		XXX	By Abnormal loss	XXX	XXX
To Overheads		XXX	By Transfer to next process	XXX	XXX
To Abnormal Gain	XXX	XXX			
Total	**XXX**	**XXX**	**Total**	**XXX**	**XXX**

Note:
Each line in the process account is identified as follows:
❖ Material, Labour and Overheads will be directly given in the question
❖ Abnormal Gain = Units * Cost Per Unit
❖ Normal Loss = Units * Realizable value per unit
❖ Abnormal Loss = Units * Cost Per Unit
❖ Transfer to next process = Units * Cost Per unit

CPU= Debit side of process a/c excluding abnormal gain – Sale value of normal loss **Expected Output**

3. Explain the accounting treatment of normal and abnormal loss? **[Category A]**

Particulars	Normal Loss	Abnormal Loss	Abnormal Gain
Recording of item	Normal loss A/c Dr To Process A/c	Abnormal loss A/c Dr To Process A/c	Process A/c Dr To Abnormal gain
Sale entry	Bank A/c Dr To Normal loss A/c	Bank A/c Dr To Abnormal loss A/c	-
Transfer of Abnormal gain to Normal loss	Abnormal Gain A/c To Normal Loss A/c	-	Abnormal Gain A/c To Normal Loss A/c
Transfer to net gain/loss to costing P&L	-	Costing P&L A/c Dr To Abnormal loss	Abnormal Gain Dr To Costing P&L

4. What is equivalent unit and explain the steps to be followed in process costing? **[Category A]**
❖ Equivalent unit concept can be used for valuation of units which are in progress. According to this 300 units which are 60 percent complete can be regarded as equivalent to 180 fully completed units
❖ Equivalent units = Total units * Degree of Completion

Scenario 1 – FIFO Method – One Material:
Step 1: Prepare Input-Output Statement:

Particulars	Units
Opening WIP	XXX
Add: Input/transfer from previous process	XXX
Total Input	XXX

Less: Closing WIP	(XXX)
Processed Production	XXX
Less: Normal loss	(XXX)
Expected output (A)	XXX
Actual output (B)	XXX
Abnormal loss/gain (B-A)	XXX

Step 2: Statement of units started and completed:

Particulars	Units
Transfer to next process	XXX
Less: Opening WIP	(XXX)
Units started and completed	XXX

Step 3: Statement of equivalent units:

Particulars	Units	DOC	Equivalent units	Remarks
Further work on opening WIP	Step 1	XXX	XXX	100 – Given %
Units started and completed	Step 2	100%	XXX	100%
Normal loss	Step 1	0%	0	0%
Abnormal loss	Step 1	XXX	XXX	Given %
Abnormal gain	(Step 1)	100%	(XXX)	100% with units written in negative
Closing WIP	Step 1	XXX	XXX	Given %
Total	**XXX**		**XXX**	

Note:
- ❖ The total of the units column should be equal to total input of Step 1
- ❖ The equivalent units need to be computed for each component of cost namely material, labour and overheads

Step 4: Statement of cost per unit:

Particulars	Material	Labour	Overheads
Cost incurred	XXX	XXX	XXX
Less: Sale value of normal loss	(XXX)		
Net cost incurred	XXX	XXX	XXX
Equivalent units	XXX	XXX	XXX
Cost per equivalent unit	XXX	XXX	XXX

Step 5: Statement of Valuation:

Particulars	Material	Labour	Overheads	Total
Further work on opening WIP				
Units started and completed				
Abnormal loss				
Abnormal gain				
Closing WIP				
Total				

- ❖ Each item is valued by taking units from step 3 and cost per unit from step 4
- ❖ Transfer to next process = Opening WIP + Further work on Opening WIP + Units started and completed

Step 6: Prepare Process Account in the normal manner

Scenario 2 – Average Cost Method – One Material:
Following are the changes required in average cost method:
- ❖ Step 1 – No change
- ❖ Step 2 – Not required

❖ Step 3 – Opening WIP and units started and completed is replaced with transfer to next process. DOC to be taken up is 100%
❖ Step 4 – Opening WIP is considered for calculating the cost per unit and the format for the same is provided as under:

Particulars	Material	Labour	Overheads
Opening WIP	XXX	XXX	XXX
Cost incurred	XXX	XXX	XXX
Less: Sale value of normal loss	(XXX)		
Net cost incurred	**XXX**	**XXX**	**XXX**
Equivalent units	XXX	XXX	XXX
Cost per equivalent unit	**XXX**	**XXX**	**XXX**

❖ Step 5 – No change
❖ Step 6 – No change

Scenario 3 – FIFO Method – Two Materials:

❖ Two materials refer to a situation where there is a transfer of material from previous process and addition of material in the current process
❖ Material received from previous process is called as material A and material added in the current process is called as material B

Following changes are required while evaluating two materials problem:

Step 1	No Change
Step 2	No change

Step 3	✓ Material column is split as Material A and Material B
	✓ DOC of Material B is taken as per the DOC given in the question
	✓ DOC of Material A is taken as per pre-determined rule and the same is summarized below
	   o Opening WIP = 0%
	   o Units started and completed = 100%
	   o Normal loss = 0%
	   o Abnormal loss and gain = 100%
	   o Closing WIP = 100%

Step 4	✓ Material column is split as Material A and Material B ✓ Sale value of normal loss is deducted from Material A
Step 5	No change
Step 6	No change

Scenario 4 – Average Cost Method – Two Materials:

❖ Same set of changes as we moved from FIFO one material to FIFO two material

5. Which method to adopt for WIP valuation? **[Category B]**
❖ If the breakup of opening WIP in terms of various costs are given then average stock method is used
❖ If the DOC of opening WIP is given then FIFO method can be used
❖ If both details are available then either of the two methods can be used

6. What are inter-process profits? **[Category B]**
❖ In some process industries output of one process is transferred to the next process at market value or cost plus a percentage of profit. The difference between the cost and transfer price is known as inter-process profits
❖ **Advantages:** Comparison between cost and its market price is facilitated at every stage; profitability of each process is computed separately
❖ **Disadvantages:** Use of inter-process profits involve complication and it can show profits which are not realized

7. What is operation costing? **[Category A]**
❖ Operation costing is used when an entity produces more than one variant of final product using different materials but with similar conversion activities

❖ Operation costing is also known as hybrid product costing system as material costs are accumulated by job order or batch wise but conversion costs are accumulated by department and process costing methods are used to assign these costs to products

❖ **Example: Ready-made garments, shoe making, jewellery**

1. **Comprehensive sum with losses** - Production in a manufacturing company passes through three distinct processes I, II and III. The output of each process is transferred to the next process and the output of process III is transferred to finished goods stock. The normal wastage in each process and the realisable value of the same are given below:

Process	% of normal waste	Realizable value per unit
I	5	0.70
II	7	0.80
III	10	1.00

The details of cost data and output for a month are as follows:

Particulars	Process I	Process II	Process III
Material consumed	1,20,000	40,000	40,000
Direct Labour cost	80,000	60,000	60,000
Production expenses	40,000	40,000	28,000
Output	38,000	34,600	32,000

Process I was fed with 40,000 units of input costing Rs. 3,20,000. There were no opening of closing work progress. Prepare the process accounts for the month.

Answer:

WN 1: Input-output statement:

Particulars	Process I	Process II	Process III
Opening stock	0	0	0
Add: Input	40,000	38,000	34,600
Total Input	**40,000**	**38,000**	**34,600**
Less: Closing stock	0	0	0
Processed Production	**40,000**	**38,000**	**34,600**
Less: Normal loss	-2,000	-2,660	-3,460
Expected Output	**38,000**	**35,340**	**31,140**
Actual Output	38,000	34,600	32,000
Abnormal loss/gain	**0**	**740**	**860**
		(Abnormal loss)	(Abnormal gain)

WN 2: Process I Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Opening stock	-	-	By Normal loss A/c	2,000	1,400
To Material	40,000	3,20,000	**By Process II A/c**	**38,000**	**5,58,600**
To Sundry material	-	1,20,000			
To Direct Labour		80,000			
To Production expenses		40,000			
Total	**40,000**	**5,60,000**		**40,000**	**5,60,000**

Note:

$$\text{Cost per Good Unit} = \frac{\text{Debit side of Process Account excl abnormal gain} - \text{Sale Value of Normal loss}}{\text{Expected Output}}$$

$$\text{Cost per Good Unit} = \frac{5,60,000 - 1,400}{38,000} = \mathbf{14.70\ per\ unit}$$

WN 3: Process II Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Opening stock	-	-	By Normal loss	2,660	2,128
To Process I A/c	38,000	5,58,600	By Abnormal loss	740	14,584
To Sundry material		40,000	**By Process III**	**34,600**	**6,81,888**
To Direct Labour		60,000			
To Production expenses		40,000			
	38,000	**6,98,600**		**38,000**	**6,98,600**

Note:

$$\text{Cost per Good Unit} = \frac{\text{Debit side of Process Account excl abnormal gain} - \text{Sale Value of Normal loss}}{\text{Expected Output}}$$

$$\text{Cost per Good Unit} = \frac{6,98,600 - 2,128}{35,340} = \mathbf{19.7078 \text{ per unit}}$$

WN 4: Process III Account:

Dr					Cr
Particulars	**Units**	**Amount**	**Particulars**	**Units**	**Amount**
To Opening stock	-	-	By Normal loss	3,460	3,460
To Process II A/c	34,600	6,81,888	**By FG Control A/c**	**32,000**	**8,28,699**
To Sundry material		40,000			
To Direct Labour		60,000			
To Production expenses		28,000			
To Abnormal gain	860	22,271			
Total	**35,460**	**8,32,159**	**Total**	**35,460**	**8,32,159**

Note:

$$\text{Cost per Good Unit} = \frac{\text{Debit side of Process Account excl abnormal gain} - \text{Sale Value of Normal loss}}{\text{Expected Output}}$$

$$\text{Cost per Good Unit} = \frac{8,09,888 - 3,460}{31,140} = \mathbf{25.8969 \text{ per unit}}$$

WN 5: Normal loss, abnormal loss and abnormal gain account:

Normal Loss Account:

Dr					Cr
Particulars	**Units**	**Amount**	**Particulars**	**Units**	**Amount**
To Process I A/c	2,000	1,400	By Bank A/c	2,000	1,400
To Process II A/c	2,660	2,128	By Bank A/c	2,660	2,128
To Process III A/c	3,460	3,460	By Bank A/c	2,600	2,600
			By Abnormal gain A/c	860	860
Total	**8,120**	**6,988**	**Total**	**8,120**	**6,988**

Abnormal Loss Account:

Dr					Cr
Particulars	**Units**	**Amount**	**Particulars**	**Units**	**Amount**
To Process II A/c	740	14,584	By Bank	740	592
			By Profit and Loss A/c		**13,992**
Total	**740**	**14,584**	**Total**	**740**	**14,584**

Abnormal Gain Account:

Dr					Cr
Particulars	**Units**	**Amount**	**Particulars**	**Units**	**Amount**
To Normal Loss A/c	860	860	By Process III A/c	860	22,271
To Profit and Loss A/c		21,411			
Total	**860**	**22,271**	**Total**	**860**	**22,271**

Sequence of events:

Entries relating to process 1:

•   Completion of double entry posting
Sale of actual loss:
•   Actual loss = Processed production – Actual output
•   Actual loss = 40,000 – 38,000 = 2,000
•   Break-up of actual loss:
o   Normal loss = 2,000 units
o   Abnormal loss = 0 units
Bank A/c   Dr   1,400 (2,000 x 0.7)
To Normal loss A/c   **1,400 (2,000 x 0.7)**

Entries relating to process 2:

• Completion of double entry posting
Sale of actual loss:
• Actual loss = Processed production – Actual output
• Actual loss = 38,000 – 34,600 = 3,400 units
• Break-up of actual loss:
o Normal loss = 2,660 units
o Abnormal loss = 740 units
Bank A/c Dr 2,720 (3,400 x 0.8)
To Normal loss A/c   2,128 (2,660 x 0.8)
To Abnormal loss A/c   592 (740 x 0.8)
Transfer of actual loss to Profit and Loss A/c
Profit and Loss A/c Dr   13,992
To Abnormal Loss A/c   13,992

Entries relating to process 3:

• Completion of double entry posting
Sale of actual loss:
• Actual loss = Processed production – Actual output
• Actual loss = 34,600 – 32,000 = 2,600 units
• **Break-up of actual loss:**
o Normal loss = 3,460 units
o Abnormal gain = -860 units
Bank A/c   Dr 2,600 (2,600 x 1)
Abnormal gain A/c Dr 860 (860 x 1)
To Normal loss A/c   3,460 (3,460 x 1)
Transfer of actual gain to Profit and Loss A/c
Abnormal gain A/c Dr   21,411
To Profit and Loss A/c   21,411

2. RST Limited processes product Z through two distinct process – Process I and Process II. On completion, it is transferred to finished stock. From the following information for the year 2006-07, prepare Process I, Process II and Finished Stock A/c:

Particulars	Process – I	Process – II
Raw materials used	7,500 units	
Raw materials cost per unit	60	
Transfer to next process/finished stock	7,050 units	6,525 units
Normal loss (on inputs)	5%	10%
Direct wages	1,35,750	1,29,250
Direct expenses	60% of direct wages	65% of direct wages
Manufacturing overheads	20% of direct wages	15% of direct wages
Realizable value of scrap per unit	Rs.12.50	Rs.37.50

6,000 units of finished goods were sold at a profit of 15% on cost. Assume that there was no opening or closing stock of work-in-progress.

Answer:

WN 1: Input-output statement:

Particulars	Process I	Process II
Opening stock	0	0
Add: Input	7,500	7,050
Total Input	**7,500**	**7,050**
Less: Closing stock	0	0
Processed Production	**7,500**	**7,050**
Less: Normal loss	-375	-705
Expected Output	**7,125**	**6,345**
Actual Output	7,050	6,525
Abnormal loss/gain	**75**	**180**

	(Ab loss)	(Ab gain)

WN 2: Process I Account:

Dr			Particulars	Units	Cr Amount
Particulars	Units	Amount	Particulars	Units	Amount
To Opening stock	-	-	By Normal loss	375	4,688
To Material	7,500	4,50,000	By Abnormal loss	75	7,260
To Direct Labour		1,35,750	**By Process II A/c**	**7,050**	**6,82,402**
To Direct expenses		81,450			
To Mfg overheads		27,150			
	7,500	**6,94,350**		**7,500**	**6,94,350**

Note:

$$\text{Cost per Good Unit} = \frac{\text{Debit side of Process Account excl abnormal gain} - \text{Sale Value of Normal loss}}{\text{Expected Output}}$$

$$\text{Cost per Good Unit} = \frac{6,94,350 - 4,688}{7,125} = \textbf{96.7947 per unit}$$

WN 3: Process II Account:

Dr			Particulars	Units	Cr Amount
Particulars	Units	Amount	Particulars	Units	Amount
To Opening stock	-	-	By Normal loss	705	26,438
To Process I A/c	7,050	6,82,402	By Finished Stock A/c	6,525	9,13,823
To Direct Labour		1,29,250			
To Direct expenses		84,013			
To Mfg overheads		19,387			
To Abnormal gain	180	25,209			
Total	**7,230**	**9,40,261**	Total	**7,230**	**9,40,261**

Note:

$$\text{Cost per Good Unit} = \frac{\text{Debit side of Process Account excl abnormal gain} - \text{Sale Value of Normal loss}}{\text{Expected Output}}$$

$$\text{Cost per Good Unit} = \frac{9,15,052 - 26,438}{6,345} = \textbf{140.0495 per unit}$$

WN 4: Finished Stock Account:

Dr			Particulars	Units	Cr Amount
Particulars	Units	Amount	Particulars	Units	Amount
To Process II A/c	6,525	9,13,823	By Sales	6,000	9,66,342
To Profit and Loss A/c		1,26,045	By Balance c/d	525	73,526
Total	**6,525**	**10,39,868**	Total	**6,525**	**10,39,868**

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

Particulars	Process-A	Process-B	Process-C
Units issued/introduced	10,000 @ 100 per unit		
Sundry materials	10,000	15,000	5,000
Labour	30,000	80,000	65,000
Direct expenses	6,000	18,150	27,200
Selling price	10	165	250

Management expenses during the year were Rs. 80,000 and selling expenses were Rs. 50,000 These are not allocable to the processes. Actual output of the three processes was: A – 9,300 units, B-5, 400 units and C-2, 100 units. Two third of the output of Process A and one half of the output of Process B was passed on to the next process and the balance was sold. The entire output of process C was sold. The normal loss of the three processes, calculated on the input of every process was: Process A-5%; B-15% and C-20% The Loss of Process A was sold at Rs. 2 per unit, that of B at Rs. 5 per unit and of Process C at Rs. 10 per unit. Prepare the Three Processes Accounts and the Profit and Loss Account.

Answer:

WN 1: Input -output statement:

Particulars	Process I	Process II	Process III
Opening stock	0	0	0
Add: Input	10,000	6,200 (9,300 x 2/3)	2,700 (5,400 x 1/2)
Total Input	**10,000**	**6,200**	**2,700**
Less: Closing stock	0	0	0
Processed Production	**10,000**	**6,200**	**2,700**
Less: Normal loss	-500	-930	-540
Expected Output	**9,500**	**5,270**	**2,160**
Actual Output	9,300	5,400	2,100
Abnormal loss/gain	**200 (Ab loss)**	**130 (Ab gain)**	**60 (Ab loss)**

WN 2: Process I Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To opening stock	-	-	By Normal loss	500	1,000
To Material	10,000	10,00,000	By Abnormal loss	200	22,000
To Sundry material		10,000	By Sales A/c	3,100	3,72,000
To Labour		30,000	By Process II A/c	6,200	6,82,000
To Direct expenses		6,000			
To Profit and Loss A/c (3,100 x 10)		**31,000**			
Total	**10,000**	**10,77,000**	**Total**	**10,000**	**10,77,000**

Note:

$$\text{Cost per Good Unit} = \frac{\text{Debit side of Process Account excl abnormal gain} - \text{Sale Value of Normal loss}}{\text{Expected Output}}$$

$$\text{Cost per Good Unit} = \frac{10,46,000 - 1,000}{9,500} = \textbf{110 per unit}$$

WN 3: Process II Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Opening stock	-	-	By Normal loss	930	4,650
To Process I A/c	6,200	6,82,000	By Sales	2,700	4,45,500
To Sundry materials		15,000	By Process III A/c	2,700	4,05,000
To Labour		80,000			
To Direct expenses		18,150			
To Abnormal gain	130	19,500			
To Profit and Loss A/c (2,700 x 15)		40,500			
Total	**6,330**	**8,55,150**		**6,330**	**8,55,150**

Note:

$$\text{Cost per Good Unit} = \frac{\text{Debit side of Process Account excl abnormal gain} - \text{Sale Value of Normal loss}}{\text{Expected Output}}$$

$$\text{Cost per Good Unit} = \frac{7,95,150 - 4,650}{5,270} = \textbf{150 per unit}$$

WN 4: Process III Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Opening stock	-	-	By Normal loss	540	5,400
To Process II A/c	2,700	4,05,000	By Abnormal loss	60	13,800
To Sundry materials		5,000	By Sales	2,100	5,25,000
To Labour		65,000			
To Direct expenses		27,200			

To Profit and Loss A/c (2,100 x 20)		42,000			
Total	**2,700**	**5,44,200**		**2,700**	**5,44,200**

Note:

$$\text{Cost per Good Unit} = \frac{\text{Debit side of Process Account excl abnormal gain} - \text{Sale Value of Normal loss}}{\text{Expected Output}}$$

$$\text{Cost per Good Unit} = \frac{5,02,200 - 5,400}{2,160} = \textbf{230 per unit}$$

WN 5: Profit and Loss Account:

Dr				Cr
Particulars	**Amount**	**Particulars**		**Amount**
To Management expenses	80,000	By Process I A/c		31,000
To Selling expenses	50,000	By Process II A/c		40,500
To Abnormal loss (200 x (110 – 2))	21,600	By Process III A/c		42,000
To Abnormal loss (60 x (230 – 10))	13,200	By Abnormal gain (130 x (150 – 5))		18,850
		By Loss for the year		**32,450**
Total	**1,64,800**	**Total**		**1,64,800**

4. **External sales in process:**

MJ Private Limited produces a product "SKY" passes through two processes, Process-A and Process-B. The details for the year ending 31st March, 2014 are as follows:

Particulars	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:

- 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
- Indirect expenses for the year was Rs.4,48,080
- 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 and Loss Account

Answer:

WN 1: Input -output statement:

Particulars	Process A	Process B
Opening stock	0	0
Add: Input	40,000	29,600
		(37,000 x 80%)
Total Input	**40,000**	**29,600**
Less: Closing stock	0	0
Processed Production	**40,000**	**29,600**
Less: Normal loss	-2,000	-2,960
Expected Output	**38,000**	**26,640**
Actual Output	37,000	27,000
Abnormal loss/gain	**1,000**	**360**
	(Ab loss)	**(Ab gain)**

WN 2: Process A Account:

Dr					Cr
Particulars	**Units**	**Amount**	**Particulars**	**Units**	**Amount**
To opening stock	-	-	By Normal loss	2,000	30,000

To Material	40,000	3,60,000	By Abnormal loss	1,000	27,000
To Sundry material		2,42,000	By Process B A/c	29,600	7,99,200
To Labour		2,58,000	By Cost of Sales A/c	7,400	1,99,800
To Manufacturing expenses		1,96,000			
Total	**40,000**	**10,56,000**	**Total**	**40,000**	**10,56,000**

Note:

$$\text{Cost per Good Unit} = \frac{\text{Debit side of Process Account excl abnormal gain} - \text{Sale Value of Normal loss}}{\text{Expected Output}}$$

$$\text{Cost per Good Unit} = \frac{10,56,000 - 30,000}{38,000} = \textbf{27 per unit}$$

Individual Processes are not responsibility centres and hence sales will not be recorded in individual process Accounts.

WN 3: Process B Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Opening stock	-	-	By Normal loss	2,960	59,200
To Process A A/c	29,600	7,99,200	By Cost of Sales A/c	27,000	12,96,000
To Sundry materials		2,25,000			
To Labour		1,90,000			
To Manufacturing expenses		1,23,720			
To Abnormal gain	360	17,280			
Total	**29,960**	**13,55,200**		**29,960**	**13,55,200**

Note:

$$\text{Cost per Good Unit} = \frac{\text{Debit side of Process Account excl abnormal gain} - \text{Sale Value of Normal loss}}{\text{Expected Output}}$$

$$\text{Cost per Good Unit} = \frac{13,37,920 - 59,200}{26,640} = \textbf{48 per unit}$$

WN 4: Profit and Loss Account:

Dr			Cr
Particulars	Amount	Particulars	Amount
To Cost of sales (Process 1 A/c)	1,99,800	By Sales (Process 1 A/c) (7,400 x 37)	2,73,800
To Cost of sales (Process 2 A/c)	12,96,000	By Sales (Process 2 A/c) (27,000 x 61)	16,47,000
To Abnormal loss (1,000 x (27 – 15)	1,200	By Abnormal gain (360 x (48 – 20))	10,080
To Indirect expenses	4,48,080	**By Loss for the year**	**25,000**
Total	**19,55,080**	**Total**	**19,55,080**

Equivalent production – FIFO

5. Following details are related to the work done in Process 'A' of XYZ Company during the month of March, 2007:

Opening work in process (2,000 units)	1,40,000
Materials	100%
Labour	75%
Overheads	75%
Material 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
Normal loss	5% of total input
Realizable value of scrap	Rs.20 per unit

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.

Answer:

WN 1: Input-output statement:

Particulars	Units
Opening WIP	2,000
Add: Input	38,000
Total Input	**40,000**
Less: Closing WIP	-2,000
Processed Production	**38,000**
Less: Normal loss	-2,000
Expected Output	**36,000**
Actual Output	35,000
Abnormal loss	**1,000**

WN 2: Statement of units started and completed:

Particulars	Units
Transfer to next process	35,000
Less: Opening WIP	-2,000
Units started and completed	**33,000**

WN 3: Statement of equivalent production:

Particulars	Units	Material DOC	Material EU	Labour DOC	Labour EU	Overheads DOC	Overheads EU
Opening WIP	2,000	0%	0	25%	500	25%	500
Units started and completed	33,000	100%	33,000	100%	33,000	100%	33,000
Closing WIP	2,000	100%	2,000	80%	1,600	80%	1,600
Normal loss	2,000	0%	0	0%	0	0%	0
Abnormal loss	1,000	100%	1,000	80%	800	80%	800
Total	**40,000**		**36,000**		**35,900**		**35,900**

WN 4: Statement of cost:

Particulars	Material	Labour	Overheads
Cost incurred	14,80,000	3,59,000	10,77,000
Less: Sale value of Normal loss	(40,000)		
Net cost incurred	**14,40,000**	**3,59,000**	**10,77,000**
Equivalent units (WN 3)	36,000	35,900	35,900
Cost per Equivalent unit	**40**	**10**	**30**

WN 5: Statement of distribution of cost/Statement of valuation:

Particulars	Material	Labour	Overheads	Total
Opening WIP	0	5,000	15,000	20,000
Units started and completed	13,20,000	3,30,000	9,90,000	26,40,000
Closing WIP	80,000	16,000	48,000	1,44,000
Abnormal loss	40,000	8,000	24,000	72,000
Total	**14,40,000**	**3,59,000**	**10,77,000**	

- Transfer to next process = Opening WIP + Units started and completed
- Opening WIP = Work done last year (question) + Work done current year (WN 5)

- Opening WIP = 1,40,000 + 20,000 = Rs.1,60,000
- **Transfer to next process = 1,60,000 + 26,40,000 = Rs.28,00,000**

WN 6: 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 Materials	38,000	14,80,000	By Abnormal loss	1,000	72,000
To Direct Labour		3,59,000	By Process B A/c	35,000	28,00,000
To Overheads		10,77,000	By Closing WIP	2,000	1,44,000
Total	**40,000**	**30,56,000**	**Total**	**40,000**	**30,56,000**

WN 7: Normal Loss Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Process A A/c	2,000	40,000	By Bank A/c	2,000	40,000
Total	**2,000**	**40,000**	**Total**	**2,000**	**40,000**

WN 8: Abnormal Loss Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Process A A/c	1,000	72,000	By Bank	1,000	20,000
			By Profit and Loss A/c		**52,000**
Total	**1,000**	**72,000**	**Total**	**1,000**	**72,000**

6. **FIFO Method for 2 processes**

A Company produces a component, which passes through two processes. During the month of April, 2006, 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:

Particulars	Amount
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:

Particulars	Amount
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.

Answer:

WN 1: Input-output statement:

Particulars	Process I	Process II
Opening WIP	-	-
Add: Input	40,000	30,000
Total input	40,000	30,000
Less: Closing WIP	-10,000	-1,800

Processed production	30,000	28,200
Less: Normal loss	-	-200
Expected output	30,000	28,000
Actual output	30,000	28,000
Abnormal loss/gain	-	-

WN 2: Statement of units started and completed:
- There is no opening stock in this question and hence method of inventory valuation does not impact answer. We have solved the answer using steps of FIFO Method.

Particulars	Process I	Process II
Transfer to next process	30,000	28,000
Less: Opening WIP	-	-
Units started and completed	**30,000**	**28,000**

WN 3: Statement of equivalent units of Process 1:

Particulars	Units	Material DOC	Material EU	Labour DOC	Labour EU	Overheads DOC	Overheads EU
Units started and 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		35,000		35,000

WN 4: Statement of cost per unit of Process 1:

Particulars	Materials	Labour	Overheads
Cost incurred	15,000	18,000	12,000
Equivalent units	40,000	35,000	35,000
Cost per equivalent unit	0.375	0.5143	0.3429

WN 5: Statement of valuation/distribution of cost of Process 1:

Particulars	Materials	Labour	Overheads	Total
Units started and completed	11,250	15,429	10,287	36,966
Closing WIP	3,750	2,572	1,715	8,037
Total	15,000	18,001	12,002	

WN 6: Process 1 Account:

Process I Account					
Particulars	Units	Amount	Particulars	Units	Amount
To Materials	40,000	15,000	BY process II	30,000	36,963
To labour		18,000	By closing WIP	10,000	8,037
To overheads		12,000			
Total	**40,000**	**45,000**		**40,000**	**45,000**

WN 7: Process 2 Account:

Process II Account					
Particulars	Units	Amount	Particulars	Units	Amount
To Process I	30,000	36,963	By Finished stock A/c (WN 10)	28,000	46,604
To Packing Material		4,000	By closing WIP (WN 10)	1,800	2,359
To Direct Wages		3,500	By Normal Loss	200	0
To Factory Overheads		4,500			
Total	**30,000**	**48,963**	**Total**	**30,000**	**48,963**

Note: This is a scenario of two materials with transfer from previous process being the main material and packing material being the sundry material.

WN 8: Statement of equivalent units of Process 2:

Particulars	Units	Material A	Material B	Labour	Overheads

		DOC	EU	DOC	EU	DOC	EU	DOC	EU
Units started and completed	28,000	100%	28,000	100%	28,000	100%	28,000	100%	28,000
Closing WIP	1,800	100%	1,800	0%	0	25%	450	25%	450
Normal loss	200	0%	0	0%	0	0%	0	0%	0
Total	**30,000**		**29,800**		**28,000**		**28,450**		**28,450**

Note: Packing material is applied only to completed components and hence DOC of Material B for closing WIP is zero.

WN 9: Statement of cost per unit of Process 2:

Particulars	Material 1	Material 2	Labour	Overheads
Cost incurred	36,963	4,000	3,500	4,500
Equivalent units	29,800	28,000	28,450	28,450
Cost per unit	**1.2404**	**0.1429**	**0.1230**	**0.1582**

WN 10: Statement of valuation/distribution of cost of Process 2:

Particulars	Material 1	Material 2	Labour	Overheads	Total
Units started and completed	34,731	4,000	3,444	4,430	46,605
Closing WIP	2,233	0	55	71	2,359
	36,964	4,000	3,499	4501	

7. **Equivalent Production (FIFO) with two materials:**

From the following Information for the month ending October, 2005, prepare Process Cost accounts for Process III. Use First-in-fist-out (FIFO) method to value equivalent production.

Opening WIP	2,000 units at Rs.25,750
Transfer from Process II	53,000 units at Rs.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:

Particulars	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 Rs. 3 per unit.

Answer:

WN 1: Process III Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Opening WIP	2,000	25,750	By Normal loss	2,500	7,500
To Process II A/c	53,000	4,11,500	By Process IV	48,000	7,19,750
To Direct Material		1,97,600	By Closing WIP	5,000	61,500
To Direct Wages		97,600			
To Production overheads		48,800			
To Abnormal gain	500	7,500			
Total	**55,550**	**7,88,750**		**55,500**	**7,88,750**

WN 2: Input-output statement:

Particulars	Units
Opening WIP	2,000
Add: Input	53,000
Total Input	**55,000**
Less: Closing WIP	-5,000

Processed Production	**50,000**
Less: Normal loss	-2,500
Expected Output	**47,500**
Actual Output	48,000
Abnormal gain	**500**

WN 3: Statement of units started and completed:

Particulars	Units
Transfer to next process	48,000
Less: Opening WIP	-2,000
Units started and completed	**46,000**

WN 4: Statement of equivalent units

Particulars	Units	Material A DOC	Material A EU	Material B DOC	Material B EU	Labour DOC	Labour EU	Overheads DOC	Overheads EU
Opening WIP	2,000	0%	0	20%	400	40%	800	40%	800
Units started and completed	46,000	100%	46,000	100%	46,000	100%	46,000	100%	46,000
Closing WIP	5,000	100%	5,000	70%	3,500	50%	2,500	50%	2,500
Normal loss	2,500	0%	0	0%	0	0%	0	0%	0
Abnormal gain	-500	100%	-500	100%	-500	100%	-500	100%	-500
Total	**55,000**		**50,500**		**49,400**		**48,800**		**48,800**

WN 5: Statement of cost:

Particulars	Material A	Material B	Labour	Overheads
Cost incurred	4,11,500	1,97,600	97,600	48,800
Less: Sale value of Normal loss	(7,500)	-	-	-
Net cost incurred	**4,04,000**	**1,97,600**	**97,600**	**48,800**
Equivalent units (WN 4)	50,500	49,400	48,800	48,800
Cost per Equivalent unit	**8**	**4**	**2**	**1**

WN 6: Statement of distribution of cost/Statement of valuation:

Particulars	Material A	Material B	Labour	Overheads	Total
Opening WIP	0	1,600	1,600	800	4,000
Units started and completed	3,68,000	1,84,000	92,000	46,000	6,90,000
Closing WIP	40,000	14,000	5,000	2,500	61,500
Abnormal Gain	-4,000	-2,000	-1,000	-500	-7,500
Total	**4,04,000**	**1,97,600**	**97,600**	**48,800**	

- Transfer to next process = Opening WIP + Units started and completed
- Opening WIP = Work done last year (question) + Work done current year (WN 4)
- Opening WIP = 25,750 + 4,000 = Rs.29,750
- **Transfer to next process = 29,750 + 6,90,000 = Rs.7,19,750**

8. **Equivalent Production – Average Cost Method:**

ABC Limited manufactures a product 'ZX' by using the process namely RT. For the month of May, 2007, the following data are available:

Material introduced (units)	16,000
Transfer to next process (units)	14,400
Work in process:	
At the beginning of the month (units) (4/5 completed)	4,000
At the end of the month (units) (2/3 completed)	3,000
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 goods 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:
- Statement of equivalent production (average cost method)
- Statement of cost and distribution of cost
- Process Account

Answer:

WN 1: Process RT Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Opening WIP	4,000	59,200	By Normal loss	1,440	0
To Materials	16,000	1,20,000	By Abnormal loss	1,160	21,926
To Conversion cost		1,60,800	By Next process	14,400	2,72,188
			By Closing WIP	3,000	45,886
Total	**20,000**	**3,40,000**	**Total**	**20,000**	**3,40,000**

WN 2: Input-output statement:

Particulars	Units
Opening WIP	4,000
Add: Input	16,000
Total Input	**20,000**
Less: Closing WIP	-3,000
Processed Production	**17,000**
Less: Normal loss	-1,440
Expected Output	**15,560**
Actual Output	14,400
Abnormal loss	**1,160**

WN 3: Statement of equivalent production:

Particulars	Units	Material		Conversion cost	
		DOC	EU	DOC	EU
Transfer to next process	14,400	100%	14,400	100%	14,400
Normal loss	1,440	0%	0	0%	0
Abnormal loss	1,160	100%	1,160	100%	1,160
Closing WIP	3,000	100%	3,000	66.67%	2,000
Total	**20,000**		**18,560**		**17,560**

WN 4: Statement of cost:

Particulars	Material	Conversion cost
Opening WIP	30,000	29,200
Cost incurred during the period	1,20,000	1,60,800
Less: Sale value of Normal loss	0	
Net cost incurred	**1,50,000**	**1,90,000**
Equivalent units (WN 3)	18,560	17,560
Cost per Equivalent unit	**8.0819**	**10.8200**

WN 5: Statement of distribution of cost/Statement of valuation:

Particulars	Material	Conversion cost	Total
Transfer to next process	1,16,379	1,55,808	**2,72,187**
Abnormal loss	9,375	12,551	**21,926**
Closing WIP	24,246	21,640	**45,886**

Total	1,50,000	1,89,999	

9. **The** following information is available in respect of process 2 for a month. Prepare necessary accounts.

Opening stock	1,000 units
Value of opening stock:	
Material 1	4,000
Material 2	2,000
Wages	350
Overheads	800
Transfer from process 1 – 16,000 units	81,000
Material added during the process	43,750
Labour cost	14,300
Overheads	28,500
Normal loss	5% of production
Units scraped	500 units
Stage of completion of scrap:	
Materials	100%
Labour	60%
Overheads	20%
Closing stock	2,000 units
Stage of completion of WIP:	50%
Materials	50%
Labour	20%
Overheads	20%
Scrap rate	Rs. 5 per unit

Answer:

WN 1: Process 2 Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Opening WIP	1,000	7,150	By Normal loss	750	3,750
To Process 1	16,000	81,000	By Next process	14,500	1,59,500
To Materials		43,750	By Closing WIP	2,000	14,200
To Labour		14,300			
To Overheads		28,500			
To Abnormal gain	250	2,750			
Total	**17,250**	**1,77,450**	**Total**	**17,250**	**1,77,450**

WN 2: Input-output statement:

Particulars	Units
Opening WIP	1,000
Add: Input	16,000
Total Input	**17,000**
Less: Closing WIP	-2,000
Processed Production	**15,000**
Less: Normal loss	-750
Expected Output	**14,250**
Actual Output (b/f)	14,500
Abnormal gain	**250**

WN 3: Statement of equivalent production:

Particulars	Units	Material 1		Material 2		Labour		Overheads	
		DOC	EU	DOC	EU	DOC	EU	DOC	EU
Transfer to next process	14,500	100%	14,500	100%	14,500	100%	14,500	100%	14,500
Closing WIP	2,000	100%	2,000	50%	1,000	20%	400	20%	400
Normal loss	750	0%	0	0%	0	0%	0	0%	0

Abnormal gain	-250	100%	-250	100%	-250	100%	-250	100%	-250
Total	**17,000**		**16,250**		**15,250**		**14,650**		**14,650**

WN 4: Statement of cost:

Particulars	Material 1	Material 2	Labour	Overheads
Opening WIP	4,000	2,000	350	800
Cost incurred during the period	81,000	43,750	14,300	28,500
Less: Sale value of Normal loss	-3,750			
Net cost incurred	**81,250**	**45,750**	**14,650**	**29,300**
Equivalent units (WN 3)	16,250	15,250	14,650	14,650
Cost per Equivalent unit	**5**	**3**	**1**	**2**

WN 5: Statement of distribution of cost/Statement of valuation:

Particulars	Material 1	Material 2	Labour	Overheads	Total
Transfer to next process	72,500	43,500	14,500	29,000	**1,59,500**
Abnormal Gain	-1,250	-750	-250	-500	**-2,750**
Closing WIP	10,000	3,000	400	800	**14,200**
Total	**81,250**	**45,750**	**14,650**	**29,300**	

WN 6: Normal Loss Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Process 2 A/c	750	2,750	By Bank A/c	500	2,500
			By Abnormal gain A/c	250	1,250
Total	**750**	**3,750**	**Total**	**750**	**3,750**

WN 7: Abnormal Gain Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Normal Loss A/c	250	1,250	By Process 2 A/c	250	2,750
To Profit and Loss A/c		1,500			
Total	**250**	**2,750**	**Total**	**250**	**2,750**

Inter process profits

10. A Ltd. produces product 'AXE' which passes through two processes before it is completed and transferred to finished stock. The following data relate to October 2005:

Particulars	Process I	Process II	Finished stock
Opening stock	7,500	9,000	22,500
Direct Materials	15,000	15,750	
Direct Wages	11,200	11,250	
Factory Overheads	10,500	4,500	
Closing Stock	3,700	4,500	11,250
Inter process profit included in opening stock	-	1,500	8,250

- Output of Process I is transferred to Process II at 25% profit on the transfer price.
- Output of Process II is transferred to finished stock at 20% profit on the transfer price. Stock in process is valued at prime cost.
- Finished stock is valued at the price at which it is received from process II. Sales during the period are Rs. 1,40,000.

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

Answer:

Process 1 Account:

Dr							Cr
Particulars	CTC	Profit	CTP	Particulars	CTC	Profit	CTP
To Opening stock	7,500	-	7,500	By process II	40,500	13,500	54,000
To Direct material	15,000	-	15,000				

To Direct wages	11,200	-	11,200					
Valuation base (Prime cost)	**33,700**	**-**	**33,700**					
Less: Closing stock	-3,700	-	-3,700					
Net Prime cost	**30,000**	**-**	**30,000**					
To Factory Overheads	10,500	-	10,500					
Total Cost	**40,500**	**-**	**40,500**					
To Profit and Loss A/c (1/3 x 40,500)		13,500	13,500					
Total	**40,500**	**13,500**	**54,000**	Total		40,500	13,500	54,000

Note:

- CTC = Cost to company; CTP = Cost to Process
- Profit margin is 1/4 of transfer price (selling price) and hence same would be 1/3 of cost price

Process 2 Account:

Dr								Cr
Particulars	CTC	Profit	CTP	Particulars	CTC	Profit	CTP	
To Opening stock	7,500	1,500	9,000	By Finished stock A/c	75,750	36,750	1,12,500	
To Process I A/c	40,500	13,500	54,000					
To Direct material	15,750	0	15,750					
To Direct Labour	11,250	0	11,250					
Valuation base (Prime cost)	**75,000**	**15,000**	**90,000**					
Less: Closing stock	-3,750	-750	-4,500					
Net Prime Cost	**71,250**	**14,250**	**85,500**					
To Factory overheads	4,500	-	4,500					
Total Cost	**75,750**	**14,250**	**90,000**					
To Profit & Loss A/c (1/4 x 90,000)		22,500	22,500					
Total	**75,750**	**36,750**	**1,12,500**	Total	75,750	36,750	1,12,500	

Note:

Profit element in closing stock = 4,500 x $\left(\dfrac{15,000}{90,000}\right)$ = 750

Profit margin is 1/5 of transfer price (selling price) and hence same would be 1/4 of cost price

Finished stock Account:

Dr								Cr
Particulars	CTC	Profit	CTP	Particulars	CTC	Profit	CTP	
To Opening stock	14,250	8,250	22,500	By Sales	82,425	57,575	1,40,000	
To Process 2 A/c	75,750	36,750	1,12,500					
Valuation base (Prime cost)	**90,000**	**45,000**	**1,35,000**					
Less: Closing stock	-7,575	-3,675	-11,250					
Net cost	**82,425**	**41,325**	**1,23,750**					
To Profit and Loss A/c (b/f)		16,250	16,250					
Total	**82,425**	**57,575**	**1,40,000**	Total	82,425	57,575	1,40,000	

Note:

Profit element in closing stock = 11,250 x $\left(\dfrac{36,750}{1,12,500}\right)$ = 3,675

Profit and Loss Account:

Dr			Cr
Particulars	Amount	Particulars	Amount
To Profit element in closing stock	4,425	By Process I A/c	13,500
To Profit for the year	**57,575**	By Process II A/c	22,500
		By FG Control A/c	16,250
		By Profit element in opening stock	9,750
Total	**62,000**	**Total**	**62,000**

11. Inter-process profits:

The following are the details in respect of Process A and Process B of a processing factory:

Particulars	Process A	Process B
Materials	40,000	-
Labour	40,000	56,000
Overheads	16,000	40,000

The output of Process A is transferred to Process B at a price calculated to give a profit of 20% on the transfer price and the output of Process B is charged to finished stock at a profit of 25% on the transfer price. The finished stock department realized Rs. 4,00,000 for the finished goods received from Process B.

PREPARE process accounts and CALCULATE total profit, assuming that there was no opening or closing work-in-progress.

Answer:

Process A Account:

Dr							Cr
Particulars	CTC	Profit	CTP	Particulars	CTC	Profit	CTP
To Opening stock	-	-	-	By Process B A/c	96,000	24,000	1,20,000
To Direct material	40,000	-	40,000				
To Direct wages	40,000	-	40,000				
To Overheads	16,000	-	16,000				
Total Cost	96,000	-	96,000				
To Profit and Loss A/c (1/4 x 96,000)		24,000	24,000				
Total	96,000	24,000	1,20,000	Total	96,000	24,000	1,20,000

Note:
- CTC = Cost to company; CTP = Cost to Process
- Profit margin is 1/5 of transfer price (selling price) and hence same would be 1/4 of cost price

Process B Account:

Dr							Cr
Particulars	CTC	Profit	CTP	Particulars	CTC	Profit	CTP
To Opening stock	-	-	-	By Finished stock A/c	1,92,000	96,000	2,88,000
To Process B A/c	96,000	24,000	1,20,000				
To Direct wages	56,000	-	56,000				
To Overheads	40,000	-	40,000				
Total Cost	1,92,000	24,000	2,16,000				
To Profit and Loss A/c (1/3 x 2,16,000)		72,000	72,000				
Total	1,92,000	96,000	2,88,000	Total	1,92,000	96,000	2,88,000

Note:

Profit margin is 1/4 of transfer price (selling price) and hence same would be 1/3 of cost price

Finished stock Account:

Dr							Cr
Particulars	CTC	Profit	CTP	Particulars	CTC	Profit	CTP
To Opening stock	-	-	-	By Sales	1,92,000	2,08,000	4,00,000
To Process B A/c	1,92,000	96,000	2,88,000				
To Profit and Loss A/c (b/f)		1,12,000	1,12,000				
Total	1,92,000	2,08,000	4,00,000	Total	1,92,000	2,08,000	4,00,000

Profit and Loss Account:

Dr			Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Profit for the year	**2,08,000**	By Process X A/c	24,000
		By Process Y A/c	72,000
		By Finished stock A/c	1,12,000
Total	**2,08,000**	**Total**	**2,08,000**

12. A Chemical Company carries on production operation in two processes. The material first passes through Process I, where Product 'A' is produced.
Following data are given for the month just ended:

Material input quantity	2,00,000 Kgs
Opening Work in progress quantity (Material -100% and Conversion 50% complete)	40,000 kgs
Work completed quantity	1,60,000 Kgs
Closing work in progress quantity (Material 100% and conversion 2/3rd complete)	30,000 Kgs
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 Rs. 1.60 per kg. Alternatively, it can be transferred to Process II for further processing and then sold as Product 'AX' for Rs. 2 per kg. Further materials are added in Process II, which yield two kgs. of product 'AX' for every kg. of Product 'A' of Process I. Of the 1,60,000 kgs. per month of work completed in Process I, 40,000 kgs are sold as Product 'A' and 1,20,000 kgs. are passed through Process II for sale as Product 'AX'. Process II has facilities to handle upto 1,60,000 kgs. of Product 'A' per month, if required. The monthly costs incurred in Process II (other than the cost of Product 'A') are:

Particulars	1,20,000 kgs of Product A input	1,60,000 kgs of Product A input
Material cost	1,32,000	1,76,000
Processing cost	1,20,000	1,40,000

Required:

(i) Determine, using weighted average cost method, the cost per kg of Product A in Process A and value of both work completed and closing work in progress for the month just ended.

(ii) Is it worthwhile processing 1,20,000 kgs. 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?

Answer:
WN 1: Input-output statement:

Particulars	Units
Opening WIP	40,000
Add: Input	2,00,000
Total Input	**2,40,000**
Less: Closing WIP	-30,000
Processed Production	**2,10,000**
Less: Normal loss	-40,000
Expected Output	**1,70,000**
Actual Output	1,60,000
Abnormal loss	**10,000**

WN 2: Statement of equivalent production:

Particulars	Units	Material		Procession cost	
		DOC	EU	DOC	EU
Work completed	1,60,000	100%	1,60,000	100%	1,60,000

Normal loss	40,000	0%	0	0%	0
Abnormal loss	10,000	100%	10,000	100%	10,000
Closing WIP	30,000	100%	30,000	66.67%	20,000
Total	**2,40,000**		**2,00,000**		**1,90,000**

WN 3: Statement of cost:

Particulars	Material	Processing cost
Opening WIP	20,000	12,000
Cost incurred during the period	75,000	1,02,000
Less: Sale value of Normal loss	0	
Net cost incurred	**95,000**	**1,14,000**
Equivalent units (WN 2)	2,00,000	1,90,000
Cost per Equivalent unit	**0.475**	**0.600**

- Cost per unit of Product A = 0.475 + 0.600 = Rs.1.075 per unit

WN 4: Statement of distribution of cost/Statement of valuation:

Particulars	Material	Conversion cost	Total
Work completed	76,000	96,000	**1,72,000**
Abnormal loss	4,750	6,000	**10,750**
Closing WIP	14,250	12,000	**26,250**
Total	**95,000**	**1,14,000**	

WN 5: Decision on further processing of 1,20,000 KGS:

Particulars	Product A	Product AX
Sales	1,92,000 [1,20,000 x 1.60]	4,80,000 [2,40,000 x 2.00]
Less: Product A	-1,29,000 [1,20,000 x 1.075]	-1,29,000 [1,20,000 x 1.075]
Less: Material cost		-1,32,000
Less: Processing cost		-1,20,000
Profit	**63,000**	**99,000**

Conclusion: It is worthwhile to process Product A further and sell it as Product AX because of higher profit.

WN 6: Minimum acceptable selling price for additional output of Product AX:

Particulars	Product A	Product AX
Sales	64,000 [40,000 x 1.60]	1,28,000 [reverse working)
Less: Product A	-43,000 [40,000 x 1.075]	-43,000 [40,000 x 1.075]
Less: Material cost	0	-44,000 [1,76,000 – 1,32,000]
Less: Processing cost	0	-20,000 [1,40,000 – 1,20,000]
Profit	**21,000**	**21,000**

Minimum selling price $= \left(\dfrac{1,28,000}{80,000}\right) = \mathbf{1.60 \text{ per kg}}$.

Note: Minimum price is calculated by assuming same profit for Product AX as that of Product A.

13. **Process accounts**

ABX Company Ltd. provides the following information relating to Process-B:

Opening work in progress	Nil
Units introduced	45,000 units @ Rs.10 per unit
Expenses debited to the process	
Direct material	65,500
Labour	90,800
Overheads	1,80,700

Normal loss in the process	2% of input
Work in progress	1,800 units
Degree of completion of closing WIP:	
Materials	100%
Labour	50%
Overheads	40%
Finished output	42,000 units
Degree of completion of abnormal loss	
Materials	100%
Labour	80%
Overheads	60%
Realizable value of units scrapped as normal loss	Rs.5 per unit
Realizable value of units scrapped as abnormal loss	Rs.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.

Answer:

WN 1: Process B Account:

Dr					Cr
Particulars	**Units**	**Amount**	**Particulars**	**Units**	**Amount**
To Opening WIP	-	-	By Normal loss	900	4,500
To Material	45,000	4,50,000	By Abnormal loss (WN 5)	300	4,740
To Material		65,500	By FG Control A/c (WN 5)	42,000	7,51,975
To Labour		90,800	By Closing WIP (WN 5)	1,800	25,785
To Overheads		1,80,700			
Total	**45,000**	**7,87,000**	**Total**	**45,000**	**7,87,000**

WN 2: Input-output statement:

Particulars	Units
Opening WIP	0
Add: Input	45,000
Total Input	**45,000**
Less: Closing WIP	-1,800
Processed Production	**43,200**
Less: Normal loss	-900
Expected Output	**42,300**
Actual Output	42,000
Abnormal loss	**300**

WN 3: Statement of equivalent production:

Particulars	Units	Material 1		Material 2		Labour		Overheads	
		DOC	EU	DOC	EU	DOC	EU	DOC	EU
Transfer to next process	42,000	100%	42,000	100%	42,000	100%	42,000	100%	42,000
Closing WIP	1,800	100%	1,800	100%	1,800	50%	900	40%	720
Normal loss	900	0%	0	0%	0	0%	0	0%	0
Abnormal loss	300	100%	300	100%	300	80%	240	60%	180
Total	**45,000**		**44,100**		**44,100**		**43,140**		**42,900**

WN 4: Statement of cost:

Particulars	Material 1	Material 2	Labour	Overheads
Opening WIP	0	0	0	0
Cost incurred during the period	4,50,000	65,500	90,800	1,80,700
Less: Sale value of Normal loss	-4,500			

Net cost incurred	4,45,500	65,500	90,800	1,80,700
Equivalent units (WN 3)	44,100	44,100	43,140	42,900
Cost per Equivalent unit	10.1020	1.4853	2.1048	4.2121

WN 5: Statement of distribution of cost/Statement of valuation:

Particulars	Material 1	Material 2	Labour	Overheads	Total
Transfer to next process	4,24,284	62,383	88,402	1,76,908	7,51,977
Abnormal Loss	3,031	446	505	758	4,740
Closing WIP	18,184	2,674	1,894	3,033	25,785
Total	4,45,499	65,503	90,801	1,80,699	

WN 6: Abnormal Loss Account

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Process B A/c	300	4,740	By Bank A/c	300	600
			By Costing P&L A/c		**4,140**
Total	300	4,740		300	4,740

14. **Process Accounts – Missing Information:**

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 Rs. 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 scrap value of Rs.15 per litre
*   All raw materials are added at the commencement of the process
*   The cost per equivalent unit (litre) is Rs.39 per month made up as follows:

Raw material	23 per unit
Labour	7 per unit
Overheads	9 per unit
Total cost	39 per unit

Required:
i.   Calculate the quantity (in litres) of raw materials inputs during the month
ii. 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
iii. Calculate the value of raw material, labour and overheads added to the process during the month
iv. Prepare the process accounts for the month

Answer:

Approach to the question:
*   This is a problem on missing information and reverse working. Company follows FIFO method and it is a scenario of one material
*   We will follow the six steps and find the missing information

WN 1: Input-output statement:

Particulars	Units

Opening WIP	800
Add: Input (refer note)	5,360
Total Input	**6,160**
Less: Closing WIP	-160
Processed Production	**6,000**
Less: Normal loss	-536
Expected Output	**5,464**
Actual Output	4200
Abnormal loss	**1,264**

WN 2: Statement of units started and completed:

Particulars	Units
Transfer to next process	4200
Less: Opening WIP	-800
Units started and completed	**3400**

WN 3: Statement of equivalent production:

Particulars	Units	Material		Labour		Overheads	
		DOC	EU	DOC	EU	DOC	EU
Opening WIP	800	0%	0	30%	240	40%	320
Units started and completed	3400	100%	3,400	100%	3,400	100%	3,400
Closing WIP	160	100%	160	30%	48	20%	32
Normal loss	536	0%	0	0%	0	0%	0
Abnormal loss	1,264	100%	1,264	100%	1,264	100%	1,264
Total	**6,160**		**4,824**		**4,952**		**5,016**

It is assumed that defectives are identified in finished state and hence DOC for abnormal loss is 100%

WN 4: Statement of cost:

Particulars	Material	Labour	Overheads
Cost incurred (reverse working)	**1,18,992**	**34,664**	**45,144**
Less: Sale value of Normal loss	-8,040		
Net cost incurred (reverse working)	**1,10,952**	**34,664**	**45,144**
Equivalent units (WN 3)	4,824	4,952	5,016
Cost per Equivalent unit	**23**	**7**	**9**

WN 5: Statement of distribution of cost/Statement of valuation:

Particulars	Material	Labour	Overheads	Total
Opening WIP	-	1,680	2,880	4,560
Units started and completed	78,200	23,800	30,600	1,32,600
Closing WIP	3,680	336	288	4,304
Abnormal loss	29,072	8,848	11,376	49,296
Total	**1,10,952**	**34,664**	**45,144**	

- Transfer to next process = Opening WIP + Units started and completed
- Opening WIP = Work done last year (question) + Work done current year (WN 5)
- Opening WIP = 26,640 + 4,560 = Rs.31,200
- **Transfer to next process = 31,200 + 1,32,600 = Rs.1,63,800**

WN 6: Process Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Opening WIP	800	26,640	By Normal loss	536	8,040
To Materials	5,360	1,18,992	By Abnormal loss	1,264	49,296
To Direct Labour		34,664	By FG Control A/c	4,200	1,63,800
To Overheads		45,144	By Closing WIP	160	4,304
Total	**6,160**	**2,25,440**	**Total**	**6,160**	**2,25,440**

Notes:

Computation of units introduced:

Units introduced + Opening WIP = Normal loss + Abnormal loss + Output + Closing WIP

Units introduced + 800 = 1,800 + 4,200 + 160

Units introduced = 5,360 units

Additional Homework Problems:

1. **Average Cost Method – One Material:**

Following information is available regarding process A for the month of February, 2012:

Particulars	Units/Amount
Production Record:	
Units in process as on 1.2.2012 (All material used, 25% complete for labour and overhead)	4,000
New units introduced	16,000
Units completed	14,000
Units in process as on 28.2.2012 (All materials used, 33.33% complete for labour and overhead)	6,000
Cost records:	
Work in process as on 1.2.2012	
Materials	6,000
Labour	1,000
Overheads	1,000
Total	**8,000**
Cost during the month	
Materials	25,600
Labour	15,000
Overheads	15,000
Total	**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

Answer:

WN 1: Process A Account:

Dr					Cr
Particulars	**Units**	**Amount**	**Particulars**	**Units**	**Amount**
To Opening WIP	4,000	8,000	By next process	14,000	50,120
To Materials	16,000	25,600	By Closing WIP	6,000	13,480
To Labour		15,000			
To Overheads		15,000			
Total	**20,000**	**63,600**	**Total**	**20,000**	**64,600**

WN 2: Input-output statement:

Particulars	Units
Opening WIP	4,000
Add: Input	16,000
Total Input	**20,000**
Less: Closing WIP	-6,000
Processed Production	**14,000**
Less: Normal loss	0
Expected Output	**14,000**
Actual Output	14,000
Abnormal loss	**0**

WN 3: Statement of equivalent production:

Particulars	Units	Material		Labour		Overheads	
		DOC	EU	DOC	EU	DOC	EU
Transfer to next process	14,000	100%	14,000	100%	14,000	100%	14,000
Closing WIP	6,000	100%	6,000	33.33%	2,000	33.33%	2,000
Total	**20,000**		**20,000**		**16,000**		**16,000**

WN 4: Statement of cost:

Particulars	Material	Labour	Overheads
Opening WIP	6,000	1,000	1,000
Cost incurred during the period	25,600	15,000	15,000
Less: Sale value of Normal loss	0		
Net cost incurred	**31,600**	**16,000**	**16,000**
Equivalent units (WN 3)	20,000	16,000	16,000
Cost per Equivalent unit	**1.58**	**1**	**1**

WN 5: Statement of distribution of cost/Statement of valuation:

Particulars	Material	Labour	Overheads	Total
Transfer to next process	22,120	14,000	14,000	**50,120**
Closing WIP	9,480	2,000	2,000	**13,480**
Total	**31,600**	**16,000**	16,000	

2. Inter-process profits

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:

Particulars	Process – X	Process – Y	Process – Z	Finished stock
Opening stock	15,000	27,000	40,000	45,000
Materials	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 profits 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 Rs. 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.

Answer:
Process X Account:

Dr							Cr
Particulars	CTC	Profit	CTP	Particulars	CTC	Profit	CTP
To Opening stock	15,000	-	15,000	By Process Y	2,96,000	74,000	3,70,000
To Direct material	80,000	-	80,000				
To Direct wages	1,25,000	-	1,25,000				
Valuation base (Prime cost)	**2,20,000**	**-**	**2,20,000**				
Less: Closing stock	-20,000	-	-20,000				
Net Prime cost	**2,00,000**	**-**	**2,00,000**				
To Factory Overheads	96,000	-	96,000				
Total Cost	**2,96,000**	**-**	**2,96,000**				
To Costing Profit and Loss A/c (1/4 x 2,96,000)		74,000	74,000				

| Total | 2,96,000 | 74,000 | 3,70,000 | Total | 2,96,000 | 74,000 | 3,70,000 |

Note:
- CTC = Cost to company; CTP = Cost to Process
- Profit margin is 1/5 of transfer price (selling price) and hence same would be 1/4 of cost price

Process Y Account:

Dr							Cr
Particulars	CTC	Profit	CTP	Particulars	CTC	Profit	CTP
To Opening stock	23,000	4,000	27,000	By process Z	5,36,379	2,26,121	7,62,500
To Process X A/c	2,96,000	74,000	3,70,000				
To Direct material	65,000	0	65,000				
To Direct Labour	1,08,000	0	1,08,000				
Valuation base (Prime cost)	**4,92,000**	**78,000**	**5,70,000**				
Less: Closing stock	-27,621	-4,379	-32,000				
Net Prime Cost	**4,64,379**	**73,621**	**5,38,000**				
To Factory overheads	72,000	-	72,000				
Total Cost	**5,36,379**	**73,621**	**6,10,000**				
To Profit & Loss A/c (1/4 x 6,10,000)		1,52,500	1,52,500				
Total	**5,36,379**	**2,26,121**	**7,62,500**	**Total**	**5,36,379**	**2,26,121**	**7,62,500**

Note:

Profit element in closing stock = $32{,}000 \times \left(\dfrac{78{,}000}{5{,}70{,}000}\right) = 4{,}379$

Profit margin is 1/5 of transfer price (selling price) and hence same would be 1/4 of cost price

Process Z Account:

Dr							Cr
Particulars	CTC	Profit	CTP	Particulars	CTC	Profit	CTP
To Opening stock	30,000	10,000	40,000	By Finished goods A/c	7,45,629	5,50,371	12,96,000
To Process Y A/c	5,36,379	2,26,121	7,62,500				
To Direct material	50,000	0	50,000				
To Direct Labour	92,000	0	92,000				
Valuation base (Prime cost)	**7,08,379**	**2,36,121**	**9,44,500**				
Less: Closing stock	-29,250	-9,750	-39,000				
Net Prime Cost	**6,79,129**	**2,26,371**	**9,05,500**				
To Factory overheads	66,500	-	66,500				
Total Cost	**7,45,629**	**2,26,371**	**9,72,000**				
To Costing Profit & Loss A/c (1/3 x 9,72,000)		3,24,000	3,24,000				
Total	**7,45,629**	**5,50,371**	**12,96,000**	**Total**	**7,45,629**	**5,50,371**	**12,96,000**

Note:

Profit element in closing stock = $39{,}000 \times \left(\dfrac{2{,}36{,}121}{9{,}44{,}500}\right) = 9{,}750$

Profit margin is 1/4 of transfer price (selling price) and hence same would be 1/3 of cost price

Finished stock Account:

Dr							Cr
Particulars	CTC	Profit	CTP	Particulars	CTC	Profit	CTP
To Opening stock	25,000	20,000	45,000	By Sales	7,41,862	6,58,138	14,00,000

To Process Z A/c	7,45,629	5,50,371	12,96,000				
Valuation base (Prime cost)	**7,70,629**	**5,70,371**	**13,41,000**				
Less: Closing stock	-28,767	-21,233	-50,000				
Net cost	**7,41,862**	**5,49,138**	**12,91,000**				
To Costing Profit and Loss A/c (b/f)		1,09,000	1,09,000				
Total	**7,41,862**	**6,58,138**	**14,00,000**	**Total**	**7,41,862**	**6,58,138**	**14,00,000**

Note:

Profit element in closing stock = 50,000 x $\left(\dfrac{5,50,371}{12,96,000}\right)$ = 21,233

Costing Profit and Loss Account:

Dr			Cr
Particulars	**Amount**	**Particulars**	**Amount**
To Profit element in closing stock (4,379 + 9,750 + 21,233)	35,362	By Process X A/c	74,000
To Profit for the year	**6,58,138**	By Process Y A/c	1,52,500
		By Process Z A/c	3,24,000
		By FG Control A/c	1,09,000
		By Profit element in opening stock (4,000 + 10,000 + 20,000)	34,000
Total	**6,93,500**	**Total**	**6,93,500**

Balance sheet as at 31st March 2014 (abstract)

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
		Total stock	1,41,000
		Less: Provision for unrealized profit	(35,362)
		Net stock	1,05,638

3. **Process costing with royalty:**

MTK Ltd. purchased 10,000 kgs. of a basic material @ Rs. 12 per kg and issued it for further processing in purifying department. In purifying department wages paid amounted to Rs. 4,200 and overhead was applied @ 150% of the labour cost. Indirect materials costing Rs. 1,500 were introduced into the process. The normal yield from the process is 90%. 9,100 kgs of output was obtained from this purifying process. Any difference in weight between the input of basic material and output of purified material can is sold @ Rs. 1.50 per kg. The process is operated under a licence for which royalty @ Rs. 0.20 per kg. of purified material produced is paid.

You are required to prepare:
 i.   Purifying process Account
 ii. Normal loss Account
 iii. Abnormal loss/ gain Account
 iv. Royalty Payable Account.

Answer:

WN 1: Input-output statement:

Particulars	Units
Opening WIP	0
Add: Input	10,000
Total Input	**10,000**
Less: Closing WIP	0
Processed Production	**10,000**
Less: Normal loss	-1,000

Expected Output	9,000
Actual Output	9,100
Abnormal gain	100

WN 2: Purifying Process Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Opening stock	0	0	By normal loss	1,000	1,500
To Materials	10,000	1,20,000	By Finished Stock A/c	9,100	1,31,950
To Labour		4,200			
To Overheads		6,300			
To Indirect materials		1,500			
To Abnormal gain	100	1,450			
Total	10,100	1,33,450	Total	10,100	1,33,450

Note:

$$\text{Cost per Good Unit} = \frac{\text{Debit side of Process Account excl abnormal gain} - \text{Sale Value of Normal loss}}{\text{Expected Output}}$$

$$\text{Cost per Good Unit} = \frac{1,32,000 - 1,500}{9,000} = \textbf{Rs. 14.50 per unit}$$

Note: Royalty is not considered as part of process account and the same would be directly added to finished stock. This is because Royalty is only incurred for finished output

WN 3: Normal Loss Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Purifying Process A/c	1,000	1,500	By Bank	900	1,350
			By Abnormal gain	100	150
Total	1,000	1,500	Total	1,000	1,500

WN 4: Abnormal Loss Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To normal loss a/c	100	150	By Purifying Process A/c	100	1,450
To Costing P&L A/c		1,300			
Total	100	1,450	Total	100	1,450

WN 5: Royalty Payable Account:

Dr			Cr
Particulars	Amount	Particulars	Amount
To balance c/d	1,820	By Finished stock A/c (9,100 x 0.20)	1,820
Total	1,820	Total	1,820

CHAPTER 11: JOINT PRODUCTS AND BY PRODUCTS

1. What are joint products and by-products? **[Category A]**
   - ❖ When a manufacturing process results in the production of two or more products which have equal economic significance are called as joint products
   - ❖ If one of the product has lower economic significance it is called as by-product and the product having higher economic significance is called as main product

2. What are co-products? **[Category B]**
   - ❖ Joint products and co-products are used synonymously but still the two has some distinction
   - ❖ Co-products can be defined as two are more products which are contemporary but do not emerge necessarily from the same material in the same process
   - ❖ **Example:** Timber boards from different trees

3. What is split-off point? **[Category B]**
   - ❖ The point at which the product emerge with separate identities is called split off point
   - ❖ All costs incurred upto the split off point are called joint costs and are jointly incurred over the products. All costs incurred after the split off point are called as further processing cost

4. What are the steps to prepare profitability statement in joint & by-product costing? **[Category A]**
   - ❖ **Step 1:** Identify joint cost
   - ❖ **Step 2:** Identify ratio of distribution
   - ❖ **Step 3:** Distribute the joint cost on the basis of the identified ratio
   - ❖ **Step 4:** Compute profit using the following format:

Particulars	Product A	Product B	Product C
Sales	XXX	XXX	XXX
Less: Share of joint cost	(XXX)	(XXX)	(XXX)
Less: Further processing cost	(XXX)	(XXX)	(XXX)
Profit	XXX	XXX	XXX

5. What are the various methods for distribution of costs? **[Category A]**

Method	Basis of distribution
Physical units method or average unit cost method	✓ Joint cost is distributed in the ratio of the number of units
Net realizable value at split off method	✓ Joint cost is distributed on the basis of NRV ✓ NRV is calculated using the below format | Particulars	Amount
Sales value after further processing	XXX
Less: Estimated profit margins	(XXX)
Less: Selling & distribution costs	(XXX)
Less: Further processing costs	(XXX)
NRV	XXX	
Technical estimates	✓ Certain joint products may consume more of the joint cost resources and hence points need to be given to them ✓ Joint cost is distributed on the basis of units * points
Market value at the point of separation	✓ Joint cost is distributed on the basis of market value at split-off point
Market value after further processing	✓ Joint cost is distributed on the basis of the market value after further processing
Contribution margin method	✓ Joint cost is split as variable cost and fixed cost ✓ Variable cost is split on the basis of physical units or average cost ✓ Fixed cost is split on the basis of contribution

6. What are the methods of apportioning joint costs to by-products? **[Category A]**

Net Realizable Value Method	✓ Under this method the NRV of the by-product may be deducted from the total joint cost to arrive at the cost of the main product
Standard cost in technical estimates	✓ By-products are valued at standard costs which are determined on the basis of past costs or making some technical estimates
Comparative price	✓ Value of the by-product is ascertained with reference to the price of a similar or an alternative material
Re-use basis	✓ By-products can be reprocessed in the same process as part of the input of the process. Hence in that case the by-product cost should be same as that of the materials introduced in the process

7. What is the treatment of by-product cost in cost accounting? **[Category A]**

When they are of small value	✓ Sale value of the by-products can be credited to costing profit and loss account and be treated as miscellaneous income or additional revenue ✓ Sale value can also be shown as deduction from the total cost
When the by-products are of considerable total value	✓ In this case the by-products are to be treated as joint products
Where they require further processing	✓ In this case NRV of the by-product at the split off point is determined. If the NRV is small then it is treated as per point (a) and if NRV is considerable then the same is treated as per point (b)

1. Various methods

The following figures are in respect of the joint production of A and B for a month:

Particulars	Amount
Direct Material	5,000
Direct Labour	3,000
Variable overheads	2,000
Fixed overheads	2,000

Sales:

A – 100 quintals at Rs.80 per quintal

B – 150 quintals at Rs.40 per quintal

Compute the profit or loss per product under the following methods:
- Physical measurement
- Survey method or technical evaluation with 3 and 2 points for products A and B respectively
- Contribution margin or marginal cost method

Answer:

WN 1: Profitability analysis under Physical measurement method:

Step 1: Identify Joint cost:

Joint cost = 5,000 + 3,000 + 2,000 + 2,000 = 12,000

Step 2: Identify ratio of distribution:
- Joint cost under physical measurement method is distributed on the basis of physical units produced
- Ratio of distribution = 100:150 (or) 2:3

Step 3: Distribution of joint cost:
- Share of Joint cost of A = 12,000 x (2/5) = Rs.4,800
- Share of Joint cost of B = 12,000 x (3/5) = Rs.7,200

Step 4: Profit and Loss statement:

Particulars	A	B	Total
Sales	8,000	6,000	14,000
Less: Share of joint cost	(4,800)	(7,200)	(12,000)
Less: Further processing cost	0	0	0

Profit/Loss	3,200	(1,200)	2,000

WN 2: Profitability analysis under Survey/Technical Evaluation method:
Step 1: Identify Joint cost:
Joint cost = 5,000 + 3,000 + 2,000 + 2,000 = 12,000

Step 2: Identify ratio of distribution:
- Joint cost under survey method is distributed on the basis of units x points
- Ratio of distribution = (100 x 3): (150 x 2) = 300:300 (or) 1:1

Step 3: Distribution of joint cost:
- Share of Joint cost of A = 12,000 x (1/2) = Rs.6,000
- Share of Joint cost of B = 12,000 x (1/2) = Rs.6,000

Step 4: Profit and Loss statement:

Particulars	A	B	Total
Sales	8,000	6,000	14,000
Less: Share of joint cost	(6,000)	(6,000)	(12,000)
Less: Further processing cost	0	0	0
Profit/Loss	**2,000**	**0**	**2,000**

WN 3: Profitability analysis under Contribution margin method:
Step 1: Identify Joint cost:
- Variable joint cost = 5,000 + 3,000 + 2,000 = 10,000
- Fixed joint cost = 2,000

Step 2: Identify ratio of distribution:
- Variable joint cost would be distributed on the basis of physical units method. Ratio of distribution is 2:3
- Fixed joint cost would be distributed on the basis of contribution

Step 3: Distribution of joint cost:
- Share of Variable Joint cost of A = 10,000 x (2/5) = Rs.4,000
- Share of Variable Joint cost of B = 10,000 x (3/5) = Rs.6,000

Step 4: Profit and Loss statement:

Particulars	A	B	Total
Sales	8,000	6,000	14,000
Less: Share of variable joint cost	(4,000)	(6,000)	(10,000)
Contribution	**4,000**	**0**	**4,000**
Less: Share of fixed joint cost	(2,000)	0	(2,000)
Less: Further processing cost	0	0	0
Profit/Loss	**2,000**	**0**	**2,000**

2. Market Value Method

X Co. Ltd manufactures two products A and B and sells them at Rs.170 and Rs.260 per unit respectively. During a particular period, 200 units of A and 200 units of B were produced and sold. The joint cost incurred was Rs.64,500. The further processing costs for products A and B and Rs.4000 and Rs.32000 respectively. The products can be processed further and be sold at Rs.200 & Rs.300 respectively for A and B. Apportion the joint costs and prepare profitability statements based on the following methods:
- Sale value at split-off point
- Sale value after further processing
- Net realizable value method

Answer:
WN 1: Profitability analysis under Sale value at split off point method:

Step 1: Identify Joint cost:
- Joint cost = Rs.64,500

Step 2: Identify ratio of distribution:
- Joint cost would be distributed on the basis of sales value at split off point
- Ratio of distribution = (200 x 170): (200 x 260) = 34,000:52,000

Step 3: Distribution of joint cost:
- Share of Joint cost of A = 64,500 x (34/86) = Rs.25,500
- Share of Joint cost of B = 64,500 x (52/86) = Rs.39,000

Step 4: Profit and Loss statement:

Particulars	A	B	Total
Sales	34,000	52,000	86,000
Less: Share of joint cost	(25,500)	(39,000)	(64,500)
Less: Further processing cost	0	0	0
Profit/Loss	**8,500**	**13,000**	**21,500**

WN 2: Profitability analysis under Sale value after further processing method:
Step 1: Identify Joint cost:
- Joint cost = Rs.64,500

Step 2: Identify ratio of distribution:
- Joint cost would be distributed on the basis of sale value after further processing
- Ratio of distribution = (200 x 200): (200 x 300) = 40,000:60,000

Step 3: Distribution of joint cost:
- Share of Joint cost of A = 64,500 x (40/100) = Rs.25,800
- Share of Joint cost of B = 64,500 x (60/100) = Rs.38,700

Step 4: Profit and Loss statement:

Particulars	A	B	Total
Sales	34,000	52,000	86,000
Less: Share of joint cost	(25,800)	(38,700)	(64,500)
Less: Further processing cost	0	0	0
Profit/Loss	**8,200**	**13,300**	**21,500**

WN 3: Profitability analysis under NRV Method:
Step 1: Identify Joint cost:
- Joint cost = Rs.64,500

Step 2: Identify ratio of distribution:
- Joint cost would be distributed on the basis of NRV and same is calculated below:

Particulars	A	B
Sale value after further processing	40,000	60,000
Less: Further processing cost	(4,000)	(32,000)
Less: Estimated selling and distribution cost	0	0
Less: Estimated profit	0	0
Net realizable value	**36,000**	**28,000**

Step 3: Distribution of joint cost:
- Share of Joint cost of A = 64,500 x (36/64) = Rs.36,281
- Share of Joint cost of B = 64,500 x (28/64) = Rs.28,219

Step 4: Profit and Loss statement:

Particulars	A	B	Total
Sales	34,000	52,000	86,000
Less: Share of joint cost	(36,281)	(28,219)	(64,500)
Less: Further processing cost	0	0	0
Profit/Loss	**(2,281)**	**23,781**	**21,500**

3. NRV Method/Decision Making

The sunshine oil company purchases crude vegetable oil. It does refining of the same. The refining process results in four products at the split off point: M, N, O and P.

Product O is fully processed at the split off point. Product M, N and P can be individually further refined into 'Super M', 'Super N', and 'Super P'. In the most recent month (October, 1999), the output at split off point was:

Product M	3,00,000 gallons
Product N	1,00,000 gallons
Product O	50,000 gallons
Product P	50,000 gallons

The joint cost of purchasing the crude vegetable oil and processing it were Rs.40,00,000.

Sunshine had no beginning or ending inventories. Sales of Product O in October were Rs.20,00,000. Total output of products M, N and P was further refined and then sold. Data related to October,1999 are as follows:

	Further processing costs to make super products	Sales
Super 'M'	Rs.80,00,000	Rs.1,20,00,000
Super 'N'	Rs.32,00,000	Rs.40,00,000
Super 'P'	Rs.36,00,000	Rs.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 October, 1999:

Product M	Rs.20,00,000
Product N	Rs.12,00,000
Product P	Rs.28,00,000

You are required to answer:
- How the joint cost would be allocated against each product under each of the following methods:
  - Sales value at split off
  - Physical output (gallons) and
  - Estimated net realizable value
- Could Sunshine Limited increased its profits by making different decisions about further refining of Product M, N or P? Show the effect of the change you recommend on operating profits.

Answer:

WN 1: Distribution of Joint cost under multiple methods:

Particulars	M	N	O	P	Total
Sales value at split off:					
Ratio of distribution	20,00,000	12,00,000	20,00,000	28,00,000	80,00,000
Share of joint cost	10,00,000	6,00,000	10,00,000	14,00,000	40,00,000
Physical output (gallons):					
Ratio of distribution	3,00,000	1,00,000	50,000	50,000	5,00,000
Share of joint cost	24,00,000	8,00,000	4,00,000	4,00,000	40,00,000
NRV Method:					
Sale value after further processing	1,20,00,000	40,00,000	20,00,000	48,00,000	2,28,00,000
Less: Further processing cost	(80,00,000)	(32,00,000)	-	(36,00,000)	(1,48,00,000)
Less: Estimated S&D cost	-	-	-	-	-
Less: Estimated profit	-	-	-	-	-
NRV (ratio of distribution)	**40,00,000**	**8,00,000**	**20,00,000**	**12,00,000**	**80,00,000**
Share of joint cost	20,00,000	4,00,000	10,00,000	6,00,000	40,00,000

WN 2: Decision on further processing and impact on profits:
Part 1 – Existing profitability statement with cost being distributed under NRV method:

Particulars	M	N	O	P	Total
Sales	1,20,00,000	40,00,000	20,00,000	48,00,000	2,28,00,000
Less: Share of joint cost	(20,00,000)	(4,00,000)	(10,00,000)	(6,00,000)	(40,00,000)
Less: Further processing cost	(80,00,000)	(32,00,000)	-	(36,00,000)	(1,48,00,000)
Profit/Loss	**20,00,000**	**4,00,000**	**10,00,000**	**6,00,000**	**40,00,000**

Part 2: Decision on further processing:

Particulars	M	N	P
Sale value after further processing	1,20,00,000	40,00,000	48,00,000
Less: Sale value at split off	20,00,000	12,00,000	28,00,000
Incremental revenues	**1,00,00,000**	**28,00,000**	**20,00,000**
Incremental cost (FPC)	(80,00,000)	(32,00,000)	(36,00,000)
Incremental Profit/Loss	**20,00,000**	**(4,00,000)**	**(16,00,000)**
Decision	SAFP	SASO	SASO

- SAFP = Sale after further processing; SASO = Sale at split-off

Part 3 – Revised profitability statement with cost being distributed under NRV method:

Particulars	M	N	O	P	Total
Decision	SAFP	SASO	SASO	SASO	
Sales	1,20,00,000	12,00,000	20,00,000	28,00,000	1,80,00,000
Less: Share of joint cost	(20,00,000)	(4,00,000)	(10,00,000)	(6,00,000)	(40,00,000)
Less: Further processing cost	(80,00,000)	-	-	-	(80,00,000)
Profit/Loss	**20,00,000**	**8,00,000**	**10,00,000**	**22,00,000**	**60,00,000**

- Overall profits will increase by Rs.20,00,000 due to change in processing decision for N and P

4. Reverse cost method
Two products P and Q are obtained in a crude form and require further processing at a cost of Rs. 5 for P and Rs. 4 for Q per unit before sale. Assuming a net margin of 25 percent on cost, their sale prices are fixed at Rs. 13.75 and Rs. 8.75 per unit respectively. During the period, the joint cost was Rs. 88,000 and the outputs were:

      P   8,000 units
      Q   6,000 units

Ascertain the joint cost per unit
Answer:
Computation of joint cost per unit:
- Estimated margin is given in the question and hence we will follow NRV method for joint cost distribution

Particulars	P	Q	Total
Sale value after further processing	1,10,000	52,500	1,62,500
Less: Further processing cost	(40,000)	(24,000)	(64,000)
Less: Estimated S&D cost	-	-	
Less: Estimated profit (1/4 on cost = 1/5 on sales)	(22,000)	(10,500)	(32,500)
NRV (ratio of distribution)	48,000	18,000	66,000
Share of joint cost	**64,000**	**24,000**	**88,000**
No of units	8,000	6,000	
Joint cost per unit	8	4	

5. Further processing - Decision making
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 is further processed in department R and product C is further processed in department S. There is no loss in further processing of any of the three products. The cost data for a month are as under:

Cost of raw materials introduced in department P	Rs.12,68,800
Direct wages of Department P	Rs.3,84,000

Department Q	Rs.96,000
Department R	Rs.64,000
Department S	Rs.46,000

Factory overheads of Rs.4,72,000 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:

Product	A	B	C
Output sold kg	44,000	40,000	20,000
Selling price	32	24	16

There is no opening or closing stock. If these products are sold at the split off stage, that is without further processing, the selling prices would have been Rs.20, Rs.22 and Rs.10 each per kg respectively for A, B and C.

Required:
- Prepare a statement showing the apportionment of joint costs to the three products.
- Prepare a statement showing product-wise and total profit for the month under reference as per the current processing policy
- What processing decision should have been taken to improve the profitability of the company
- Calculate the product-wise and total profit arising from your above recommendation

Answer:

WN 1: Computation of Joint cost and Further processing cost of A, B and C:

Particulars	Dept P	Dept Q	Dept R	Dept S
Nature of cost	Joint cost	A's FPC	B's FPC	C's FPC
Direct material	12,68,800			
Direct Labour	3,84,000	96,000	64,000	46,000
Overheads	3,07,200	76,800	51,200	36,800
Total Cost	**19,60,000**	**1,72,800**	**1,15,200**	**82,800**

WN 2: Distribution of Joint cost

Particulars	A	B	C	Total
Sales value at split off:				
Ratio of distribution	8,80,000	8,80,000	2,00,000	19,60,000
Share of joint cost	8,80,000	8,80,000	2,00,000	19,60,000

Note: It is assumed that company follows sales value at split off point method for distribution.

WN 3: Existing profitability statement with cost being distributed under Sales value at split off point:

Particulars	A	B	C	Total
Sales	14,08,000	9,60,000	3,20,000	26,88,000
Less: Share of joint cost	(8,80,000)	(8,80,000)	(2,00,000)	(19,60,000)
Less: Further processing cost	(1,72,800)	(1,15,200)	(82,800)	(3,70,800)
Profit/Loss	**3,55,200**	**(35,200)**	**37,200**	**3,57,200**

WN 4: Decision on further processing:

Particulars	A	B	C
Sale value after further processing	14,08,000	9,60,000	3,20,000
Less: Sale value at split off	(8,80,000)	(8,80,000)	(2,00,000)
Incremental revenues	**5,28,000**	**80,000**	**1,20,000**
Incremental cost (FPC)	(1,72,800)	(1,15,200)	(82,800)
Incremental Profit/Loss	**3,55,200**	**(35,200)**	**37,200**
Decision	SAFP	SASO	SAFP

- SAFP = Sale after further processing; SASO = Sale at split-off

WN 5: Revised profitability statement with cost being distributed under sale value at split off method:

Particulars	A	B	C	Total

Decision	SAFP	SASO	SAFP	
Sales	14,08,000	8,80,000	3,20,000	26,08,000
Less: Share of joint cost	(8,80,000)	(8,80,000)	(2,00,000)	(19,60,000)
Less: Further processing cost	(1,72,800)	-	(82,800)	(2,55,600)
Profit/Loss	**3,55,200**	**-**	**37,200**	**3,92,400**

- Overall profits of the company increase by Rs.35,200

6. Further processing – decision making – with closing stock

A company processes a raw material in its department 1 to produce three products viz. A, B and X at the same split off stage. During a period 1,80,000 kgs of raw materials were processed in Department 1 at a total cost of Rs.12,88,000 and the resultant output of A, B and X were 18,000 kgs, 10,000 kgs and 54,000 kgs respectively. A and B were further processed in department 2 at a cost of Rs.1,80,000 and Rs.1,50,000 respectively.

X was further processed in Department 3 at a cost of Rs.1,08,000. There is no waste in further processing. The details of sales effected during the period were as under:

		A	B	X
Quantity sold	(kgs)	17,000	5,000	44,000
Sales value	(Rs.)	12,24,000	2,50,000	7,92,000

There were no opening stocks. If these stocks were sold at split-off stage, the selling prices of A, B and X would have been Rs.50, Rs.40 and Rs.10 per kg respectively.

Required:
- Prepare a statement showing the apportionment of joint costs A, B and X
- Prepare a statement showing the cost per kg of each product indicating joint costs and further processing and total cost respectively
- Prepare a statement showing the product wise and total profit for the period
- State with supporting calculations as to whether all or any of the products should be further processed or not.

Answer:
WN 1: Distribution of joint cost:
Step 1: Identify Joint Cost:
Joint cost = Rs.12,88,000

Step 2: Identify ratio and distribute joint cost:
- It is assumed that company follows sales value at split off method for distribution of joint cost

Particulars	A	B	X
Units produced	18,000	10,000	54,000
SP at split off	50	40	10
Sales value at split off (ratio of distribution)	**9,00,000**	**4,00,000**	**5,40,000**
Share of joint cost	**6,30,000**	**2,80,000**	**3,78,000**

WN 2: Computation of cost per kg of Product A, B and X:

Particulars	A	B	X
Units produced (KG)	18,000	10,000	54,000
Share of joint cost (WN 1)	6,30,000	2,80,000	3,78,000
Joint cost per KG	**35**	**28**	**7**
Further processing cost	1,80,000	1,50,000	1,08,000
FPC per KG	**10**	**15**	**2**
Total cost per KG	**45**	**43**	**9**

WN 3: Profitability statement for the period:

Particulars	A	B	X	Total
Units sold (Kg)	17,000	5,000	44,000	
Selling price per kg	72	50	18	
Less: Share of joint cost per kg	(35)	(28)	(7)	
Less: Further processing cost per kg	(10)	(15)	(2)	
Profit per kg	**27**	**7**	**9**	

Total Profit	4,59,000	35,000	3,96,000	8,90,000

WN 4: Decision on further processing:

Particulars	A	B	X
Selling price after further processing	72	50	18
Less: Sale price at split off	(50)	(40)	(10)
Incremental revenues per kg	**22**	**10**	**8**
Incremental cost per kg (FPC)	(10)	(15)	(2)
Incremental Profit/Loss per kg	**12**	**(5)**	**6**
Decision	SAFP	SASO	SAFP

SAFP = Sale after further processing; SASO = Sale at split off

Conclusion: The company should sell Product B at split-off. This will improve profits by Rs.5 per kg and overall profits can increase by Rs.25,000 (5,000 kgs x 5)

7. **Decision Making**

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, 2004 are:

Particulars	Amount
Cocoa Beans Processed	7,500 pounds
Costs of processing cocoa beans to split off point (including purchase of beans)	Rs.7,12,500

Production and sales data is provided below:

	Production	Sales	Selling price
Chocolate powder	3,000 pounds	3,000 pounds	Rs. 190 per pound
Milk chocolate	5,100 pounds	5,100 pounds	Rs. 237.50 per pound

The October, 2004 separable costs of processing chocolate-powder liquor into chocolate powder are Rs. 3,02,812.50. The October 2004 separable costs of processing milk-chocolate liquor base into milk-chocolate are Rs. 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, 2004, Pokemon could have sold the chocolate powder liquor base for Rs. 997.50 a gallon and the milk-chocolate liquor base for Rs. 1,235 a gallon.

Required:
i. Calculate how the joint cost of Rs. 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)?
iii. Could Pokémon have increased its operating income by a change in its decision to fully process both of its intermediate products? Show your computations.

Answer:

WN 1: Reconciliation of input and output:

Particulars	Standard	Actual
Input	500 pounds of Cocoa Beans	7,500 pounds of Cocoa Beans
Intermediate products (Split-off stage)	20 Gallons of CPLB 30 Gallons of MCLB	300 Gallons of CPLB 450 Gallons of MCLB
Final products (Post processing stage	200 pounds of chocolate powder 340 pounds of milk chocolate	3,000 pounds of chocolate powder 5,100 pounds of milk chocolate

CPLB = Chocolate Powder Liquor Base

MCLB = Milk Chocolate Liquor Base

WN 2: Distribution of joint cost:

Particulars	CPLB	MCLB
Sales value at split off:		
Ratio of distribution	2,99,250 (300 x 997.50)	5,55,750 (450 x 1,235)
Share of joint cost	**2,49,375**	**4,63,125**
Physical measure (gallons):		
Ratio of distribution	300	450
Share of joint cost	**2,85,000**	**4,27,500**
NRV Method:		
Sale value after further processing	5,70,000	12,11,250
Less: Further processing cost	(3,02,812.50)	(6,23,437.50)
Less: Estimated profit	-	-
Less: Selling and distribution	-	-
NRV (Ratio of distribution)	2,67,187.50	5,87,812.50
Share of joint cost	**2,22,656.25**	**4,89,843.75**

WN 3: Profitability statement under different methods:

Method 1 – Sales value at split-off:

Particulars	Chocolate Powder	Milk Chocolate	Total
Sales	5,70,000.00	12,11,250.00	17,81,250.00
Less: Further processing cost	(3,02.812.50)	(6,23,437.50)	(9,26,250.00)
Less: Share of joint cost	(2,49,375.00)	(4,63,125.00)	(7,12,500.00)
Profit	**17,812.50**	**1,24,687.50**	**1,42,500.00**
Profit margin	**3.13%**	**10.29%**	**8.00%**

Method 2 – Physical measure method:

Particulars	Chocolate Powder	Milk Chocolate	Total
Sales	5,70,000.00	12,11,250.00	17,81,250.00
Less: Further processing cost	(3,02.812.50)	(6,23,437.50)	(9,26,250.00)
Less: Share of joint cost	(2,85,000.00)	(4,27,500.00)	(7,12.500.00)
Profit	**(17,812.50)**	**1,60,312.50**	**1,42,500.00**
Profit margin	**-3.13%**	**13.24%**	**8.00%**

Method 3 – NRV method:

Particulars	Chocolate Powder	Milk Chocolate	Total
Sales	5,70,000.00	12,11,250.00	17,81,250.00
Less: Further processing cost	(3,02.812.50)	(6,23,437.50)	(9,26,250.00)
Less: Share of joint cost	(2,22,656.25)	(4,89,843.75)	(7,12,500.00)
Profit	**44,531.25**	**97,968.75**	**1,42,500.00**
Profit margin	**7.81%**	**8.09%**	**8.00%**

Method 4 – Constant gross margin percentage:

Particulars	Chocolate Powder	Milk Chocolate	Total
Sales	5,70,000.00	12,11,250.00	17,81,250.00
Less: Further processing cost	(3,02.812.50)	(6,23,437.50)	(9,26,250.00)

Less: Share of joint cost (b/f)	(2,21,587.50)	(4,90,912.50)	(7,12,500.00)
Profit	45,600.00	96,900.00	1,42,500.00
Profit margin	8.00%	8.00%	8.00%

WN 3: Decision on further processing:

Particulars	Chocolate Powder	Milk Chocolate
Sale value after further processing	5,70,000.00	12,11,250.00
Less: Sale value at split off	(2,99,250.00)	(5,55,750.00)
Incremental revenues	**2,70,750.00**	**6,55,500.00**
Incremental cost (FPC)	(3,02,812.50)	(6,23,437.50)
Incremental Profit/Loss	**(32,062.50)**	**32,062.50**
Decision	SASO	SAFP

SASO = Sell at split off; SAFP = Sell after further processing

Conclusion: The company should sell chocolate powder at split-off stage to increase its profits by Rs.32,062.50

8. **By-product costing**

A company manufactures one main product (M1) and two by-products B1 and B2. For the month of January 2013, following details are available: Total Cost upto separation Point Rs. 2,12,400

Particulars	M1	B1	B2
Cost after separation	-	35,000	24,000
No of units produced	4,000	1,800	3,000
Selling price per unit	Rs.100	Rs.40	Rs.30
Estimated net profit as percentage to sales value	-	20%	30%
Estimated selling expenses as percentage to sales value	20%	15%	15%

There is no beginning or closing inventory.

Prepare statement showing:
    (i)   Allocation of joint cost; and
    (ii)   Product-wise and overall profitability of the company for January 2013.

Answer:

Distribution of joint cost and profitability statement:

Particulars	M1	B1	B2	Total
Sales	4,00,000	72,000	90,000	5,62,000
Less: Share of joint cost (b/f)	(1,75,100)	(11,800)	(25,500)	(2,12,400)
Less: Further processing cost	-	(35,000)	(24,000)	(59,000)
Less: Selling and distribution cost	(80,000)	(10,800)	(13,500)	(1,04,300)
Profit	**1,44,900**	**14,400**	**27,000**	**1,86,300**

Note:
- Profit margins have been given in the question and hence share of joint cost of B1 and B2 is reverse worked and taken as balancing figure
- Share of joint cost of M1 = Total cost – Share of Joint cost of B1 and B2

9. **Decision on further processing:**

SV chemicals Limited processes 9,00,000 kgs. of raw material in a month purchased at Rs. 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 'P1' and 'P2' in the ratio of 60 : 40. Product 'P1' can be sold at split off stage or can be further processed in department Y and sold as a new product 'YP1'. The input output ratio of department Y is 100: 95. Department Y is utilized only for further processing of product 'P1' to product 'YP1'. Individual departmental expenses are as follows:

Particulars	Department X (in lacs)	Department Y (in lacs)
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 lacs)
Product P1	28.38
Product P2	25.00
Product YP1	19.00

Selling price of the products 'P1' and 'P2' at split off point is Rs.110 per kg and Rs.325 per kg respectively. Selling price of new product 'YP1' is Rs. 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 'YP1'.

(iv) Would you recommend further processing of P1?

Answer:

WN 1: Reconciliation of input and output:

Particulars	Department X	Department Y
Input	9,00,000 Kg (RM)	4,86,000 kg (P1)
Output	90,000 Kg (Loss)	24,300 Kg (Loss)
	4,86,000 Kg (P1)	4,61,700 kg (YP1)
	3,24,000 Kg (P2)	

Note:

Department X:

- 10% of production is lost in processing and hence loss is 90,000 kg (9,00,000 x 10%)
- Balance 8,10,000 kgs is produced in the ratio of 60:40 for P1 and P2

Department Y:

- 5% of production is lost in processing and hence loss is 24,300 kg and 95% will be production of YP1 which is equal to 4,61,700 Kg

WN 2: Distribution of joint cost:

Step 1: Identify Joint cost:

Joint cost = (9 lac kgs x 95) + 350 lacs = 1,205 lacs

Step 2: Identify ratio of distribution and distribute joint cost

- Joint cost would be distributed on the basis of sales value net of selling expenses and the same is calculated below

Particulars	Product P1 (in lacs)	Product P2 (in lacs)
No of units	4,86,000	3,24,000
Selling price	110	325
Value of sales	534.60	1,053.00
Less: Selling expenses	(28.38)	(25.00)
Net sales value (ratio of distribution)	**506.22**	**1,028**
Share of joint cost	**397.59**	**807.41**

WN 3: Profitability statement of P1, P2 and YP1:

(in lacs)

Particulars	P1	P2	YP1
Units	4,86,000	3,24,000	4,61,700
Selling Price	110	325	150
Sales	**534.60**	**1,053.00**	**692.55**
Less: Share of joint cost	(397.59)	(807.41)	(397.59)
Less: Further processing cost	NA	NA	(128.00)
Less: Selling expenses	(28.38)	(25.00)	(19.00)
Profit	**108.63**	**220.59**	**147.96**

Conclusion:

- **The company should go ahead with further processing of P1 as the same leads to incremental profit of Rs.39.33 lacs**

10. **Joint and by-product costing**

Three products X, Y and Z along with a byproduct B are obtained again in a crude state which require further processing at a cost of Rs. 5 for X; Rs. 4 for Y; and Rs. 2.50 for Z per unit before sale. The byproduct is however saleable as such to a nearby factory. The selling prices for the three main products and byproduct, assuming they should yield a net margin of 25 percent of cost, are fixed at Rs. 13.75 Rs. 8.75 and Rs. 7.50 and Re. 1.00 respectively – all per unit quantity sold.

During a period, the joint input cost including the material cost was Rs. 90,800 and the respective outputs were:

X	8,000 units
Y	6,000 units
Z	4,000 units
B	1,000 units

By product should be credited to the joint cost and only the net joint costs are to be allocated to the main products.

Calculate the joint cost per unit of each product and the margin available as a percentage on cost.

Answer:

WN 1: Computation of Joint cost allocated to by-product:

Particulars	Amount
Sales	1,000
Less: Profit (1/4 on cost = 1/5 on sales)	-200
Joint cost allocated to by-product	**800**

WN 2: Distribution of joint cost:
- Total Joint cost = Rs.90,800
- Joint cost allocated to by-product = Rs.800
- **Joint cost to be allocated to main products = 90,800 – 800 = Rs.90,000**

Method to be followed:
- Estimated margin is given in the question and hence we can follow NRV method for cost distribution

Particulars	X	Y	Z	Total
Sales	1,10,000	52,500	30,000	1,92,500
Less: Further processing cost	(40,000)	(24,000)	(10,000)	(74,000)
Less: Estimated profit (1/5 on sales)	(22,000)	(10,500)	(6,000)	(38,500)
NRV (Ratio of distribution)	**48,000**	**18,000**	**14,000**	**80,000**
Share of joint cost	**54,000**	**20,250**	**15,750**	**90,000**
No of units	8,000	6,000	4,000	
Joint cost per unit	**6.75**	**3.375**	**3.9375**	

WN 3: Computation of actual margin as percentage of cost:

Particulars	X	Y	Z
Sales	1,10,000	52,500	30,000
Less: Further processing cost	(40,000)	(24,000)	(10,000)
Less: Share of joint cost	(54,000)	(20,250)	(15,750)
Gross margin (A)	16,000	8,250	4,250
Total cost (B)	94,000	44,250	25,750
Gross margin as % of cost (A/B)	**17.02%**	**18.64%**	**16.50%**

11. **Decision on further processing:**

A Company produces two joint products P and Q in 70 :30 ratio from basic raw materials in department A. The input output ratio of department A is 100:85. Product P can be sold at the split of stage or can be processed further at department B and sold as product AR. The input output ratio is 100:90 of department B. The department B is created to process product P only and to make it product AR.

The selling prices per kg. are as under:

- Product P Rs. 85
- Product Q Rs. 290
- Product AR Rs. 115

The production will be taken up in the next month.
- Raw materials 8,00,000 Kgs.
- Purchase price Rs. 80 per Kg.

Particulars	Department A (in lacs)	Department B (in lacs)
Direct materials	35.00	5.00
Direct Labour	30.00	9.00
Variable overheads	45.00	18.00
Fixed overheads	40.00	32.00
Total	**150.00**	**64.00**
Selling expenses:		
Product P	24.60	
Product Q	21.60	
Product AR	16.80	

Required:

(i) Prepare a statement showing the apportionment of joint costs.

(ii) State whether it is advisable to produce product AR or not.

Answer:

WN 1: Reconciliation of input and output:

Particulars	Department A	Department B
Input	8,00,000 Kg (RM)	4,76,000 kg (P)
Output	1,20,000 Kg (Loss)	47,600 Kg (Loss)
	4,76,000 Kg (P)	4,28,400 kg (AR)
	2,04,000 Kg (Q)	

Note:

Department A:

- 15% of production is lost in processing and hence loss is 1,20,000 kg (8,00,000 x 15%)
- Balance 6,80,000 kgs is produced in the ratio of 70:30 for P and Q

Department B:

- 10% of production is lost in processing and hence loss is 47,600 kg and 90% will be production of AR which is equal to 4,28,400 Kg

WN 2: Distribution of joint cost:

Step 1: Identify Joint cost:

Joint cost = (8 lac kgs x 80) + 150 lacs = 790 lacs

Step 2: Identify ratio of distribution and distribute joint cost

- It is assumed that Joint cost would be distributed on the basis of sales value net of selling expenses

Particulars	Product P (in lacs)	Product Q (in lacs)
No of units	4,76,000	2,04,000
Selling price	85	290
Value of sales	404.60	591.60
Less: Selling expenses	(24.60)	(21.60)
Net sales value (ratio of distribution)	**380**	**570**
Share of joint cost	**316**	**474**

WN 3: Profitability statement of P, Q and AR:

(in lacs)

Particulars	P	Q	AR
Units	4,76,000	2,04,000	4,28,400
Selling Price	85	290	115

Sales	404.60	591.60	492.66
Less: Share of joint cost	(316.00)	(474.00)	(316.00)
Less: Further processing cost	NA	NA	(64.00)
Less: Selling expenses	(24.60)	(21.60)	(16.80)
Profit	**64.00**	**96.00**	**95.86**

Conclusion:

- **The company should go ahead with further processing of P1 as the same leads to incremental profit of Rs.39.33 lacs**

12. By-product Costing:

While manufacture of the main product 'A' two by-products 'P' and 'Q' emerge. The joint expenses of manufacture amount to Rs.1,67,550. All the three products are processed further separation and sold as per details given below:

Particulars	Main Product A	By Product P	By Product Q
Sales	1,30,000	70,000	50,000
Cost incurred after separation	8,000	7,000	6,000
Profit as percentage of sales (%)	20	10	15

Total fixed selling expenses are 10% of total cost of sales which are apportioned to the three products in the ratio of 5:3:2 Prepare a statement showing the appointment of joints costs to the main product and two byproducts.

Answer:

Distribution of joint cost:

Particulars	A	P	Q	Total
Sales	1,30,000	70,000	50,000	2,50,000
Less: Share of joint cost (b/f)	**(85,525)**	**(49,715)**	**(32,310)**	**(1,67,550)**
Less: Further processing cost	(8,000)	(7,000)	(6,000)	(21,000)
Less: Selling and distribution cost	(10,475)	(6,285)	(4,190)	(20,950)
Profit	**26,000**	**7,000**	**7,500**	**40,500**

Note:

- Profit margins have been given in the question and the same would add to Rs.40,500
- Total selling and distribution cost are taken as balancing figure and distributed in the ratio of 5:3:2
- Share of joint cost is finally taken as balancing figure by doing reverse working

13. By-product costing:

A factory producing article A also produces a by-product B which is further processed into finished product. The joint cost of manufacture is given below:

Particulars	Amount
Material	5,000
Labour	3,000
Overhead	2,000
Total Cost	**10,000**

Subsequent cost in Rs. are given below:

Particulars	A	B
Material	3,000	1,500
Labour	1,400	1,000
Overhead	600	500
Total Cost	**5,000**	**3,000**

Selling prices for A is Rs.16,000 and B is Rs.8,000

Estimated profit on selling prices is 25% for A and 20% for B. Assume that selling and distribution expenses are in proportion of sales prices. Show how you would apportion joint costs of manufacture and prepare a statement showing cost of production of A and B

Answer:

WN 1: Distribution of joint cost and profit statement:

Particulars	A	B	Total
Sales	16,000	8,000	24,000

Less: Further processing cost	(5,000)	(3,000)	(8,000)
Less: Share of joint cost	**(6,733)**	**(3,267)**	**(10,000)**
Less: Selling and distribution cost	(267)	(133)	400
Profit	4,000	1,600	5,600

Note:
- Profit margins have been given in the question and the same would add to Rs.5,600
- Total selling and distribution cost are taken as balancing figure and distributed in the ratio of selling prices
- Share of joint cost is finally taken as balancing figure by doing reverse working

WN 2: Statement showing cost of production of A and B:

Particulars	A	B	Total
Material cost			
Share of joint cost of material (5,000)	3,367	1,633	5,000
FPC of material	3,000	1,500	4,500
Total material cost	**6,367**	**3,133**	**9,500**
Labour cost:			
Share of joint cost of labour (3,000)	2,020	980	3,000
FPC of labour	1,400	1,000	2,400
Total labour cost	**3,420**	**1,980**	**5,400**
Overheads cost:			
Share of joint cost of overheads (2,000)	1,346	654	2,000
FPC of overheads	600	500	1,100
Total overheads cost	**1,946**	**1,154**	**3,100**

14. By-product costing:

A factory is engaged in the production of chemical Bomex and in the course of its manufacture a by-product Cromex is produced which after further processing has a commercial value. For the month of April 2019, the following are the summarized cost data:

Particulars	Joint expenses	Separate expenses	
		Bomex	**Cromex**
Materials	1,00,000	6,000	4,000
Labour	50,000	20,000	18,000
Overheads	30,000	10,000	6,000
Selling price per unit		100	40
Estimated profit per unit on sale of cromex			5
Number of units produced		2,000 units	2,000 units

The factory uses NRV method for apportionment of joint cost to by-products. You are required to prepare statement showing:

        (i)   Joint cost allocable to Cromex
        (ii)   Product wise and overall profitability of the factory for April 2019

Answer:
Distribution of joint cost:

Particulars	Bomex	Cromex	Total
Sales	2,00,000	80,000	2,80,000
Less: Share of joint cost	**(1,38,000)**	**(42,000)**	**(1,80,000)**
Less: Further processing cost	(36,000)	(28,000)	(64,000)
Profit	**26,000**	**10,000**	**36,000**

Note:
- Profit margins have been given in the question and hence share of joint cost of Cromex is reverse worked and taken as balancing figure
- Share of joint cost of Bomex = Total cost – Share of Joint cost of Cromex

15. By-product Costing:

A Limited produces 'M' as a main product and gets two by products – 'P' and 'Q' in the course of processing. Following information are available for the month of October 2017:

Particulars	M	P	Q

Cost after separation	-	60,000	30,000
No of units produced	4,500	2,500	1,500
Selling price (per unit)	170	80	50
Estimated net profit to sales	-	30%	25%

The joint cost of manufacture upto separation point amounts to Rs.2.50,000. Selling expenses amounting to Rs.85,000 are to be apportioned to the three products in the ratio of sales units. There is no opening and closing stock.

Prepare the statement showing:
- Allocation of joint cost
- Product wise overall profitability and
- Advise the company regarding results if the by product 'P' is not further processed and is sold at the point of separation at Rs.60 per unit without incurring selling expenses

Answer:
WN 1: Distribution of joint cost and profitability statement:

Particulars	M	P	Q	Total
Sales	7,65,000	2,00,000	75,000	10,40,000
Less: Share of joint cost (b/f)	(1,83,750)	(55,000)	(11,250)	(2,50,000)
Less: Further processing cost	-	(60,000)	(30,000)	(90,000)
Less: Selling and distribution cost	(45,000)	(25,000)	(15,000)	(85,000)
Profit	5,36,250	60,000	18,750	6,15,000

Note:
- Profit margins have been given in the question and hence share of joint cost of P and Q is reverse worked and taken as balancing figure
- Share of joint cost of M = Total cost – Share of Joint cost of P and Q

WN 2: Decision on further processing of by product 'P':

Particulars	M
Sales	1,50,000
Less: Share of joint cost (b/f)	(55,000)
Less: Further processing cost	-
Less: Selling and distribution cost	-
Profit	95,000

The company should sell by product P at split off stage as the same leads to incremental profit of Rs.35,000

Additional Home Work Problems:
1. **Loss in processing and decision on further processing**

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 Rs. 12 per kg. The processing costs per month are:

Particulars	Amount
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 Rs. 12 per kg. and Q Rs. 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 Rs. 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 Rs. 1,85,000 per month.

You are required to prepare a statement showing the monthly profitability based both on the existing manufacturing operations and on further processing.

Will you recommend further processing?

Answer:
WN 1: Reconciliation of input and output:

Particulars	Process 1	Process 2

Input	1,50,000 kg (RM)	47,500 kg (P)
Output	7,500 kg (Loss) 47,500 kg (P) 95,000 kg (Q)	47,500 kg (S)

Note:
Process 1:
- 5% of production is lost in processing and hence loss is 7,500 kg (1,50,000 x 5%)
- Balance 1,42,500 kgs is produced in the ratio of 1:2 for P and Q

Process 2:
- There is no loss in processing and hence input of 47,500 kg of P will lead to output of 47,500 kg of S

WN 2: Distribution of joint cost:
Step 1: Identify Joint cost:
Joint cost = 18,00,000 + 90,000 + 1,20,000 + 1,00,000 + 1,00,000 = Rs.22,10,000

Step 2: Identify ratio of distribution and distribute joint cost
- It is assumed that Joint cost would be distributed on the basis of sales value at split off

Particulars	Product P (in lacs)	Product Q (in lacs)
No of units	47,500	95,000
Selling price	12	20
Sales value at split off (ratio of distribution)	5,70,000	19,00,000
Share of joint cost	**5,10,000**	**17,00,000**

WN 3: Profitability statement of P, Q and S:

Particulars	P	Q	S
Units	47,500	95,000	47,500
Selling Price	12	20	15
Sales	**5,70,000**	**19,00,000**	**7,12,500**
Less: Share of joint cost	(5,10,000)	(17,00,000)	(5,10,000)
Less: Further processing cost	NA	NA	(1,85,000)
Profit	**60,000**	**2,00,000**	**17,500**

Conclusion:
- **Total profit of existing operations = 60,000 + 2,00,000 = 2,60,000**
- **Total profit based on further processing = 17,500 + 2,00,000 = 2,17,500**
- **The company should not go ahead with further processing of P as the same leads to incremental loss of Rs.42,500**

2. **Distribution of joint cost and decision on further processing**
Inorganic Chemicals purchases salt and processes it into more refined products such as Caustic Soda, Chlorine and PVC. In the month of July, Inorganic Chemicals purchased Salt for Rs. 40,000. Conversion of Rs. 60,000 were incurred upto the split off point, at which time two sealable products were produced. Chlorine can be further processed into PVC.
The July production and sales information are as follows:

Particulars	Production (tonnes)	Sales quantity (tonnes)	Selling price Per tonne
Caustic soda	1,200	1,200	Rs.50
Chlorine	800	-	-
PVC	500	500	Rs.200

All 800 tonnes of Chlorine were further processed, at an incremental cost of Rs. 20,000 to yield 500 tonnes of PVC. There was no beginning or ending inventories of Caustic Soda, Chlorine or PVC in July. There is active market for Chlorine. Inorganic Chemicals could have sold all its July production of Chlorine at Rs. 75 per tonne.

Required:

(1) To calculate how joint cost of Rs. 1,00,000 would be apportioned between Caustic Soda and Chlorine under each of following methods:

 a) Sales value at split off,
 b) Physical measure (method), and
 c) Estimated net realisable value.

(2) Lifetime Swimming Pool Products offers to purchase 800 tonnes of Chlorine in August at Rs. 75 per tonne. This sale of Chlorine would mean that no PVC would be produced in August. How the acceptance of this offer for the month of August would affect operating income?

Answer:

WN 1: Distribution of joint cost:

Particulars	Caustic Soda	Chlorine	Total
Sales value at split off:			
Sales value at split off (Ratio of distribution)	60,000	60,000	1,20,000
Share of joint cost	50,000	50,000	1,00,000
Physical measure method			
Units produced (ratio of distribution)	1,200	800	2,000
Share of joint cost	60,000	40,000	1,00,000
NRV Method			
Sale value after further processing	60,000	1,00,000	1,60,000
Less: Further processing cost	-	(20,000)	(20,000)
NRV (Ratio of distribution)	60,000	80,000	1,40,000
Share of joint cost	42,857	57,143	1,00,000

WN 2: Decision on further processing:

Particulars	PVC
Sale value after further processing	1,00,000
Less: Sale value at split off	(60,000)
Incremental revenues	**40,000**
Incremental cost (FPC)	(20,000)
Incremental Profit/Loss	**20,000**
Decision	SAFP

The company should not accept the offer of selling chlorine and should process the same to PVC to earn incremental profit of Rs.20,000

 3. Distribution of joint cost and decision on further processing:

Sunmoon Ltd. produces 2,00,000: 30,000; 25,000; 20,000 and 75,000 units of its five products A, B, C, D and E respectively in a manufacturing process and sells them at Rs. 17, Rs. 13, Rs. 8, Rs. 10 and Rs. 14 per unit. Except product D remaining products can be further processed and then can be sold at Rs. 25, Rs. 17, Rs. 12 and Rs. 20 per unit in case of A, B, C and E respectively.

Raw material costs Rs. 35,90,000 and other manufacturing expenses cost Rs. 5,47,000 in the manufacturing process which are absorbed on the products on the basis of their 'Net realisable value'. The further processing costs of A, B, C and E are Rs. 12,50,000; Rs. 1,50,000; Rs. 50,000 and Rs. 1,50,000 respectively. Fixed costs are Rs. 4,73,000.

You are required to prepare the following in respect of the coming year:

 a) Statement showing income forecast of the company assuming that none of its products are to be further processed.
 b) Statement showing income forecast of the company assuming that products A, B, C and E are to be processed further.
 c) Can you suggest any other production plan whereby the company can maximise its profits? If yes, then submit a statement showing income forecast arising out of adoption of that plan.

Answer:

WN 1: Distribution of joint cost as per NRV Method:

Particulars	A	B	C	D	E	Total
Sale value after further processing	50,00,000	5,10,000	3,00,000	2,00,000	15,00,000	75,10,000

Less: Further processing cost	(12,50,000)	(1,50,000)	(50,000)	-	(1,50,000)	(15,50,000)
NRV (Ratio of distribution)	**37,50,000**	**3,60,000**	**2,50,000**	**2,00,000**	**13,50,000**	**59,10,000**
Share of joint cost	26,25,000	2,52,000	1,75,000	1,40,000	9,45,000	41,37,000

WN 2: Profitability statement if all products are sold at split off stage:

Particulars	A	B	C	D	E	Total
Sales	34,00,000	3,90,000	2,00,000	2,00,000	10,50,000	52,50,000
Less: Share of joint cost	(26,25,000)	(2,52,000)	(1,75,000)	(1,40,000)	(9,45,000)	(41,37,000)
Profit/loss	7,75,000	1,38,000	25,000	60,000	1,05,000	11,03,000
Less: Fixed cost						(4,73,000)
Profit						6,30,000

WN 3: Profitability statement if all products except D is sold after further processing:

Particulars	A	B	C	D	E	Total
Sales	50,00,000	5,10,000	3,00,000	2,00,000	15,00,000	75,10,000
Less: Share of joint cost	(26,25,000)	(2,52,000)	(1,75,000)	(1,40,000)	(9,45,000)	(41,37,000)
Less: Further processing cost	(12,50,000)	(1,50,000)	(50,000)	-	(1,50,000)	(16,00,000)
Profit/loss	11,25,000	1,08,000	75,000	60,000	4,05,000	17,73,000
Less: Fixed cost						(4,73,000)
Profit						13,00,000

WN 4: Optimum processing decision and revised profitability statement:
- A, C and E should be sold after further processing as they make higher profits with further processing
- B should be sold at split off stage as the profits are higher with sale at split off

Particulars	A	B	C	D	E	Total
Sales	50,00,000	3,90,000	3,00,000	2,00,000	15,00,000	73,90,000
Less: Share of joint cost	(26,25,000)	(2,52,000)	(1,75,000)	(1,40,000)	(9,45,000)	(41,37,000)
Less: Further processing cost	(12,50,000)	-	(50,000)	-	(1,50,000)	(14,50,000)
Profit/loss	11,25,000	1,08,000	75,000	60,000	4,05,000	18,03,000
Less: Fixed cost						(4,73,000)
Profit						13,30,000

4. Process costing and Joint and by-product costing:

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:

Particulars	Process 1	Process 2
Direct material 2,500 kg @ Rs.4	10,000	-
Direct labour	6,260	6,900
Overheads	4,500	6,900
Normal loss	10% of input	
Scrap value of loss	Rs.2 per KG	

Output = 2,300 KG which include 900 kg of A, 800 kg of B and 600 Kg of C.

There was no opening or closing stocks in either process and the selling prices of the output from process 2 were:

Particulars	Amount
Joint Product A	Rs.24 per KG
Joint Product B	Rs.18 per KG
Joint Product C	Rs.12 per KG

Required:
1. Prepare an account for process 1 together with any Loss or Gain Accounts you consider necessary to record the month's activities.
2. 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.

Answer:

WN 1: Input output statement for Process 1:

Particulars	Units
Opening stock	0
Add: Input	2,500
Total Input	2,500
Less: Closing stock	0
Processed Production	2,500
Less: Normal loss @ 10%	(250)
Expected output	2,250
Actual output	2,300
Abnormal loss	50

WN 2: Process 1 Account:

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Direct material	2,500	10,000	By Normal loss	250	500
To Direct Labour		6,250	By Process 2 A/c	2,300	20,700
To Overheads		4,500			
To Abnormal gain	50	450			
Total	**2,550**	**21,200**	**Total**	**2,550**	**21,200**

$$\text{Cost per good unit} = \frac{\text{Total cost} - \text{Sale value of normal loss}}{\text{Expected Output}} = \frac{20,750 - 500}{2,250} = \text{Rs. 9 per unit}$$

WN 3: Normal loss and Abnormal gain Account:

Normal Loss Account

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Process 1 A/c	250	500	By Bank A/c	200	400
			By Abnormal gain A/c	50	100
Total	**250**	**500**	**Total**	**250**	**500**

Abnormal Gain Account

Dr					Cr
Particulars	Units	Amount	Particulars	Units	Amount
To Normal loss A/c	50	100	By Process 1 A/c	50	450
To Profit and Loss A/c		350			
Total	**50**	**450**	**Total**	**50**	**450**

WN 4: Distribution of joint cost:

- Joint cost = 20,700 + 6,900 + 6,900 = Rs.34,500

Particulars	A	B	C	Total
Physical unit method:				
Units produced (ratio of distribution)	900	800	600	2,300
Share of joint cost	**13,500**	**12,000**	**9,000**	**34,500**
Market value of output:				
Sale value of output (ratio of distribution)	21,600	14,400	7,200	43,200
Share of joint cost	**17,250**	**11,500**	**5,750**	**34,500**

WN 5: Profitability statement:

Based on Physical unit method:

Particulars	A	B	C	Total
Sales	21,600	14,400	7,200	43,200
Less: Share of joint cost	(13,500)	(12,000)	(9,000)	(34,500)
Profit/Loss	**8,100**	**2,400**	**(1,800)**	**8,700**

Based on market value of output:

Particulars	A	B	C	Total
Sales	21,600	14,400	7,200	43,200
Less: Share of joint cost	(17,250)	(11,500)	(5,750)	(34,500)
Profit/Loss	**4,350**	**2,900**	**1,450**	**8,700**

5. Distribution of joint cost and computation of gross margin

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 Rs. 1,500 per ton
- Y – 527 tons sold for Rs. 1,125 per ton
- Z – 736 tons sold for Rs. 750 per ton

The total joint manufacturing costs for the year were Rs. 6,25,000. An additional Rs.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)

Answer:

WN 1: Distribution of joint cost under NRV Method:

Particulars	X	Y	Z	Total
Sale value after further processing	5,49,000 (366 x 1,500)	6,60,375 (587 x 1,125)	5,70,750 (761 x 750)	17,80,125
Less: Further processing cost	-	-	(3,10,000)	(3,10,000)
NRV (Ratio of distribution)	**5,49,000**	**6,60,375**	**2,60,750**	**14,70,125**
Share of joint cost	**2,33,398**	**2,80,748**	**1,10,854**	**6,25,000**

WN 2: Valuation of closing stock and Cost of Good Sold under NRV Method:

Particulars	X	Y	Z
Share of joint cost	2,33,398	2,80,748	1,10,854
Further processing cost	-	-	3,10,000
Total cost	**2,33,398**	**2,80,748**	**4,20,854**
No of units produced	366	587	761
Cost per unit	**637.6995**	**478.2760**	**553.0276**
Value of closing stock (Closing stock x cost per unit)	**1,14,786**	**28,697**	**13,826**
Value of cost of sales (units sold x cost per unit)	**1,18,612**	**2,52,051**	**4,07,028**

WN 3: Computation of Gross margin under NRV Method:

Particulars	X	Y	Z	Total
Sales	2,79,000	5,92,875	5,52,000	14,23,875
Less: Cost of goods sold (WN 2)	(1,18,612)	(2,52,051)	(4,07,028)	(7,77,691)

Gross Margin	1,60,388	3,40,814	1,44,972	6,46,174
Gross Margin %	**57.49%**	**57.48%**	**26.26%**	**45.38%**

WN 4: Computation of company gross margin under constant gross margin percentage method:

Particulars	Calculation	Amount
Sale value of all units produced	WN 1	17,80,125
Less: Joint cost		(6,25,000)
Less: Further processing cost		(3,10,000)
Overall margin		8,45,125
Overall margin %	$\dfrac{8,45,125}{17,80,125}$ **x 100**	**47.4756%**

WN 5: Distribution of Joint cost under constant gross margin percentage method:

Particulars	X	Y	Z	Total
Sales value of all units	5,49,000	6,60,375	5,70,750	17,80,125
Less: Gross margin (Sales x 47.4756%)	(2,60,641)	(3,13,517)	(2,70,967)	(8,45,125)
Cost of units produced	2,88,359	3,46,858	2,99,783	9,35,000
Less: Further processing cost	-	-	(3,10,000)	(3,10,000)
Share of Joint cost	**2,88,359**	**3,46,858**	**(10,217)**	**6,25,000**

Note: Share of joint cost is negative for product Z and that is possible under constant gross margin percentage method to make the gross margin same for all products

WN 6: Valuation of closing stock and Cost of Goods Sold under constant gross margin:

Particulars	X	Y	Z
Share of joint cost	2,88,359	3,46,858	(10,217)
Further processing cost	-	-	3,10,000
Total cost	**2,88,359**	**3,46,858**	**2,99,783**
No of units produced	366	587	761
Cost per unit	**787.8661**	**590.9000**	**393.9330**
Value of closing stock (Closing stock x cost per unit)	**1,41,816**	**35,454**	**9,848**
Value of cost of sales (units sold x cost per unit)	**1,46,543**	**3,11,404**	**2,89,935**

WN 7: Computation of Gross margin under NRV Method:

Particulars	X	Y	Z	Total
Sales	2,79,000	5,92,875	5,52,000	14,23,875
Less: Cost of goods sold (WN 2)	(1,46,543)	(3,11,404)	(2,89,935)	(7,47,882)
Gross Margin	1,32,457	2,81,461	2,62,065	6,75,983
Gross Margin %	**47.48%**	**47.48%**	**47.48%**	**47.48%**

6. **Loss in processing with closing stock**

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 Rs. 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 Rs. 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 Rs. 1,50,000.

The details of sales during the year are:

Particulars	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 Rs. 8 and Rs. 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.

Answer:

WN 1: Reconciliation of input and output:

Particulars	Department 1	Department 2	Department 3
Input	2,00,000 kg (RM)	1,20,000 kg (X)	60,000 kg (Y)
Output	20,000 kg (Loss) 1,20,000 Kg (X) 60,000 kg (Y)	20,000 kg (Loss) 1,00,000 Kg (X)	1,20,000 kg (Y)

Note:

Department 1:

- 10% of production is lost in processing and hence loss is 20,000 kg (2,00,000 x 10%)
- 60% of production was X and same would be 1,20,000 kg (2,00,000 x 60%)
- 30% of production was Y and same would be 60,000 kg (2,00,000 x 30%)

Department 2:

- $1/6^{th}$ of the output is lost in processing and hence loss is 20,000 kg (1,20,000 x (1/6))
- Balance production of X = 1,20,000 – 20,000 = 1,00,000 Kg

Department 3:

- New materials are added and hence weight will double to 1,20,000 kgs

WN 2: Distribution of joint cost:

Step 1: Identify Joint Cost:

Joint cost = Rs.8,75,000

Step 2: Identify ratio and distribute joint cost:

Particulars	X	Y
Units produced	1,20,000	60,000
SP at split off	8	4
Sales value at split off (ratio of distribution)	**9,60,000**	**2,40,000**
Share of joint cost	**7,00,000**	**1,75,000**

WN 3: Computation of cost per kg of Product X and Y:

Particulars	X	Y
Units produced (KG)	1,00,000	1,20,000
Share of joint cost (WN 2)	7,00,000	1,75,000
Joint cost per KG	**7.0000**	**1.4583**
Further processing cost	1,80,000	1,50,000
FPC per KG	**1.8000**	**1.2500**
Total cost per KG	**8.8000**	**2.7083**

WN 4: Profitability statement for the period:

Particulars	X	Y
Units sold (Kg)	90,000	1,15,000
Selling price per kg	10.0000	4.0000
Less: Share of joint cost per kg	(7.0000)	(1.4583)
Less: Further processing cost per kg	(1.8000)	(1.2500)

Profit per kg	1.2000	1.2917
Total Profit	1,08,000	1,48,546

WN 5: Decision on further processing:

Particulars	X	Y
Sale value after further processing (for all units produced)	10,00,000	4,80,000
Less: Sale value at split off (for all units produced)	(9,60,000)	(2,40,000)
Incremental revenues	**40,000**	**2,40,000**
Incremental cost (FPC)	1,80,000	1,50,000
Incremental Profit/Loss	**(1,40,000)**	**90,000**
Decision	SASO	SAFP

SAFP = Sale after further processing; SASO = Sale at split off

Decision: The company should sell Product X at split-off stage

7. **Decision on further processing:**

In an Oil Mill four products emerge from a refining process. The total cost of input during the quarter ending March 2010 is Rs.1,48,000. The output, sales and additional processing costs are as under:

Products	Output in Litres	Further processing cost	Sales Value
ACH	8,000	43,000	1,72,500
BCH	4,000	9,000	15,000
CSH	2,000	-	6,000
DSH	4,000	1,500	45,000

In case these products are disposed off at the split off point that is before further processing, the selling price would have been:

Products	Price
ACH	15.00
BCH	6.00
CSH	3.00
DSH	7.50

Prepare a statement of profitability based on:
- If the products are sold after further processing is carried out in the mill
- If they are sold at the split off point

Answer:

WN 1: Distribution of joint cost:

It is assumed that company is following sales value at split off method for distributing joint cost.

Particulars	ACH	BCH	CSH	DSH	Total
Sales value at split off	1,20,000	24,000	6,000	30,000	1,80,000
Share of joint cost	98,667	19,733	4,933	24,667	1,48,000

WN 2: Statement of profitability if all products are sold after further processing:

Particulars	ACH	BCH	CSH	DSH	Total
Sales	1,72,500	15,000	6,000	45,000	2,38,500
Less: Share of joint cost	(98,667)	(19,733)	(4,933)	(24,667)	(1,48,000)
Less: Further processing cost	(43,000)	(9,000)	-	(1,500)	(53,500)
Profit/Loss	**30,833**	**(13,733)**	**1,067**	**18,833**	**37,000**

WN 3: Statement of profitability if all products are sold after further processing:

Particulars	ACH	BCH	CSH	DSH	Total
Sales	1,20,000	24,000	6,000	30,000	1,80,000
Less: Share of joint cost	(98,667)	(19,733)	(4,933)	(24,667)	(1,48,000)
Less: Further processing cost	-	-	-	-	-
Profit/Loss	**21,333**	**4,267**	**1,067**	**5,333**	**32,000**

8. **Decision on further processing:**

Oleum refinery Limited refines crude oil and produces two joint product Gasoline and HSD in the ratio of 4:6. The refining is done in three processes.

Crude oil is first fed in Process A, from where two products Gasoline and HSD are get separated. After separation from Process A, Gasoline and HSD are further processed in Process B and Process C respectively. During the month of July, 2014, 4,50,000 litres of crude oil were processed in Process A at a total cost of Rs.1,71,99,775. In Process B, Gasoline is further processed at a cost of Rs.10,80,000. In Process C, HSD is further processed at a cost of Rs.1,35,000.

The input output ratio for each process is as follows:
- Process A = 1:0.80
- Process B = 1:0.95
- Process C = 1:0.90

The details of sales during the month are:

Particulars	Gasoline	HSD
Quantity sold	1,32,000	1,88,000
Sales Price per litre	68	46

There were no opening stocks. If these products were sold at split-off point, the selling price of Gasoline and HSD would be Rs.64 and Rs.41 per litre respectively.

Required:
- Prepare a statement showing the apportionment of joint cost to Gasoline and HSD in proportion of sales value at split off point
- Prepare a statement showing the cost per litre of each product indicating joint cost, processing cost and total cost separately
- Prepare a statement showing the product wise profit or loss for the month

Answer:

WN 1: Reconciliation of input and output:

Particulars	Process A	Process B	Process C
Input	4,50,000 litres (Crude Oil)	1,44,000 Litres (Gasoline)	2,16,000 Litres (HSD)
Output	90,000 Litres (Loss) 1,44,000 Litres (Gasoline) 2,16,000 Litres (HSD)	7,200 Litres (Loss) 1,36,800 Litres (Gasoline)	21,600 Litres (Loss) 1,94,400 Litres (HSD)

Note:

Process A:
- 20% of production is lost in processing and hence loss is 90,000 litres (4,50,000 x 20%)
- 40% of production was Gasoline and same would be 1,44,000 litres (3,60,000 x 40%)
- 60% of production was HSD and same would be 2,16,000 litres (3,60,000 x 60%)

Process B:
- 5% of production is lost in processing and hence loss is 7,200 Litres (1,44,000 x 5%)
- Balance production of Gasoline = 1,44,000 – 7,200 = 1,36,800 litres

Process C:
- 10% of production is lost in processing and hence loss is 21,600 Litres (2,16,000 x 10%)
- Balance production of HSD = 2,16,000 – 21,600 = 1,94,400 Litres

WN 2: Distribution of joint cost:
Step 1: Identify Joint Cost:
Joint cost = Rs.1,71,99,775

Step 2: Identify ratio and distribute joint cost:

Particulars	Gasoline	HSD
Units produced	1,44,000	2,16,000
SP at split off	64	41
Sales value at split off (ratio of distribution)	**92,16,000**	**88,56,000**
Share of joint cost	**87,71,200**	**84,28,575**

WN 3: Computation of cost per kg of Product X and Y:

Particulars	X	Y

Units produced (KG)	1,36,800	1,94,400
Share of joint cost (WN 2)	87,71,200	84,28,575
Joint cost per KG	**64.1170**	**43.3569**
Further processing cost	10,80,000	1,35,000
FPC per KG	**7.8947**	**0.6944**
Total cost per KG	**72.0117**	**44.0513**

WN 4: Profitability statement for the period:

Particulars	X	Y
Units sold (Kg)	1,32,000	1,88,000
Selling price per kg	68.0000	46.0000
Less: Share of joint cost per kg	(64.1170)	(43.3569)
Less: Further processing cost per kg	(7.8947)	(0.6944)
Profit per kg	**(4.0117)**	**1.9487**
Total Profit	**(5,29,544)**	**3,66,356**

CHAPTER 12: SERVICE COSTING

1. Differentiate service costing and product costing? **[Category B]**

Service costing differs from product costing in the following ways:
- ❖ Unlike products, services are intangible and hence there is no inventory for the services
- ❖ Use of composite cost units for cost measurement and to express the volume of outputs
- ❖ Employee cost forms a major cost element in service costing
- ❖ Service sector heavily depends on support services and hence indirect costs like administration overheads are generally a significant proportion of total cost

2. What is a service cost unit? **[Category A]**
- ❖ Cost unit is a **unit of product, service or time** (or combination of these) in relation to which costs may be ascertained or expressed
- ❖ Service sector can employ composite cost units as costs are driven by multiple factors. Typical cost units for some of the services is provided in the below table:

Service Industry	Unit of cost
Transport services	Passenger Kilometres, Quintal Kilometres, Ton-KM
Electricity supply	Kilowatt hours
Hospital	Patient days, room days, per bed, per operation
Canteen	Per item, per meal
Cinema	Per ticket
Hotels	Guest days or room days
Bank of financial institutions	Per transaction or per service
Educational institutions	Per course, per student, per batch, per lecture
IT & ITES	Cost per project, per module
Insurance	Per policy, per claim, per TPA

3. What is a composite cost unit? **[Category B]**
- ❖ Two measurement units are combined together to know the cost of service is known as composite cost unit.
- ❖ Example: Passenger KM, Patient days, Student hours

4. What is absolute tonne KM and commercial tonne KM? **[Category B]**
- ❖ Absolute tonne KM is the summation of the respective distance multiplied by respective quantity
- ❖ Commercial tonne KM is calculated as total distance travelled multiplied by average quantity

5. Explain the format of operating cost sheet? **[Category B]**

Particulars	Calculation	Amount
Fixed costs or standing charges		
Depreciation		XXX
Tax		XXX
Insurance		XXX
Stationery		XXX
Manager's salary		XXX
Garage Rent		XXX
Driver's salary		XXX
Conductor's salary		XXX
Total fixed costs		**XXX**
Variable costs or running charges		
Diesel and Oil		XXX
Total Variable costs		**XXX**
Semi-variable costs or maintenance charges		
Repairs		XXX
Total semi-variable costs		**XXX**

Total costs		XXX

1. Calculation of absolute tonne-km and commercial tonne-km

A lorry starts with a load of 20 tonnes of goods from station A. It unloads 8 tonnes at station B and rest of goods at station C. It reaches back directly to station A after getting reloaded with 16 tonnes of goods at station C. The distance between A to B, B to C and then from C to A are 80 kms., 120 kms., and 160 kms., respectively. Compute 'Absolute tonnes-kms. and 'Commercial tonnes-kms.

Answer:

Computation of Absolute Tonne KM:

Route	Distance in KM	Tonnes	Tonne KM
A to B	80	20	1,600
B to C	120	12	1,440
C to A	160	16	2,560
Total	**360**	**48**	**5,600**

Absolute Tonne KM = 5,600 tonne KM

Commercial Tonne KM = Total distance x Average Load = $360 \times \dfrac{48}{3}$ = 5,760 tonne KM

2. Fare to be charged per passenger KM

A transport company has been given a 40 kilometre long route to run 5 buses. The cost of each bus is Rs.6,50,000. The buses will make 3 round trips per day carrying on average 80 percent passengers of the seating capacity. The seating capacity of each bus is 40 passengers. The buses will run on an average for 25 days in a month. The other information for 2011-12 is given below:

Particulars	Amount
Garage Rent	Rs.4,000 per month
Annual repairs and maintenance	Rs.22,500 each bus
Salaries of 5 drivers	Rs.3,000 each per month
Wages of 5 conductors	Rs.1,200 each per month
Manager's salary	Rs.7,500 per month
Road tax, permit fee etc	Rs.5,000 for a quarter
Office expenses	Rs.2,000 per month
Cost of diesel per litre	Rs.33
Kilometers run per litre for each bus	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 1/3 on takings (total receipts from passengers).

Answer:

WN 1: Computation of distance travelled and Passenger KM:

Particulars	Amount
Distance travelled per day (40 KM x 2 x 3 round trips)	240
Distance travelled per month (240 KM x 25 days)	6,000
Distance travelled per year (6,000 x 12 months)	72,000
Distance travelled per year for 5 buses (72,000 x 5)	3,60,000
Average passenger occupancy (40 x 80%)	32
Passenger KM (Distance x Passengers)	**1,15,20,000**

WN 2: Cost sheet for operating five buses for a year:

Particulars	Calculation	Amount
Fixed cost or standing charges:		
Garage rent	4,000 x 12	48,000
Driver's salary	3,000 x 12 x 5	1,80,000
Conductor's salary	1,200 x 12 x 5	72,000
Manager salary	7,500 x 12	90,000
Road tax (5,000 per quarter assumed for 5 buses)	5,000 x 4	20,000
Office expenses	2,000 x 12	24,000

Depreciation	6,50,000 x 15% x 5	4,87,500
Insurance	6,50,000 x 3% x 5	97,500
Total Fixed Cost (A)		**10,19,000**
Variable cost or running charges		
Diesel cost	$3,60,000 \times \left(\dfrac{33}{6}\right)$	19,80,000
Total Variable Cost (B)		**19,80,000**
Semi-variable cost or maintenance charges:		
Repairs and maintenance	22,500 x 5	1,12,500
Total Semi-variable cost (C)		**1,12,500**
Total Cost (A+B+C)		**31,11,500**
Add: Profit (1/3 on sales = 1/2 on cost)	31,11,500 x (1/2)	15,55,750
Total Collections (D)		**46,67,250**
No of Passenger KM (E)	WN 1	1,15,20,000
Fare per Passenger KM (D/E)		**0.4051**
Fare for 40 KM Journey	**0.4051 x 40**	**16.204**

3. **Calculation of cost per passenger KM**

Mr. X owns a bus which runs according to the following schedule:
-   (i) Delhi to Chandigarh and back, the same day.
    Distance covered: 250 kms. one way.
    Number of days run each month: 8
    Seating capacity occupied 90%.
-   (ii) Delhi to Agra and back, the same day.
    Distance covered: 210 kms. one way.
    Number of days run each month: 10
    Seating capacity occupied 85%.
-   (iii) Delhi to Jaipur and back, the same day.
    Distance covered: 270 kms. one way.
    Number of days run each month: 6
    Seating capacity occupied 100%.
-   (iv) Following are the other details:

Particulars	Amount
Cost of the bus	Rs.6,00,000
Salary of the Driver	Rs.2,800 per month
Salary of the conductor	Rs.2,200 per month
Salary of the part time accountant	Rs.200 per month
Insurance of the bus	Rs.4,800 per annum
Diesel consumption 4 kms per litre at	Rs.46 per litre
Road tax	Rs.1,500 per annum
Lubricant oil	Rs.10 per 100 kms
Permit fee	Rs.315 per month
Repairs and maintenance	Rs.1,000 per month
Depreciation of the bus	20% per annum
Seating capacity of the bus	50 persons

Passenger tax is 20% of the total takings. Calculate the bus fare to be charged from each passenger to earn a profit of 30% on total takings. The fares are to be indicated per passenger for the journeys:
-   (i) Delhi to Chandigarh
-   (ii) Delhi to Agra
-   (iii) Delhi to Jaipur.

Answer:

WN 1: Computation of distance travelled and Passenger KM (for a month)

Particulars	Delhi to Chandigarh	Delhi to Agra	Delhi to Jaipur	Total
Distance travelled per day	500 KM	420 KM	540 KM	
No of days per month	8	10	6	
Distance travelled per month	**4,000**	**4,200**	**3,240**	**11,440**
No of passengers	45	42.50	50	

Passenger KM	1,80,000	1,78,500	1,62,000	5,20,500

WN 2: Cost sheet for operating a bus for a month:

Particulars	Calculation	Amount
Fixed cost or standing charges:		
Depreciation	6,00,000 x 20% x (1/12)	10,000
Driver salary		2,800
Conductor salary		2,200
Accountant salary		200
Insurance	4,800/12	400
Road Tax	1,500/12	125
Permit fee		315
Total Fixed Cost (A)		**16,040**
Variable cost or running charges		
Diesel cost	$11,440 \times \left(\dfrac{46}{4}\right)$	1,31,560
Lubricant oil	$11,440 \times \left(\dfrac{10}{100}\right)$	1,144
Total Variable Cost (B)		**1,32,704**
Semi-variable cost or maintenance charges:		
Repairs and maintenance		1,000
Total Semi-variable cost (C)		**1,000**
Total Cost (A + B + C) (50)		**1,49,744**
Passenger Tax (20)	20% x 2,99,488	59,898
Profit (30)	30% x 2,99,488	89,846
Total Collections (100)	$1,49,744 \times \left(\dfrac{100}{50}\right)$	**2,99,488**
Passenger KM		5,20,500
Fare per Passenger KM	$\dfrac{\mathbf{2,99,488}}{\mathbf{5,20,500}}$	0.5754
Fare to be charged:		
Delhi to Chandigarh (one way)	**250 x 0.5754**	**143.85**
Delhi to Agra (One way)	**210 x 0.5754**	**120.83**
Delhi to Jaipur (One way)	**270 x 0.5754**	**155.36**

4. Transport costing – fare to be charged per tonne km

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 was distance KM	No of trips per day	Load carried per trip/day
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	Rs.10 per litre. Each litre gives 4 Km per ltire of diesel on an average
Driver's salary	Rs.2,000 per month
License and taxes	Rs.5,000 per annum per truck
Insurance	Rs.5,000 per annum for all the three vehicles
Purchase price per truck	Rs.3,00,000 Life 10 years. Scrap value at the end of life is Rs.10,000
Oil and sundries	Rs.25 per 100 KM run
General overhead	Rs.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

Answer:

WN 1: Computation of distance travelled and Tonne KM:

Particulars	Truck No.1	Truck No.2	Truck No.3	Total
Distance travelled per day	128	160	180	
Distance travelled per month	3,072	3,840	4,320	
Distance travelled per year	**36,864**	**46,080**	**51,840**	**1,34,784**
Average tonnes	3	4.5	4	
Tonne KM	**1,10,592**	**2,07,360**	**2,07,360**	**5,25,312**

WN 2: Annual cost statement of operating three vehicles:

Particulars	Calculation	Amount
Fixed cost or standing charges:		
Driver salary	2,000 x 3 x 12	72,000
License and taxes	5,000 x 3	15,000
Insurance		5,000
Depreciation	$\dfrac{3,00,000 - 10,000}{10} \times 3$	87,000
General Overhead		11,084
Total Fixed Cost (A)		**1,90,084**
Variable cost or running charges		
Diesel cost	$1,34,784 \times \left(\dfrac{10}{4}\right)$	3,36,960
Oil and sundries	$1,34,784 \times \left(\dfrac{25}{100}\right)$	33,696
Total Variable Cost (B)		**3,70,656**
Semi-variable cost or maintenance charges:		
Maintenance cost	Note 1	39,696
Total Semi-variable cost (C)		**39,696**
Total Cost (A + B + C)		**6,00,436**
Add: Profit (1/10 on sales = 1/9 on cost)		66,715
Total collections/Freight		**6,67,151**
No of Tonne KM		5,25,312
Freight rate per Tonne KM	$\dfrac{6,67,151}{5,25,312}$	**1.27**
Cost per KM	$\dfrac{6,00,436}{1,34,784}$	**4.4548**
Cost per Tonne KM	$\dfrac{6,00,436}{5,25,312}$	**1.1432**

Note 1: Computation of Maintenance Cost:

Particular	Year 1	Year 2
Cost	46,050	45,175
Distance travelled	1,60,200	1,56,700

Computation of VC per KM:

$$\text{Variable cost per KM} = \frac{\text{Change in cost}}{\text{Change in distance}} = \frac{46,050 - 45,175}{1,60,200 - 1,56,700} = \frac{875}{3,500} = \text{Rs. 0.25 per KM}$$

Computation of fixed cost:

Total cost for year 1 = Total Fixed Cost + Total Variable cost

46,050 = Total Fixed Cost + (1,60,200 x 0.25)

Total Fixed cost = 6,000

Computation of cost for current year:

Total cost for current year = Total Fixed Cost + Total Variable cost

Total Cost = 6,000 + (1,34,784 x 0.25)

Total Cost = 39,696

5.   Differential charges for category of passengers

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 kms. 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 2003-2004 are as under:

Driver's salary	Rs.5,000 per month per driver – payable for all the 12 months
Cleaner's salary	Rs.3,000 per month per driver – payable for all the 12 months – one cleaner has been employed for every five buses
License Fees, Taxes	Rs.2,300 per bus per annum
Insurance premium	Rs.15,600 per bus per annum
Repairs and maintenance	Rs.16,400 per bus per annum
Purchase price of the bus	Rs.16,50,000 each
Life of the bus	16 years
Scrap value	Rs.1,50,000
Diesel cost	Rs.18.50 per litre

Each bus gives an average of 10 kms 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 kms	25% of full	15%
8 kms	50% of full	30%
16 kms	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 kms from the school.

(b) Students coming from a distance of upto 8 kms from the school; and

(c) Students coming from a distance of upto 16 kms from the school

Answer:

WN 1: Computation of distance travelled:

Particular	Amount
Distance travelled per bus per day (16 x 2 x 4 Trips)	128
Distance travelled per bus per month (128 x 24 days)	3,072
Distance travelled per bus per year (3,072 x 10 months)	30,720
Number of buses	25
Distance travelled for 25 buses	**7,68,000**

WN 2: Annual cost of operating a single bus and fleet of 25 buses:

Particulars	Calculation	Single bus	25 buses

Fixed cost or standing charges:			
Driver salary	5,000 x 12	60,000	15,00,000
Cleaner salary	(3,000 x 12)/5	7,200	1,80,000
License fees and taxes		2,300	57,500
Insurance premium		15,600	3,90,000
Depreciation	$\frac{16,50,000 - 1,50,000}{16}$	93,750	23,43,750
Total Fixed Cost (A)		**1,78,850**	**44,71,250**
Variable cost or running charges			
Diesel cost	$30,720 \text{ x} \frac{18.50}{10}$	56,832	14,20,800
Total Variable Cost (B)		**56,832**	**14,20,800**
Semi-variable cost or maintenance charges:			
Repairs and maintenance		16,400	4,10,000
Total Semi-variable cost (C)		**16,400**	**4,10,000**
Total Cost (A + B + C) (50)		**2,52,082**	**63,02,050**

WN 3: Computation of average cost per student per month for different categories:

Let us assume annual fee for 16 KM category student to be X. Hence fee for 8 KM and 4 KM will be 0.5X and 0.25X

Category	No of students	Annual Fee	Total Collections
16 KM	66 [120 x 55%]	X	66X
8 KM	36 [120 x 30%]	0.5X	18X
4 KM	18 [120 x 15%]	0.25X	4.5X
Total	**120**		**88.5X = 2,52,082**

Annual Fees for 16KM category $= \dfrac{2,52,082}{88.5} = 2,848.38$

Cost per student per month for 16KM category $= \dfrac{2,848.38}{12} = 237.36$

Cost per student per month for 8 KM category $= 237.36 \text{ x } 50\% = 118.68$

Cost per student per month for 4 KM category $= 237.36 \text{ x} 25\% = 59.34$

6.   Cost per absolute tonne KM and profit

Global Transport Ltd. charges Rs. 90 per ton for its 6-tons truck lorry load from city 'A' to city 'B'. The charges for the return journey are Rs. 84 per ton. No concession or reduction in these rates is made for any delivery of goods at intermediate station 'C'. In January 2007, the truck made 12 outward journeys for city 'B' with full load out of which 2 tons were unloaded twice in the way at city 'C'. The truck carried a load of 8 tons in its return journey for 5 times but was once caught by police and Rs. 1,200 was paid as fine. For the remaining trips the truck carried full load out of which all the goods on load were unloaded once at city 'C', but it returned without any load once only from 'C' station to 'A' station. The distance from city 'A' to city 'C' and city 'B' are 140 kms. and 300 kms. respectively. Annual fixed costs and maintenance charges are Rs. 60,000 and Rs. 12,000 respectively. Running charges spent during January 2007 are Rs. 2,944.

You are required to find out the cost per absolute ton-kilometre and the profit for January, 2007.
Answer:
WN 1: Computation of Absolute Tonne KM and Revenues

Route	No of Times	Distance in KM	Total distance	Tonnes	Tonne KM	Revenues
Onward:						
A to B	10	300	3,000	6	18,000	5,400
A to C	2	140	280	6	1,680	1,080
C to B	2	160	320	4	1,280	0
Return:						

B to A	5	300	1,500	8	12,000	3,360
B to A	6	300	1,800	6	10,800	3,024
B to C	1	160	160	6	960	504
C to A	1	140	140	0	0	0
Total			**7,200**		**44,720**	**13,368**

WN 2: Operating cost statement for the month of January, 2007:

Particulars	Calculation	Amount
Fixed cost or standing charges	60,000/12	5,000
Variable cost or running charges		2,944
Semi-variable cost or maintenance charges	12,000/12	1,000
Total Cost		**8,944**
Profit	b/f	**4,424**
Total Revenues	WN 1	**13,368**
Cost per absolute ton KM	8,944/44,720	**0.20**

Note:

- Fines and Penalties will not form part of total cost as the same is abnormal in nature

7. Costing of flight

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% throughout the year of 52 weeks. The one-way fare is Rs. 7,200. The cost of operation of flights are:

Fuel cost (variable)	Rs.96,000 per flight
Food served on board on non-chargeable basis	Rs.125 per passenger
Commission	5% of fare applicable for all booking
Fixed cost:	
Aircraft lease	Rs.3,50,000 per flight
Landing charges	Rs.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 Rs. 6,720. Advise whether this proposal should be implemented or not.

Answer:

Computation of net operating income per flight:

Particulars	Calculation	Original scenario	Revised scenario
Fixed cost/standing charges:			
Aircraft lease		3,50,000	3,50,000
Landing charges		72,000	72,000
Total Fixed cost (A)		**4,22,000**	**4,22,000**
Variable cost/running charges:			
Fuel cost		96,000	96,000
Food cost	96 x 125	12,000	
	108 x 125		13,500
Commission	5% of revenues	34,560	36,288
Total Variable cost (B)		**1,42,560**	**1,45,788**
Total Cost (A + B)		5,64,560	5,67,788
Profit/net operating income		**1,26,640**	**1,57,972**
Sales	96 x 7,200	6,91,200	
	108 x 6,720		7,25,760

- The airline should go ahead with proposal of fare reduction as the overall profits increase by Rs.31,332.

8. Hotel costing

A company runs a holiday home. For this purpose, it has hired a building at a rent of Rs. 10,000 per month along with 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 room	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 2006 are as follows:

Particulars	Amount
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

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.

Answer:

WN 1: Annual Operating cost sheet of Holiday Home:

Particulars	Calculation	Amount
Fixed cost or standing charges:		
Fixed rent	10,000 x 12	1,20,000
Staff salaries		14,25,000
Lighting, heating and power		2,15,000
Sundries		1,53,000
Total Fixed Cost (A)		**19,13,000**
Variable cost or running charges		
Room attendants' wages		4,50,000
Laundry charges		80,500
Total Variable Cost (B)		**5,30,500**
Semi-variable cost or maintenance charges:		
Repairs and renovation		1,23,500
Interior Decoration		74,000
Total semi-variable cost (C)		**1,97,500**
Total cost excluding variable rent (A+B+C) (75)		**26,41,000**
Variable rent (5)	26,41,000 x (5/75)	1,76,067
Total cost (80)		**28,17,067**
Profit (20)	26,41,000 x (20/75)	7,04,267
Total collections (100)		**35,21,334**

WN 2: Computation of rent to be charged:

- Let us assume rent of single room to be X
- Let us assume rent of double room to be 2.5X
- Let us assume rent of triple room to be 5X

Type of room	No of available rooms	No of occupied rooms	No of room days per year	Rent per day	Annual collections
Single	100	100	36,000	X	36,000X
Double	50	40	14,400	2.5X	36,000X
Triple	30	18	6,480	5X	32,400X
Total collections (in X)					**1,04,400X**

Total collections (in rupees)	WN 1	35,21,334
Rent for single room (X)	35,21,334/1,04,400	33.73
Rent for double room (2.5X)	33.73 x 2.50	84.33
Rent for triple room (5X)	33.73 x 5.00	168.65

9. **Costing of travel package**

Voyager Cabs private Limited 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 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	Rs.54 per litre
Price of diesel in Jaipur	Rs.56 per litre
Price of diesel in Agra	Rs.58 per litre
Mileage of cab per litre of diesel (km.)	16
Chauffer's salary	Rs.12,000 per month
Cost of the cab	Rs.12,00,000
Expected life of the cab	24,00,000 kms.
Servicing cost	Rs.30,000 after every 50,000 kilometres
Chauffer's meal allowance	Rs.50 for every 200 kilometres
Other set up and office cost	Rs.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 GST @ 18% to be quoted for the package if company wants to earn profit of 25% on its net taking (excluding GST).

Answer:

WN 1: Operating cost statement for travel package (Delhi – Jaipur – Agra – Delhi):

Particulars	Calculation	Amount
Fixed cost or standing charges:		
Driver salary	$12,000 \times \dfrac{3}{30}$	1,200.00
Other setup and office cost	$2,400 \times \dfrac{3}{30}$	240.00
Total Fixed Cost (A)		**1,440.00**
Variable cost or running charges		
Fuel cost for Delhi to Jaipur	$274 \times \dfrac{54}{16}$	924.75
Fuel cost for Jaipur to Agra	$238 \times \dfrac{56}{16}$	833.00
Fuel cost for Agra to Delhi	$242 \times \dfrac{58}{16}$	877.25
Depreciation	$\dfrac{12,00,000}{24,00,000} \times 754$	377.00
Servicing cost	$\dfrac{30,000}{50,000} \times 754$	452.40
Meal allowance (Note)	50 x 3	150.00
Total Variable Cost (B)		**3,614.40**
Semi-variable cost or maintenance charges (C)		0.00
Total cost (A+B+C) (75)		**5,054.40**
Profit (25)	5054.40 x (25/75)	1,684.80
Net takings (100)		**6,739.20**
GST @ 18%		1,213.06
Total Takings (118)		**7,952.26**

Note:

- It is assumed that meal allowance of Rs.50 is payable for every completed 200 kms. Hence the meal allowance for 754 kms is Rs.150.

10. Transportation costing:

Gopal Milk Co-Operative Society (GMCS) collects raw milk from the farmers of Ramgarh, Pratapgarh and Devgarh panchayats and processes this 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 some information related with the

Particulars	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 KM	34 KM	16 KM
Toll tax paid per month	2,850	3,020	-

All the 5 vehicles assigned to Devgarh panchayat, were purchased five years back at a cost of Rs. 9,25,000 each. The 4 vehicles assigned to Ramgarh panchayat, were purchased two years back at a cost of Rs. 11,02,000 each and the remaining vehicles assigned to Pratapgarh were purchased last year at a cost of Rs. 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:

Particulars	Amount
Salary of Driver (a driver for each vehicle)	Rs.18,000 per month
Salary to Cleaner (a cleaner for each vehicle)	Rs.11,000 per month
Allocated garage parking fee	Rs.1,350 per vehicle per month
Servicing cost	Rs. 3,000 for every complete 5,000 k.m. run.
Price of diesel per litre	Rs.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.

Answer:

WN 1: Computation of operating cost per month for each vehicle:

Particulars	Ramgarh	Pratapgarh	Devgarh	Total
Fixed or standing charges:				
Toll Tax (assumed to be for all vehicles)	2,850	3,020	-	5,870
Depreciation (Note 2)	36,733	32,800	38,542	1,08,075
Driver salary	72,000	54,000	90,000	2,16,000
Cleaner salary	44,000	33,000	55,000	1,32,000
Parking fee	5,400	4,050	6,750	16,200
Total Fixed cost (A)	**1,60,983**	**1,26,870**	**1,90,292**	**4,78,145**
Variable or running charges:				
Diesel cost (Note 1)	1,25,280	70,992	92,800	2,89,072
Servicing cost (Note 3)	9,000	0	3,000	12,000
Total Variable cost (B)	**1,34,280**	**70,992**	**95,800**	**3,01,072**
Semi-variable or maintenance charges (C)	0	0	0	0
Total Cost (A+B+C)	**2,95,263**	**1,97,862**	**2,86,092**	**7,79,217**
No of vehicles	4	3	5	12
Operating cost per vehicle	**73,816**	**65,954**	**57,218**	**64,935**

Note 1: Computation of diesel cost:

Particulars	Ramgarh	Pratapgarh	Devgarh
Distance travelled per day per vehicle	144	136	64
Distance travelled per day for all vehicles	576	408	320
Distance travelled per month	17,280	12,240	9,600
Mileage	8	10	6

No of litres of diesel required	2,160	1,224	1,600
Price per litre	58	58	58
Diesel cost	**1,25,280**	**70,992**	**92,800**

Note 2: Computation of depreciation:

Particulars	Ramgarh	Pratapgarh	Devgarh
Cost per vehicle	11,02,000	13,12,000	9,25,000
No of vehicles	4	3	5
Total cost	44,08,000	39,36,000	46,25,000
Depreciation per annum	4,40,800	3,93,600	4,62,500
Depreciation per month	**36,733**	**32,800**	**38,542**

Note 3: Computation of servicing cost:

Particulars	Ramgarh	Pratapgarh	Devgarh
Distance travelled per month	17,280	12,240	9,600
No of services required	3	2	1
Total servicing cost	9,000	0 (note)	3,000

Note: No servicing cost as the same is covered under free service for first two years.

WN 2: Computation of Vehicle operating cost per litre of milk:

Particulars	Ramgarh	Pratapgarh	Devgarh	Total
Monthly cost (A)	**2,95,263**	**1,97,862**	**2,86,092**	**7,79,217**
No of litres carried per vehicle per day	52,500	35,000	35,000	1,22,500
No of litres carried for all vehicles per day	2,10,000	1,05,000	1,75,000	4,90,000
No of litres carried per month (B)	**63,00,000**	**31,50,000**	**52,50,000**	**1,47,00,000**
Vehicle operating cost per month (A/B)	**0.04687**	**0.06281**	**0.05449**	**0.05301**

11. Costing of hospital:

ABC hospital runs a critical care unit (CCU) in a hired building. CCU consists of 35 beds and 5 more beds can be added, if required

- ❖ Rent per month = Rs.75,000
- ❖ Supervisors – 2 persons – Rs.25,000 per month each
- ❖ Nurses – 4 persons – Rs.20,000 per month each
- ❖ Ward boys – 4 persons – Rs.5,000 per month each
- ❖ Doctors paid Rs.2,50,000 per month – paid on the basis of number of patients attended and the time spent by them
- ❖ Fixed repairs = Rs.81,000
- ❖ Food to patients (variable) = Rs.8,80,000
- ❖ Laundry charges (variable) = Rs.6,00,000
- ❖ Medicines (variable) = Rs.7,50,000
- ❖ Other fixed expenses = Rs.10,80,000
- ❖ Administration expenses allocated = Rs.10,00,000

It was estimated that for 150 days in a year 35 beds are occupied and for 80 days only 25 beds are occupied. The hospital hired 750 beds at a charge of Rs.100 per bed per day, to accommodate the flow of patients. However, this does not exceed more than 5 extra beds over and above the normal capacity of 35 beds on any day. You are required:

- ❖ Calculate profit per patient day, if the hospital recovers on an average Rs.2,000 per day from each patient
- ❖ Find out BEP for the hospital

Answer:

WN 1: Computation of Patient days:

Patient days = (150 days x 35) + (80 days x 25) + 750 = 8,000 patient days

WN 2: Operating cost statement for a year:

Particulars	Calculation	Amount
Fixed cost/standing charges:		
Rent	75,000 x 12	9,00,000

Supervisor salary	2 x 25,000 x 12	6,00,000
Nurse salary	4 x 20,000 x 12	9,60,000
Ward boys' salary	4 x 5,000 x 12	2,40,000
Repairs		81,000
Other fixed expenses		10,80,000
Administration expenses		10,00,000
Total Fixed cost (A)		**48,61,000**
Variable cost/running charges:		
Doctor remuneration	2,50,000 x 12	30,00,000
Food to patients		8,80,000
Laundry charges		6,00,000
Medicines		7,50,000
Hire charges	750 x 100	75,000
Total Variable Cost (B)		**53,05,000**
Total Cost (A+B)		**1,01,66,000**
Profit	Bal figure	58,34,000
Total Revenues	**8,000 x 2,000**	**1,60,00,000**

- **Profit per patient day = (58,34,000/8,000) = Rs.729.25 per patient day**

WN 2: Computation of Break-even Point:

Particulars	Calculation	Amount
Total fixed cost		**48,61,000**
Charges per patient day		2,000
Variable cost per patient day	(53,05,000/8,000)	663.13
Contribution per patient day	**2,000 – 663.13**	**1,336.87**
Break-even point	(48,61,000/1,336.87)	3,636

Break-even point = 3,636 patient days

12. BEP of Hospital

Kiri Health Care Center consists of 20 beds. Unit is open for 300 days in a year. For 200 days, the unit has the full capacity of 20 patients per day and for balance 100 days, it has an average 16 beds only occupied per day. Following are the expenses:

Particulars	Amount
Rent	15,000 per month
Repairs and maintenance (fixed)	10,000
Food supplied to patients (variable)	74,000
Laundry charges (variable)	36,000
Medicines (variable)	60,000
Other expenses (fixed)	72,000
2 supervisors (each salary)	2,000 per month
4 nurses (each salary)	2,000 per month
2 ward boys (each salary)	1,000 per month

The unit engaged doctors from outside to attend patients and the fees were paid to them on an average of Rs.20,000 per month. Fees of expert doctors were paid on the basis of number of patients attended by them.

Required:
- Charge per day per patient to earn a profit of 100% on cost
- Number of patient days required by the unit to break even assuming above charge per patient day

Answer:

WN 1: Computation of charge per patient day to earn a profit of 100% on cost:

Particulars	Calculation	Amount
Variable costs		
Food cost		74,000
Laundry charges		36,000
Medicines		60,000

Doctor fees		2,40,000
Total Variable cost		**4,10,000**
Fixed costs		
Rent	15,000 x 12	1,80,000
Repairs and maintenance		10,000
Other expenses		72,000
Supervisor salary	2 x 12 x 2,000	48,000
Nurses salary	4 x 12 x 2,000	96,000
Ward Boys Salary	2 x 12 x 1,000	24,000
Total Fixed Costs		**4,30,000**
Total Costs		8,40,000
Add: Profit @ 100% on cost		8,40,000
Total revenues		**16,80,000**
No of patient days	**(200 x 20) + (100 x 16)**	**5,600**
Charge per patient day	**16,80,000/5,600**	**300**

WN 2: Computation of Break-even point:

Particulars	Calculation	Amount
Total fixed cost		4,30,000
Revenue per patient day		300
Variable cost per patient day	4,10,000/5,600	73.21
Contribution per patient day	300 – 73.21	226.79
Break-even point	$\dfrac{4,30,000}{226.79}$	**1,896**

Break-even point = 1,896 Patient days.

13. Costing of IT & ITES:

Following are the data pertaining to Infotech Private Limited for the year 2016-17:

	Amount
Salary to software engineer (5 persons)	15,00,000
Salary to project leaders (2 persons)	9,00,000
Salary to project manager	6,00,000
Repairs & Maintenance	3,00,000
Administration overheads	12,00,000

The company executes a project XYZ, the details of the same are as follows:
   ❖ Project Duration = 6 months
   ❖ One project leader and three software engineers were involved for the entire duration of the project, whereas the project manager spends 2 months efforts, during the execution of the project
   ❖ Travel expenses incurred for the project = Rs.1,87,500
   ❖ Two laptops were purchased at a cost of Rs.50,000 each, for use in the project and the life of the same is estimated to be 2 years
Prepare project cost sheet
Answer:
WN 1: Computation of Overhead Absorption Rate (OAR):

Particulars	Amount
Budgeted Overheads (3,00,000 + 12,00,000)	15,00,000
Suitable base	Employee cost
Budgeted suitable base (15,00,000 + 9,00,000 + 6,00,000)	30,00,000
OAR (15,00,000/30,00,000) x 100	50% of employee cost

WN 2: Project Cost Sheet:

Particulars	Calculation	Amount
Employee costs:		
Project leader salary	37,500 x 6 months	2,25,000
Software engineer salary	3 x 25,000 x 6 months	4,50,000
Project manager salary	50,000 x 2	1,00,000

Total Employee cost (A)		7,75,000
Other costs:		
Apportioned Overheads	7,75,000 x 50%	3,87,500
Travel expenses		1,87,500
Laptop cost	2 x 50,000 x (6/24)	25,000
Other cost (B)		**6,00,000**
Project Cost (A + B)		**13,75,000**

14. Costing of toll plaza:

BHG toll plaza built a 60 KM long highway and now operates a toll plaza to collect tolls from passing vehicles using the same. The company has invested Rs.600 crores to build the road and has estimated that a total of 60 crore vehicles will be using the highway during the 10 years toll collection tenure. Toll operating and maintenance cost for the month of April 2017 are as follows:

- ❖ Salary to collection personnel (3 shifts and 4 persons per shift) = Rs.150 per day per person
- ❖ Supervisor (2 shifts and 1 person per shift) = Rs.250 per day per person
- ❖ Security personnel (3 shifts and 2 persons per shift) = Rs.150 per day per person
- ❖ Toll Booth Manager (2 shifts and 1 person per shift) = Rs.400 per day per person
- ❖ Electricity = Rs.80,000
- ❖ Telephone = Rs.40,000
- ❖ Maintenance cost = Rs.30 lacs
- ❖ The company needs 25% profit over total cost to cover interest and other costs

Required:
- ❖ Calculate cost per kilometre
- ❖ Calculate the toll rate per vehicle (assuming that there is only one type of vehicle)

Answer:
WN 1: Operating cost statement of toll plaza for the month of April, 2007:

Particulars	Calculation	Amount
Apportionment of capital cost		
Depreciation	(600 crores/10) x (1/12)	5,00,00,000
Maintenance cost:		
Maintenance cost		30,00,000
Operating costs:		
Collection personnel salary	4 persons x 3 shift x 150 x 30 days	54,000
Supervisor salary	1-person x 2 shifts x 250 x 30 days	15,000
Security personnel salary	2 persons x 3 shift x 150 x 30 days	27,000
Toll Booth manager salary	1-person x 2 shifts x 400 x 30 days	24,000
Electricity		80,000
Telephone		40,000
Total Operating costs		**2,40,000**
Total cost		**5,32,40,000**
Add: Profit	25% x 5,32,40,000	1,33,10,000
Total collection per month		**6,65,50,000**
No of KM		60
Cost per KM	**5,32,40,000/60**	**8,87,333**
No of vehicles per month	(60 crores/10 years) x (1/12)	50,00,000
Toll rate per vehicle	**6,65,50,000/50,00,000**	**13.31**

15. Costing of canteen:

A company wants to outsource the operation of its canteen to a contractor. The company will provide space for cooking, free electricity and furniture in the canteen. The contractor will have to provide lunch to 300 workers of which 180 are vegetarian (veg) and the rest are non-vegetarian (non-veg). In the case of non-veg meals, there will be a non-veg item in addition to the veg items. A contractor who is interested in the contract has analysed the costs likely to be incurred. His analysis is given below:

Cereals	Rs.8 per plate
Veg items	Rs.5 per plate
Non-veg items	Rs.15 per plate
Spices	Rs.1 per plate

Cooking oil	Rs.4 per plate
One cook	Salary Rs.13,000 per month
Three helpers	Salary Rs.7,000 per month per head
Fuel	Two commercial cylinders per month, price of Rs.1,000 each

On an average the canteen will remain open for 25 days in a month. The contractor wants to charge the non-veg meals at 1.50 times of the veg meals. You are required to calculate:

* The price per meal (veg and non-veg separately) that contractor should quote if he wants a profit of 20% on his takings
* The price per meal (separately for veg and non-veg) that a worker will be required to pay if the company provides 60% subsidy for meals out of welfare fund

Answer:
WN 1: Operating cost sheet of canteen for a month:
* No of veg meals = 180 employees x 25 days = 4,500 meals
* No of non-veg meals = 120 employees x 25 days = 3,000 meals

Particulars	Calculation	Amount
Fixed costs:		
Cook salary		13,000
Helper salary	7,000 x 3	21,000
Total fixed cost		**34,000**
Variable costs:		
Cereals	8 x 7,500	60,000
Veg items	5 x 7,500	37,500
Non-veg items	15 x 3,000	45,000
Spices	1 x 7,500	7,500
Cooking oil	4 x 7,500	30,000
Fuel cost	2 x 1,000	2,000
Total variable cost		**1,82,000**
Total cost		**2,16,000**
Add: Profit	1/5 on sales = 1/4 on cost	54,000
Total collections		**2,70,000**

WN 2: Computation of price to be fixed for veg and non-veg meal:
Let us assume X to be the price for Veg meal and hence 1.5X will be the price of non-veg meal

Category	No of meals	Price	Total Collections
Veg	4,500	X	4,500X
Non-veg	3,000	1.5X	4,500X
Collections in terms of X			9,000X
Collections in terms of rupees			2,70,000
Price of Veg meal (X)			**30**
Price of non-veg meal (1.5X)			**45**

WN 3: Computation of price to be paid by employee:
* Price for veg meal = Rs.30 x 40% = Rs.12 per meal
* Price for non-veg meal = Rs.45 x 40% = Rs.18 per meal

16. Costing of toll road:
SLS infrastructure built and operates 110 KM highway on the basis of Built-Operate-Transfer (BOT) for a period of 25 years. A traffic assessment has been carried out to estimate the traffic flow per day shows the following figures:

S.No	Type of vehicle	Daily Traffic Volume
1	Two wheelers	44,500
2	Car and SUVs	3,450
3	Bus and LCV	1,800
4	Heavy Commercial Vehicles	816

The following is the estimated cost of the project:

S.No	Activities	Amount (in lacs)
1	Site clearance	170.70
2	Land development and filling work	9,080.35
3	Sub base and base courses	10,260.70
4	Bituminous work	35,070.80
5	Bridge, flyovers, underpasses, Pedestrian subway, footbridge etc	29,055.60
6	Drainage and protection work	9,040.50
7	Traffic sign, marking and road appurtenance	8,405.00
8	Maintenance, repairing and rehabilitation	12,429.60
9	Environmental management	982.00
	Total Project Cost	1,14,495.25

An average cost of Rs.1,120 lacs has to be incurred on administration and toll plaza operation. On the basis of vehicle specifications (weight, size, time saving etc.) the following weights has been assigned to the passing vehicles:

S.No	Type of vehicle	
1	Two wheelers	5%
2	Car and SUVs	20%
3	Bus and LCV	30%
4	Heavy commercial vehicles	45%

Required:
- Calculate the total project cost per day of concession period
- Compute toll fee to be charged per vehicle of each type, if the company wants to earn a profit of 15% on total cost

Note: Concession period is a period for which an infrastructure is allowed to operate and recovers its investment

Answer:
WN 1: Computation of total project cost per day of concession period:

Particulars	Calculation	Amount (in lacs)
Total Project Cost		1,14,925.25
Administration cost		1,120
Total Cost		**1,15,615.25**
Concession period in days	25 years x 365	9,125
Cost per day of concession period	$\dfrac{1,15,615.25}{9,125}$	12.67

WN 2: Computation of toll fee to be charged for different types of vehicles:
- **Revenues per day = 12,67,000 + 15% x 12,67,000 = Rs.14,57,050**

Let us assume toll fee charged for two-wheelers to be 0.05X, Car and SUVs to be 0.20X, Bus and LCV to be 0.30X and Heavy Commercial Vehicles to be 0.45X.

Category	No of vehicles	Toll Fee	Total Collections
Two wheelers	44,500	0.05X	2,225X
Car and SUVs	3,450	0.20X	690X
Bus and LCV	1,800	0.30X	540X
Heavy commercial vehicles	816	0.45X	367.20X
Collections per day (in X)			3,822.2X
Collection per day (in rupees)			14,57,050
X (14,57,050/3,822.20)			**381.21**
Toll fee for two-wheeler (381.21 x 0.05)			**19.06**
Toll fee for Car and SUVs (381.21 x 0.20)			**76.24**
Toll fee for two-wheeler (381.21 x 0.30)			**114.36**
Toll fee for two-wheeler (381.21 x 0.45)			**171.54**

17. Costing of school:

AD Higher Secondary School (AHSS) offers courses for 11th & 12th standard in three streams i.e. Arts, Commerce and Science. AHSS runs higher secondary classes along with primary and secondary classes but for accounting purpose it treats higher secondary as a separate responsibility centre. The Managing committee of the school wants to revise its fee structure for higher secondary students. The accountant of the school has provided the following details for a year:

Particulars	Amount
Teachers' salary (15 teachers × Rs.35,000 × 12 months)	63,00,000
Principal's salary	14,40,000
Lab attendants' salary (2 attendants × Rs.15,000 × 12 months)	3,60,000
Salary to library staff	1,44,000
Salary to peons (4 peons × Rs.10,000 × 12 months)	4,80,000
Salary to other staffs	4,80,000
Examinations expenditure	10,80,000
Office & Administration cost	15,20,000
Annual day expenses	4,50,000
Sports expenses	1,20,000

Other information:

(i)

	Standard 11 and 12			Primary and Secondary
	Arts	Commerce	Science	
No. of students	120	360	180	840
Lab classes in a year	0	0	144	156
No. of examinations in a year	2	2	2	2
Time spent at library per student per year	180 hrs	120 hrs	240 hrs	60 hrs
Time spent by principal for administration	208 hrs	312 hrs	480 hrs	1,400 hrs
Teachers for 11 & 12 standard	4	5	6	-

(ii) One teacher who teaches economics for Arts stream students also teaches commerce stream students. The teacher takes 1,040 classes in a year, it includes 208 classes for commerce students.

(iii) There is another teacher who teaches mathematics for Science stream students also teaches business mathematics to commerce stream students. She takes 1,100 classes a year, it includes 160 classes for commerce students.

(iv) One peon is fully dedicated for higher secondary section. Other peons dedicate their 15% time for higher secondary section.

(v) All school students irrespective of section and age participates in annual functions and sports activities.

Required:
- CALCULATE cost per student per annum for all three streams.
- If the management decides to take uniform fee of Rs. 1,000 per month from all higher secondary students, CALCULATE stream wise profitability.
- If management decides to take 10% profit on cost, COMPUTE fee to be charged from the students of all three streams respectively.

Answer:
WN 1: Computation of cost per student per annum for three streams:

Particulars	Arts	Commerce	Science	Total
Teacher salary (on the basis of no of teachers)	16,80,000	21,00,000	25,20,000	63,00,000
Re-apportionment of salary (Note 1)	(84,000)	1,45,091	(61,091)	-
Principal salary (on basis of administration)	1,24,800	1,87,200	2,88,000	6,00,000
Lab attendant salary (on basis of lab classes)	0	0	1,72,800	1,72,800
Library staff salary (Note 2)	19,636	39,273	39,273	98,182
Peon salary (Note 3)	31,636	94,909	47,455	1,74,000
Other staff salary (on basis of no of students)	38,400	1,15,200	57,600	2,11,200
Exam expenditure (Note 4)	86,400	2,59,200	1,29,600	4,75,200
Office and admin cost (on basis of no of students)	1,21,600	3,64,800	1,82,400	6,68,800
Annual day expenses (on basis of no of students)	36,000	1,08,000	54,000	1,98,000

Sports expenses (on basis of no of students)	9,600	28,800	14,400	52,800
Total Cost	**20,64,072**	**34,42,473**	**34,44,437**	**89,50,982**
No of students	**120**	**360**	**180**	**660**
Cost per student	**17,201**	**9,562**	**19,136**	**13,562**

WN 2: Computation of stream wise profitability:

Particulars	Arts	Commerce	Science	Total
Annual fees	12,000	12,000	12,000	
Annual cost	17,201	9,562	19,136	
Profit/loss	(5,201)	2,438	-7,136	
No of students	120	360	180	
Total profit/loss	(6,24,120)	8,77,680	(12,84,480)	(10,30,920)

WN 3: Computation of fee to be charged with 10% profit on cost:

Particulars	Arts	Commerce	Science
Annual cost	17,201	9,562	19,136
Profit @ 10% on cost	1,720	956	1,914
Fees to be charged	**18,921**	**10,518**	**21,050**

Note 1: Computation of reapportionment of salary:
Economics teacher:
- Economics teacher for Arts stream students also teaches commerce stream students. Hence portion of salary needs to be apportioned to commerce stream
- Economics teacher is paid is Rs.4,20,000 per annum (35,000 x 12)
- Apportionment of salary to commerce stream = 4,20,000 x (208/1,040) = 84,000. This cost would be added to commerce stream and deducted from Arts stream

Maths teacher:
- Maths teacher for Science stream students also teaches commerce stream students. Hence portion of salary needs to be apportioned to commerce stream
- Science teacher is paid is Rs.4,20,000 per annum (35,000 x 12)
- Apportionment of salary to commerce stream = 4,20,000 x (160/1,100) = 61,091. This cost would be added to commerce stream and deducted from Arts stream

Note 2: Distribution of library staff salary:

Particulars	Arts	Commerce	Science	P&S	Total
No of students	120	360	180	840	1,500
Time per student in library	180	120	240	60	
Total time spent	21,600	43,200	43,200	50,400	1,58,400
Salary distributed	19,636	39,273	39,273	45,818	1,44,000

Note 3: Distribution of Peon Salary:

Particulars	Calculation	Amount
Salary of one peon dedicated to higher secondary		1,20,000
Salary of other peons (15%)	3,60,000 x 15%	54,000
Total Peon salary for higher secondary		**1,74,000**
Distributed on the basis of number of students		
Arts	1,74,000 x (120/660)	31,636
Commerce	1,74,000 x (360/660)	94,909
Science	1,74,000 x (180/660)	47,455

Note 4: Distribution of exams expenditure:

Particulars	Arts	Commerce	Science	P&S	Total
No of students	120	360	180	840	1,500
No of exams	2	2	2	2	
Total exams	240	720	360	1,680	3,000
Cost distributed	86,400	2,59,200	1,29,600	6,04,800	10,80,000

18. Costing of insurance sector:

Sanziet Lifecare Ltd. operates in life insurance business. Last year it has launched a new term insurance policy for practicing professionals 'Professionals Protection Plus'. The company has incurred the following expenditures during the last year for the policy:

Policy development cost	11,25,000
Cost of marketing of the policy	45,20,000
Sales support expenses	11,45,000
Policy issuance cost	10,05,900
Policy servicing cost	35,20,700
Claims management cost	1,25,600
IT cost	74,32,000
Postage and logistics	10,25,000
Facilities cost	15,24,000
Employees cost	5,60,000
Office administration cost	16,20,400
Number of policies sold	528
Total insured value of policies	1,320 crores

Required:

(i) CALCULATE total cost for Professionals Protection Plus' policy segregating the costs into four main activities namely (a) Marketing and Sales support, (b) Operations, (c) IT and (d) Support functions.

(ii) CALCULATE cost per policy.

(iii) CALCULATE cost per rupee of insured value.

Answer:

WN 1: Operating cost sheet:

Particulars	Amount	Amount
Marketing and sales support:		
Policy development cost	11,25,000	
Cost of marketing	45,20,000	
Sales support expenses	11,45,000	67,90,000
Operations		
Policy issuance cost	10,05,900	
Policy servicing cost	35,20,700	
Claims management cost	1,25,600	46,52,000
IT Cost		74,32,000
Support functions		
Postage and Logistics	10,25,000	
Facilities cost	15,24,000	
Employees cost	5,60,000	
Office administration cost	16,20,400	47,29,400
Total Cost		**2,36,03,600**
No of policies		528
Cost per policy	$\dfrac{2,36,03,600}{528}$	**44,704**
Value of sum insured		1,320 crores
Cost per rupee of sum insured	$\dfrac{2,36,03,600}{1,320 \text{ Crores}}$	**0.0018**

Additional Homework Problems:

19. Computation of Passenger KM

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.

Answer:

Computation of Passenger KM

Distance travelled per day per bus (2 x 20 x 8)	320
Distance travelled per month (320 x 25)	8,000
Distance travelled per year (8,000 x 12)	96,000

No of buses	6
Distance travelled per year for all buses (96,000 x 6)	5,76,000
No of passengers (40 x 80%)	32
Passenger KM (5,76,000 x 32)	1,84,32,000

20. Transportation costing:

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 Rs. 9 per hour operated. Fuel, oil, tyres, repairs and maintenance cost Rs. 1.20 per km. Draw up a statement, showing the cost per tonne-kilometer of carrying mineral from each mine.

Answer:

WN 1 Computation of time taken per trip

Particulars	Mine A	Mine B
Travel time	40 mins (20 KM x (60 mins/30 KM)	60 mins (30 KM x (60 mins/30 KM)
Loading time	30 mins	20 mins
Unloading time	10 mins	10 mins
Total time taken	**80 mins**	**90 mins**

WN 2: Computation of cost per tonne KM:

Particulars	Mine A	Mine B
Fixed cost	12 (9 x 80 mins/60 mins)	13.50 (9 x 90 mins/60 mins)
Running cost	24 (1.20 x 10 x 2)	36 (1.20 x 15 x 2)
Total Cost (A)	**36**	**49.50**
Tonne KM (B)	50 [5 tons x 10]	75 [5 tons x 15]
Cost per tonne KM (A/B)	**0.72**	**0.66**

21. Computation of fare per passenger KM:

Calculate a suggested fare pre passenger km from the following information for a mini bus:

- Length of route = 30 KM
- Purchase price = Rs.4,00,000
- Pat of above cost met by loan, annual interest of which is Rs.10,000 per annum
- Other annual charges: Insurance = Rs.15,000, Garage Rent = Rs.9,000, Road tax = Rs.3,000, Repairs and maintenance = Rs.15,000, Administrative charges = Rs.5,000
- Running expenses: Driver & conductor = Rs.5,000 per month, Repairs/replacement of tyre-tube = Rs.3,600 per annum, Diesel and oil cost per KM = Rs.5
- Effective life of vehicle is estimated at 5 years at the end of which it will have a scrap value of Rs.10,000
- Mini bus has 20 seats and is planned to make six number of two-way trips for 25 days per month
- Provide profit @ 20% of total revenues

Answer:

WN 1: Computation of distance travelled and Passenger KM:

Particulars	Amount
Distance travelled per day (30 KM x 2 x 6 round trips)	360
Distance travelled per month (360 KM x 25 days)	9,000
Distance travelled per year (9,000 x 12)	**1,08,000**
No of passengers	20
Passenger KM	**21,60,000**

WN 2: Operating cost sheet for a year:

Particulars	Calculation	Amount
Fixed cost or standing charges:		
Insurance		15,000
Interest	Note 1	10,000
Garage rent		9,000
Road tax		3,000
Administrative charges		5,000
Depreciation	$\dfrac{4,00,000 - 10,000}{5}$	78,000
Total Fixed Cost (A)		**1,20,000**
Variable cost or running charges		
Driver and conductors	5,000 x 12	60,000
Repairs and replacement		3,600
Diesel cost	1,08,000 x 5	5,40,000
Total Variable Cost (B)		**6,03,600**
Semi-variable cost or maintenance charges:		
Repairs and maintenance		15,000
Total Semi-variable cost (C)		**15,000**
Total Cost (A+B+C)		**7,38,600**
Add: Profit (1/5 on sales = 1/4 on cost)	7,38,600 x 25%	1,84,650
Total Collections (D)		**9,23,250**
No of Passenger KM (E)	WN 1	21,60,000
Fare per Passenger KM (D/E)		**0.4274**

Note 1: It is assumed that interest cost is related to non-long-term funds and hence considered as part of total cost.

22. Fare to be charged per passenger KM

M/s XY Travels has been given a 25 km. long route to run an air- conditioned Mini Bus. The cost of bus is Rs. 20,00,000. It has been insured @3% premium per annum while annual road tax amounts to Rs. 36,000. Annual repairs will be Rs. 50,000 and the bus is likely to last for 5 years. The driver's salary will be Rs.2,40,000 per annum and the conductor's salary will be Rs. 1,80,000 per annum in addition to 10% of the takings as commission (to be shared by the driver and the conductor equally). Office and administration overheads will be Rs. 3,18,000 per annum. Diesel and oil will be Rs. 1,500 per 100 km. The bus will make 4 round trips carrying on an average 40 passengers on each trip. Assuming 25% profit on takings and considering that the bus will run on an average 25 days in a month, you are required to:

(i) prepare operating cost sheet (for the month).
(ii) calculate fare to be charged per passenger km

Answer:

WN 1: Computation of distance travelled and Passenger KM for a month:

Particulars	Amount
Distance travelled per day (25 KM x 2 x 4 round trips)	200
Distance travelled per month (200 KM x 25)	5,000
No of passengers	40
Passenger KM	**2,00,000**

WN 2: Operating cost sheet for a month:

Particulars	Calculation	Amount
Fixed cost or standing charges:		
Insurance charges	20,00,000 x 3% x (1/12)	5,000
Road tax	36,000/12	3,000
Depreciation	(20,00,000/5) x (1/12)	33,333
Driver salary	2,40,000/12	20,000
Conductor salary	1,80,000/12	15,000
Office and administration overheads	3,18,000/12	26,500
Total Fixed Cost (A)		**1,02,833**

Variable cost or running charges		
Diesel and oil	$5,000 \; x \; \dfrac{1,500}{100}$	75,000
Total Variable Cost (B)		**75,000**
Semi-variable cost or maintenance charges:		
Repairs	50,000/12	4,167
Total Semi-variable cost (C)		**4,167**
Total Cost before commission(A+B+C) (65)		**1,82,000**
Add: Commission (10)	1,82,000 x (10/65)	28,000
Total Cost (75)		**2,10,000**
Add: Profit (25)	1,82,000 x (25/65)	70,000
Total Collections (100)		**2,80,000**
No of Passenger KM (E)	WN 1	2,00,000
Fare per Passenger KM (D/E)		**1.40**

Note 1: It is assumed that interest cost is related to non-long-term funds and hence considered as part of total cost.

23. Transportation costing:

The following information relates to a bus operator:

Particulars	Amount
Cost of the bus	Rs.18,00,000
Insurance charges	3% per annum
Manager cum accountant salary	Rs.8,000 per month
Annual tax	Rs.50,000
Garage rent	Rs.2,500 per month
Annual repairs and maintenance	Rs.1,50,000
Expected life of the bus	15 years
Scrap value at the end of 15 years	Rs.1,20,000
Driver salary	Rs.15,000 per month
Conductor salary	Rs.12,000 per month
Stationery	Rs.500 per month
Engine oil, lubricants (for 1,200 km)	Rs.2,500
Diesel and Oil (for 10 Km)	Rs.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

WN 1: Computation of distance travelled and Passenger KM for a month:

Particulars	Amount
Distance travelled per day (20 KM x 2 x 3 round trips)	120
Distance travelled per month (120 KM x 25)	3,000
No of passengers	40
Passenger KM	**1,20,000**

WN 2: Operating cost sheet for a month:

Particulars	Calculation	Amount
Fixed cost or standing charges:		
Depreciation	$\dfrac{18,00,000 - 1,20,000}{15} \; x \; \left(\dfrac{1}{12}\right)$	9,333
Insurance charges	18,00,000 x 3% x (1/12)	4,500
Manager cum accountant salary		8,000
Tax	50,000/12	4,167
Garage rent		2,500
Driver salary		15,000
Conductor salary		12,000
Stationery		500

Total Fixed Cost (A)		56,000
Variable cost or running charges		
Diesel and oil	$3,000 \; x \left(\dfrac{52}{10}\right)$	15,600
Engine and lubricants	$3,000 \; x \left(\dfrac{2,500}{1,200}\right)$	6,250
Total Variable Cost (B)		**21,850**
Semi-variable cost or maintenance charges:		
Repairs	1,50,000/12	12,500
Total Semi-variable cost (C)		**12,500**
Total Cost before commission(A+B+C) (75)		**90,350**
Add: Commission (10)	90,350 x (10/75)	12,047
Total Cost (85)		**1,02,397**
Add: Profit (15)	90,350 x (15/75)	18,070
Total Collections (100)		**1,20,467**
No of Passenger KM (E)	WN 1	1,20,000
Fare per Passenger KM (D/E)		**1.004**

24. Transportation costing

Happy Transport service is a Delhi based national goods transport service provider, owning four trucks for this purpose. The cost of running and maintaining these trucks are as follows:

Particulars	Amount
Diesel cost	Rs.13.75 per Km
Engine oil	Rs.4,200 for every 13,000 KM
Repairs and maintenance	Rs.12,000 for every 10,000 KM
Driver's salary	Rs.18,000 per truck per month
Cleaner's salary	Rs.7,500 per truck per month
Supervision and other general expenses	Rs.12,000 per month
Cost of loading of goods	Rs.150 per Metric Ton

Each truck was purchased for Rs.20 lacs with an estimated life of 7,20,000 KM. During the next month, it is expecting 6 bookings, the details are as follows:

Journey	Distance in KM	Weight-up (in MT)	Weight-down (in MT)
Delhi to Kochi	2,700	14	6
Delhi to Guwahati	1,890	12	0
Delhi to Vijayawada	1,840	15	0
Delhi to Varanasi	815	10	0
Delhi to Asansol	1,280	12	4
Delhi to Chennai	2,185	10	8
Total	**10,710**	**73**	**18**

Required:
- Calculate the total absolute Ton-KM for the vehicles
- Calculate the cost per Ton-KM

Answer:
WN 1: Computation of distance travelled and absolute Ton KM:

Journey	Distance in KM	Weight-up (in MT)	Ton KM	Weight-down (in MT)	Ton KM
Delhi to Kochi	2,700	14	37,800	6	16,200
Delhi to Guwahati	1,890	12	22,680	0	0
Delhi to Vijayawada	1,840	15	27,600	0	0
Delhi to Varanasi	815	10	8,150	0	0
Delhi to Asansol	1,280	12	15,360	4	5,120
Delhi to Chennai	2,185	10	21,850	8	17,480
Total	**10,710**	**73**	**1,33,440**	**18**	**38,800**

- Total distance travelled = 10,710 + 10,710 = 21,420 KM
- Total Ton KM = 1,33,440 + 38,800 = 1,72,240 Ton KM

WN 2: Operating cost sheet:

Particulars	Calculation	Amount
Fixed cost or standing charges:		
Driver salary	$18,000 \times 4$	72,000
Cleaner salary	$7,500 \times 4$	30,000
Supervision and general expenses		12,000
Total Fixed Cost (A)		**1,14,000**
Variable cost or running charges		
Diesel and oil	$13.75 \times 21,420$	2,94,525
Engine oil	$21,420 \times \left(\dfrac{4,200}{13,000}\right)$	6,920
Cost of loading of goods	$150 \times (73 + 18)$	13,650
Depreciation	$\dfrac{20,00,000}{7,20,000} \times 21,420$	59,500
Total Variable Cost (B)		**3,74,595**
Semi-variable cost or maintenance charges:		
Repairs	$21,420 \times \left(\dfrac{12,000}{10,000}\right)$	25,704
Total Semi-variable cost (C)		**25,704**
Total Cost (A+B+C)		**5,14,299**
No of Ton KM	WN 1	1,72,240
Cost per Ton KM	**5,14,299/1,72,240**	**2.99**

25. Costing of lodging home:

A lodging home is being run in a small hill station with 100 single rooms. The home offers concessional rates during six off- season months in a year. During this period, half of the full room rent is charged. The management's profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending on 31st March 20X7. [Assume a month to be of 30 days].

- Occupancy during the season is 80% while in the off- season it is 40% only.
- Total investment in the home is Rs.200 lakhs of which 80% relate to buildings and balance for furniture and equipment.
- Expenses:
  - Staff salary [Excluding room attendants] = Rs.5,50,000
  - Repairs to building = Rs.2,61,000
  - Laundry charges = Rs.80,000
  - Interior = Rs.1,75,000
  - Miscellaneous expenses = Rs.1,90,800
- Annual depreciation is to be provided for buildings @ 5% and on furniture and equipment @ 15% on straight-line basis
- Room attendants are paid Rs. 10 per room day on the basis of occupancy of the rooms in a month.
- Monthly lighting charges are Rs.120 per room, except in four months in winter when it is Rs.30 per room and this cost is on the basis of full occupancy for a month.

You are required to work out the room rent chargeable per day both during the season and the off-season months on the basis of the foregoing information.

Answer:

WN 1: Computation of room days:

Particulars	Off-season	Peak Season
No of rooms	100	100
Occupancy	40%	80%
No of occupied rooms	40	80
No of days	180	180
Room days	7,200	14,400

Total Room days = 7,200 + 14,400 = 21,600 room days

WN 2: Operating cost sheet for a year:

Particulars	Calculation	Amount
Fixed costs/standing charges:		
Staff salary		5,50,000
Miscellaneous expenses		1,90,800
Depreciation on building	200 lacs x 80% x 5%	8,00,000
Depreciation on plant and machinery	200 lacs x 20% x 15%	6,00,000
Total Fixed Cost (A)		**21,40,800**
Variable/running charges:		
Laundry charges		80,000
Room attendant wages	21,600 x 10	2,16,000
Lighting charges	Note 1	72,000
Total Variable Cost		**3,68,000**
Semi-variable/maintenance charges:		
Repairs to building		2,61,000
Interiors		1,75,000
Total Semi-variable cost		**4,36,000**
Total Cost		**29,44,800**
Add: Profit	1/5 on revenues = 1/4 on cost	7,36,200
Total collections		**36,81,000**

WN 3: Computation of rent to be charged:
- Let us assume rent during peak season to be X and rent during off-season would be 0.5X

Season	No of days	Price	Total Collections
Peak	14,400	X	14,400X
Off	7,200	0.5X	3,600X
Collections in terms of X			18,000X
Collections in terms of rupees			36,81,000
Rent during peak season (X)			**204.50**
Rent during off season (0.5X)			**102.25**

Note 1: Computation of lighting charges:
- It is assumed that four months of winter are forming part of off-season and in this period, cost would be incurred at Rs.30 per room for 40 occupied rooms

Particulars	Calculation	Amount
Lighting for peak season	80 rooms x 120 per room x 6 months	57,600
Lighting for off season (2 months)	40 rooms x 120 per room x 2 months	9,600
Lighting for off season (4 months)	40 rooms x 30 per room x 4 months	4,800
Total lighting cost		**72,000**

26. Costing for loan department of Bank:

The loan department of a bank performs several functions in addition to home loan application processing task. It is estimated that 25% of the overhead costs of loan department are applicable to the processing of home-loan application. The following information is given concerning the processing of a loan application:

Particulars	Amount
Loan processor monthly salary (4 employees @ Rs.20,000 each)	80,000
Loan department overhead costs (monthly)	
Chief Loan officer's salary	5,000
Telephone expenses	750
Depreciation building	2,800
Legal advice	2,400
Advertising	400
Miscellaneous	650
Total overhead cost	**12,000**

You are required to compute the cost of processing home loan application on the assumption that one hundred home loan applications are processed each month

Answer:

Computation of cost of processing home loan application

Particulars	Calculation	Amount
Direct professional labour		80,000
Service overhead cost	25% x 12,000	3,000
Total Cost		**83,000**
Number of applications		100
Cost per application	**83,000/100**	**830**

CHAPTER 13: STANDARD COSTING

1. **What is Standard Cost? [Category B]**
   - ❖ Standard Cost refers to the planned unit cost of a product, component or service provided in a period
   - ❖ Standard cost are established to evaluate the performance of a particular cost centre or responsibility centre, control costs and establish selling prices

2. Explain the need for standard costing? **[Category C]**
   - ❖ Standard costing is a method of costing which measures the performance by comparing the actuals with standards, analyse the variations (deviations) and reporting of variances
   - ❖ Standard costing does not end with only computation of variances but will also extend fixation of responsibility for deviation in performance
   - ❖ Following are the benefits of standard costing:
     - o Prediction of future cost for decision making
     - o Provide target to be achieved
     - o Used in budgeting and performance evaluation
     - o Interim profit measurement and inventory valuation

3. What are the different types of standards? **[Category C]**

Ideal standards	❖ Represent the level of performance attainable when prices for material and labour are most favourable, when the highest output is achieve and when the maximum efficiency in utilization of resources is done
Normal standards	❖ Standards that are achieved under normal operating conditions
Basic or bogey standards	❖ These standards are used when they are likely to remain constant or unaltered over a long period ❖ When basic standards are used, variances are not calculated but the actual cost is expressed as a percentage of basic cost
Current standards	❖ These reflect the management's anticipation of what actual costs will be for current periods ❖ Variances arising from the expected standards represent the degree of efficiency in usage of the factors of production, variation in prices paid for materials and services and difference in the volume of production

4. **Explain the process of Standard Costing? [Category B]**
   - ❖ Setting of Standards
   - ❖ Ascertainment of actual costs
   - ❖ Comparison of actual cost with standard cost
   - ❖ Investigation of variances
   - ❖ Disposition of variances

5. What are the types of variances? **[Category A]**

Controllable and uncontrollable variances:
   - ❖ Purpose of standard costing is to investigate the reasons for significant variance so as to identify the reasons for significant variation and to take corrective action
   - ❖ Controllable variances are those which can be controlled by departmental heads whereas uncontrollable variances are those which are beyond their control
   - ❖ Responsibility will be only fixed for controllable variances. If there is a significant uncontrollable variance then the standards may need revision

Favourable and adverse variances:
   - ❖ Favourable variances are those which are profitable for the company and adverse variances are those which causes loss to the company
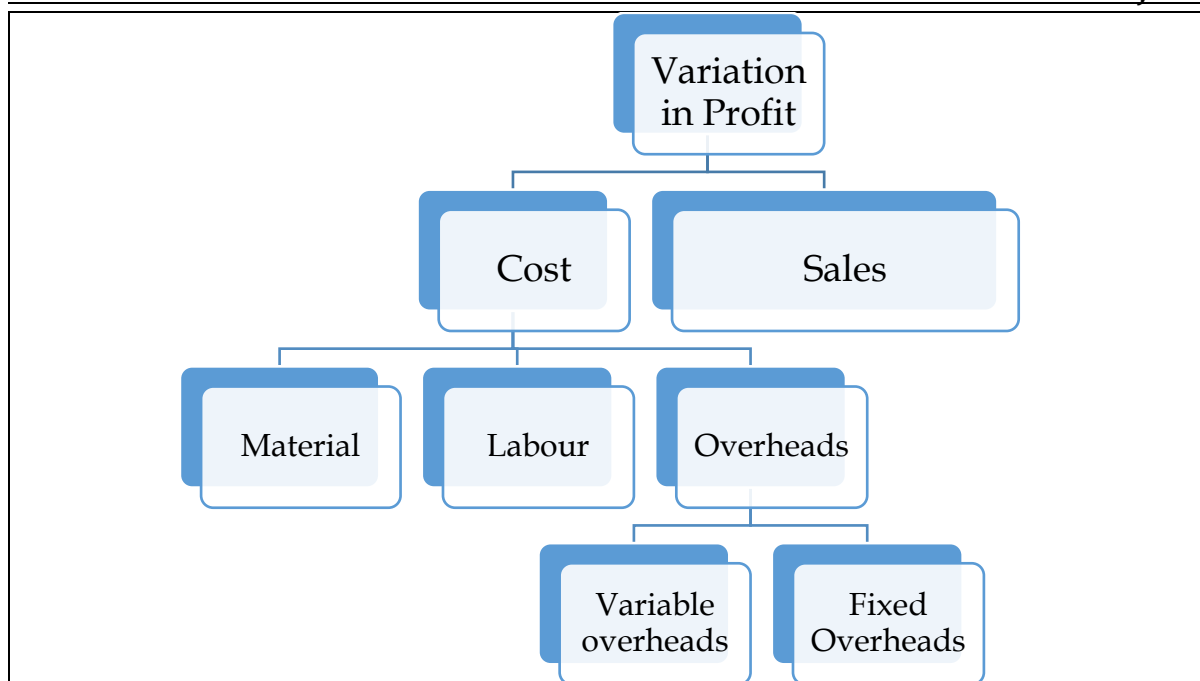
6. Differentiate Standard Cost and Budgeted Cost? **[Category A]**
❖ Budgeted cost refers to the cost to be incurred for producing budgeted output and standard cost refers to the cost to be incurred for producing actual profit
❖ Standards are concerned with analysing the reasons for variation between **actual cost and standard cost**

Example:
Budgeted output = 20,000 units; Budgeted Cost = Rs.4,00,000; Actual output = 16,000 units; Actual cost = Rs.3,60,000
   ❖ Budgeted Cost = Rs.4,00,000
   ❖ Actual Cost = Rs.3,60,000
   ❖ Standard cost = 16,000 units * Rs.20/unit = Rs.3,20,000
   ❖ Cost Variance = Standard cost – Actual Cost = 40,000 A

7. Who is to be held responsible for various variances? **[Category A]**

Material Price Variance	Purchase department
Material Usage Variance	Production department
Labour rate variance	Personnel Manager
Labour efficiency variance	Production manager or foreman

8. What are the advantages and criticisms of standard costing? **[Category B]**
Advantages of standard costing:
   ❖ Serves as a basis for measuring operating performance and cost control
   ❖ Standard costing can be used to predict costs and hence the same aids in fixing prices
   ❖ Standard costing facilitates evaluation of jobs and introduction of incentives
   ❖ It is used as a basis for inventory valuation
   ❖ It aids in measurement of profits
   ❖ It aids business planning, budgeting and managerial decision making
   ❖ Standard costing aids in standardization of products, operations and processes
   ❖ It provides objectives and targets to be achieved by each level of management
   ❖ Standard costing sets a uniform basis for comparison of all elements of cost
   ❖ Wastage of material and loss due to idle time can be controlled
Criticisms of standard costing:
   ❖ **Variation in prices:** One of the chief problems faced in the operation of the standard costing system is the precise estimation of likely prices or rates to be paid. Variation in prices can be huge and hence the actual profit can show a huge deviation

❖ **Varying levels of output:** If the standard level of output is not achieved then it will not be possible for the company to achieve the standard cost for fixed overheads and hence the variation can be significant

❖ **Changing standard of technology:** Standard costing is not suitable for industries where frequent technological changes happen

❖ **Mix of products:** Standard costing assumes a mix of products and in case the mixture of materials is not same then the costs can vary

❖ Fixation of standards can be costly

❖ Standard cannot possibly reflect the true value in exchange

9. Differentiate Partial plan and single plan of recognizing variances? **[Category A]**

Partial Plan	Single Plan
Raw material stock valued at actual cost and WIP and FG valued at standard cost	All the 3 stocks are valued at standard cost
WIP account debited with actual cost	WIP account debited with standard cost
All variances originate from WIP accounts	All variances originate from their respective accounts
Material price variance computed at the time of consumptions	Material purchase price variance computed at the time of purchase
AQ for price variance means AQ consumed	AQ for price variance means AQ purchased

Single Plan and partial plan accounting:

- In partial plan accounting the WIP is first debited with actual cost and thereafter the variance are debited or credited. When the variances are adjusted the WIP value is brought to the standard cost.
- In single plan accounting the WIP is debited with the standard cost and the variances are adjusted in the respective ledger accounts.

Journal Entries (all entries are made assuming adverse variances. In case the variance is favorable then it will be the reverse entry)

Transaction	Single	Partial

Purchase of RM	RM Control A/c
	MPV A/C
	   To GL Adjustment A/c
		RM Control A/c
		   To GL Adjustment A/c

Issue of raw material to stores	WIP Control A/c
	MUV A/c
	   To RM Control A/c
		WIP Control A/c
		   To RM Control A/c

Recognition of MPV and MUV	Already recognized	MPV A/c MUV A/c To WIP Control A/c

Disposal of MPV and MUV	Costing P & L A/c
	   To MPV A/c
	   To MUV A/c
		Costing P & L A/c
		   To MPV A/c
		   To MUV A/c

Payment of wages	Wages control A/c
	LRV A/c
	   To GL Adjustment A/c
		Wages control A/c
		   To GL Adjustment A/c

Transfer of wages to WIP	WIP Control A/c
	LEV A/c
	   To Wages Control A/c
		WIP Control A/c
		   To Wages Control A/c

Recognition of LRV and LEV	Already recognized	LRV A/c LEV A/c To WIP Control A/c

Disposal of LRV and LEV	Costing P& L A/c
	   To LRV A/c
	   To LEV A/c
		Costing P& L A/c
		   To LRV A/c
		   To LEV A/c

Note: Similar entries are to be recorded for overheads

Formulae for variances:

Students are requested to visit my youtube channel and go through this link to understand simple way to remember all formulae. Link for playlist containing all videos are http://bit.ly/2VwqOxy

Material Variances:
1. In order to compute the material variances we require the following information
   a. Standard Quantity – This is the budgeted quantity flexed for actual output
   b. Revised standard quantity – This is the total of the actual quantity apportioned in the standard mix. This is applicable only when there is more than one material
   c. Actual quantity – Actual quantity used and this is normally directly given in the problem
   d. Standard price – This is the budgeted price to be paid for procuring the material
   e. Actual price – This refers to the actual price paid for procuring the raw materials
2. The objective of variance analysis is to fix responsibility and take corrective action wherever required. They are attention seekers rather than the problem solvers
3. Material variances compute the difference between the standard material cost and the actual material cost and fix the responsibility for the variances. The variance can either occur on account of quantity or price variances

Types of problems under material variances:
- Single material
- Multiple material

Scenario 1: Single Material
Computation table

SP * SQ	SP * AQ	AP * AQ
Standard material cost		Actual Material cost

Formulae:

Material Cost Variance	(SP x SQ) – (AP x AQ)	Col 1 – Col 3
Material Price Variance	(SP x AQ) – (AP x AQ)	Col 2 – Col 3
Material Usage Variance	(SP x SQ) – (SP x AQ)	Col 1 – Col 2

Scenario 2: Multiple Materials:
Computation table:

SP * SQ	SP * RSQ	SP * AQ	AP * AQ
Standard material cost			Actual Material cost

Formulae:

Material Cost Variance	(SP x SQ) – (AP x AQ)	Col 1 – Col 4
Material Price Variance	(SP x AQ) – (AP x AQ)	Col 3 – Col 4
Material Usage Variance	(SP x SQ) – (SP x AQ)	Col 1 – Col 3
Material Mix Variance	(SP x RSQ) – (SP x AQ)	Col 2 – Col 3
Material Yield Variance	(SP x SQ) – (SP x RSQ)	Col 1 – Col 2

Labour Variances:
1. In order to compute the labour variances we require the following information
   a. Standard Hours – This is the budgeted hours flexed for actual output
   b. Revised standard hours – This is the total of the actual hours worked **(not actual hours paid)** apportioned in the standard mix. This is applicable only when there is more than one grade of labour
   c. Actual hours worked – This refers to the number of hours actually worked. AHW = Actual hours paid – Idle time
   d. Actual Hours paid – This refers to the number of hours for which the company is paying. Actual hours worked and actual hours paid are different only when there is idle time because idle time refer to hours paid but not worked
   e. Standard rate – This is the budgeted rate to be paid to the labour

f. Actual rate – This refers to the actual rate paid for using the labour
2. Labour variances compute the difference between the standard labour cost and the actual labour cost and fix the responsibility for the variances. The variance can either occur on account of efficiency or rate variances

Different types of problems under labour variances:
- ❖ Single labour without idle time
- ❖ Single labour with idle time
- ❖ Multiple labour without idle time
- ❖ Multiple labour with idle time

Scenario 1: Single labour without idle time:
Computation table:

SR x SH	SR x AH	AR x AH

Formulae:

Labour cost variance	(SR x SH) – (AR x AH)	Col 1 – Col 3
Labour rate variance	(SR x AH) – (AR x AH)	Col 2 – Col 3
Labour efficiency variance	(SR x SH) – (SR x AH)	Col 1 – Col 2

Scenario 2: Single labour with idle time:
Computation table:

SR x SH	SR x AHW	SR x AHP	AR x AHP

Formulae:

Labour cost variance	(SR x SH) – (AR x AHP)	Col 1 – Col 4
Labour rate variance	(SR x AHP) – (AR x AHP)	Col 3 – Col 4
Labour efficiency variance	(SR x SH) – (SR x AHW)	Col 1 – Col 2
Labour idle time variance	(SR x AHW) – (SR x AHP)	Col 2 – Col 3

Scenario 3: Multiple labour without idle time:
Computation table:

SR x SH	SR x RSH	SR x AH	AR x AH

Formulae:

Labour cost variance	(SR x SH) – (AR x AH)	Col 1 – Col 4
Labour rate variance	(SR x AH) – (AR x AH)	Col 3 – Col 4
Labour efficiency variance	(SR x SH) – (SR x AH)	Col 1 – Col 3
Labour mix/gang variance	(SR x RSH) – (SR x AH)	Col 2 – Col 3
Labour sub-efficiency/yield variance	(SR x SH) – (SR x RSH)	Col 1 – Col 2

Scenario 4: Multiple labour with idle time:
Computation table:

SR x SH	SR x RSH	SR x AHW	SR x AHP	AR x AHP

Formulae:

Labour cost variance	(SR x SH) – (AR x AHP)	Col 1 – Col 5
Labour rate variance	(SR x AHP) – (AR x AHP)	Col 4 – Col 5
Labour idle time variance	(SR x AHW) – (SR x AHP)	Col 3 – Col 4
Labour efficiency variance	(SR x SH) – (SR x AHW)	Col 1 – Col 3
Labour mix/gang variance	(SR x RSH) – (SR x AHW)	Col 2 – Col 3
Labour sub-efficiency/yield variance	(SR x SH) – (SR x RSH)	Col 1 – Col 2

Variable overhead Variances:
1. In order to compute the Variable OH variances we require the following information
   a. Standard Hours – This is the budgeted hours flexed for actual output

b. Actual Hours– This refers to the number of hours actually worked. It does not include idle time as it is assumed that the company does not incur variable overheads during idle time
c. Standard rate per hour – This is the budgeted rate to be incurred every hour and is calculated by dividing the budgeted hours from budgeted variable overheads. {SR. per hour = Budgeted VOH / BH}
d. Actual rate per hour – This refers to the actual rate incurred on variable overheads

2. VOH variances compute the difference between the standard VOH cost and the actual VOH cost and fix the responsibility for the variances. The variance can either occur on account of efficiency or rate variances

Computation table for VOH Variances:

SR * SH	SR * AH	AR * AH
Standard VOH cost		Actual VOH Cost

Conversion factor when information on output is given but hours not directly available:
- SR/per hour * SH = SR/per unit * AO
- SR/per hour * AH = SR/per unit * SO

Note:
- SR/per unit = Budgeted VOH / Budgeted units
- **Logic behind conversion:** The standard hours are always calculated with the help of the actual output and hence they standard hours are equated to actual output.

Formulae:

VOH Cost Variance	Standard VOH – Actual VOH	Col 1 – Col 3
VOH Expenditure variance	(SR x AH) – (AR x AH)	Col 2 – Col 3
VOH Efficiency Variance	(SR x SH) – (SR x AH)	Col 1 – Col 2

Fixed overhead Variances:
i. In order to compute the Fixed OH variances we require the following information
   a. Actual output or standard hours
   b. Actual Hours or standard output
   c. Standard rate per hour – This is the budgeted rate to be incurred every hour and is calculated by dividing the budgeted hours from budgeted variable overheads. {SR. per hour = Budgeted FOH / BH}
   d. Actual rate per hour – This refers to the actual rate incurred on fixed overheads
   e. Possible Hours = Budgeted hours x (Actual days/Budgeted days)

Different types of problems under FOH variances:
- ❖ FOH variances without calendar variance
- ❖ FOH variances with calendar variance

Scenario 1: FOH variances without calendar variance
Computation table:

SR x SH	SR x AH	SR x BH	AFOH

Formulae:

FOH Cost Variance	SR x SH – AFOH	Col 1 – Col 4
FOH Expenditure Variance	(SR x BH) – AFOH	Col 3 – Col 4
FOH Volume Variance	(SR x SH) – (SR x BH)	Col 1 – Col 3
FOH efficiency variance	(SR x SH) – (SR x AH)	Col 1 – Col 2
FOH capacity variance	(SR x AH) – (SR x BH)	Col 2 – Col 3

Scenario 2: FOH variances with calendar variance
Computation table:

SR x SH	SR x AH	SR x PH	SR x BH	AFOH

Note: FOH variances will have same conversion factors as in VOH variances

Formulae:

FOH Cost Variance	SR x SH – AFOH	Col 1 – Col 5
FOH Expenditure Variance	(SR x BH) – AFOH	Col 4 – Col 5
FOH Volume Variance	(SR x SH) – (SR x BH)	Col 1 – Col 4
FOH efficiency variance	(SR x SH) – (SR x AH)	Col 1 – Col 2
FOH capacity variance	(SR x AH) – (SR x PH)	Col 2 – Col 3
FOH calendar variance	(SR x PH) – (SR x BH)	Col 3 – Col 4

1. **Material variances – Single material**

ABC Ltd furnishes the following information

Standard	Material for 70 kg finished products	100 kg
	Price of material	Rs.1 per kg
Actual	Output	2,10,000 Kg
	Materials used	2,80,000 Kg
	Cost of materials	2,52,000

Compute all the relevant variances

Answer:

Computation table:

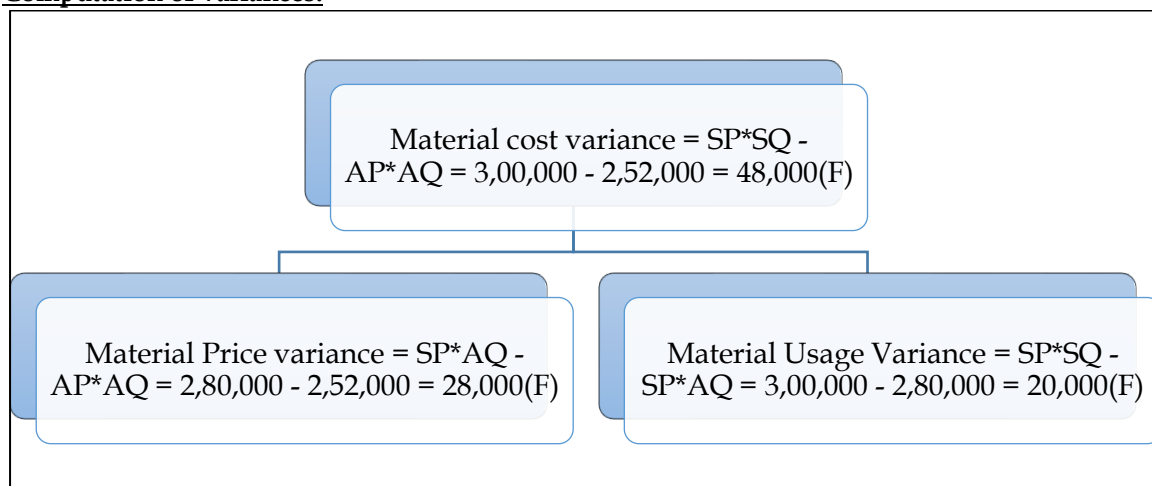| SP x SQ	SP x AQ	AP x AQ
1 x 3,00,000	1 x 2,80,000	0.90 x 2,80,000
3,00,000	**2,80,000**	**2,52,000**

Note:

1. Computation of Actual Price:

$$\text{Actual price} = \frac{\text{Actual Material Cost}}{\text{Actual quantity used}} = \frac{2,52,000}{2,80,000} = \text{Rs. } 0.90 \text{ per KG}$$

2. Computation of Standard Quantity:

$$\text{Standard Quantity} = \text{Actual Output x} \left(\frac{\text{Input}}{\text{Output}}\right) = 2,10,000 \text{ x} \left(\frac{100}{70}\right) = 3,00,000 \text{ kgs}$$

Computation of variances:

Material cost variance = SP*SQ - AP*AQ = 3,00,000 - 2,52,000 = 48,000(F)

Material Price variance = SP*AQ - AP*AQ = 2,80,000 - 2,52,000 = 28,000(F)

Material Usage Variance = SP*SQ - SP*AQ = 3,00,000 - 2,80,000 = 20,000(F)

2. **Material variances – Multiple material**

The standard cost of a chemical mixture is as follows:
- 40% material A at Rs. 20 per kg.
- 60% material B at Rs. 30 per kg.

A standard loss of 10% of input is expected in production. The cost records for a period showed the following usage:
- 90 kg material A at a cost of Rs. 18 per kg.
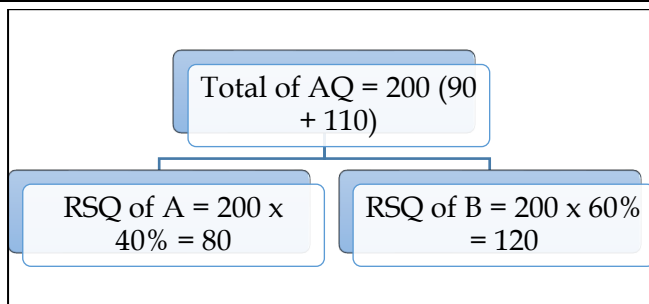- 110 kg material B at a cost of Rs. 34 per kg.

The quantity produced was 189 kg. of good product. Calculate all material variances
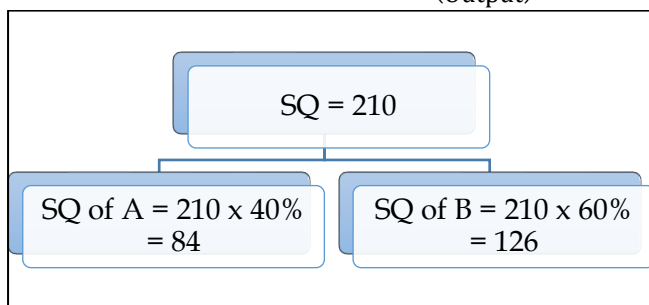
Answer:

Computation table:

Material	SP x SQ	SP x RSQ	SP x AQ	AP x AQ
Material A	20 x 84	20 x 80	20 x 90	18 x 90
Material B	30 x 126	30 x 120	30 x 110	34 x 110
Total	**5,460**	**5,200**	**5,100**	**5,360**

Note 1: Computation of RSQ:

Total of AQ = 200 (90 + 110)
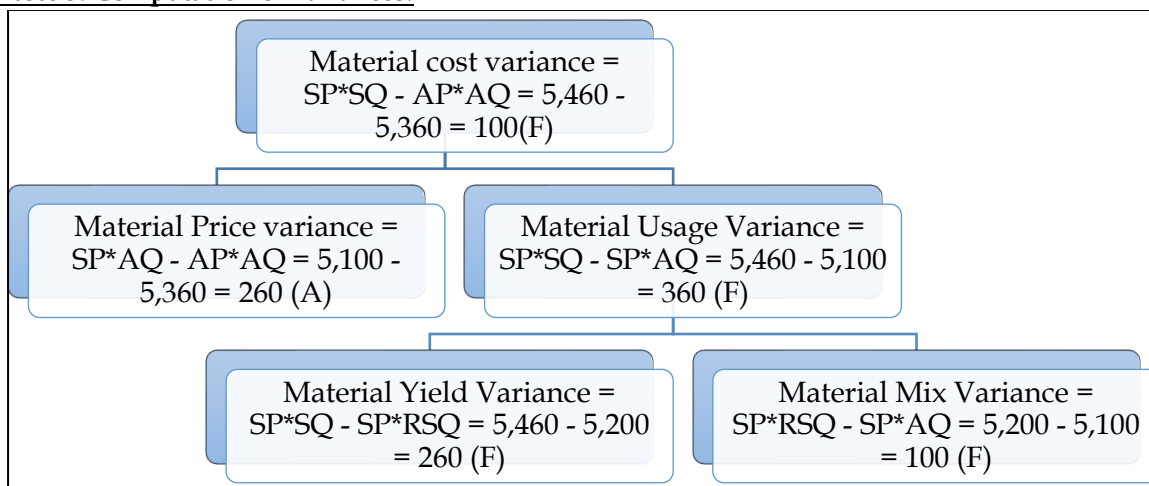
RSQ of A = 200 x 40% = 80

RSQ of B = 200 x 60% = 120

Note 2: Computation of SQ:

Standard Quantity = Actual Output x $\left(\frac{\text{Input}}{\text{Output}}\right)$ = 189 x $\left(\frac{100}{90}\right)$ = 210 KG

SQ = 210

SQ of A = 210 x 40% = 84

SQ of B = 210 x 60% = 126

Note 3: Computation of variances:

Material cost variance = SP*SQ - AP*AQ = 5,460 - 5,360 = 100(F)

Material Price variance = SP*AQ - AP*AQ = 5,100 - 5,360 = 260 (A)

Material Usage Variance = SP*SQ - SP*AQ = 5,460 - 5,100 = 360 (F)

Material Yield Variance = SP*SQ - SP*RSQ = 5,460 - 5,200 = 260 (F)

Material Mix Variance = SP*RSQ - SP*AQ = 5,200 - 5,100 = 100 (F)

3. **Material variances with stock:**

Eksay Limited produces an article by blending two basic raw materials. The following standards have been set for the raw materials:

Material	Standard Mix	Standard Price
A	40%	Rs.4.00
B	60%	Rs.3.00

The standard loss in processing is 15%. During September 2011, the company produced 1700 kg of the finished product.

The position of stock and purchases for the month of September 2011 is as under

Material	Opening stock	Closing stock	Purchases in Kg	Purchases in Rupees
A	35	5	800	3,400
B	40	50	1,200	3,000

Calculate all relevant variances. Assume FIFO for the issue of material.
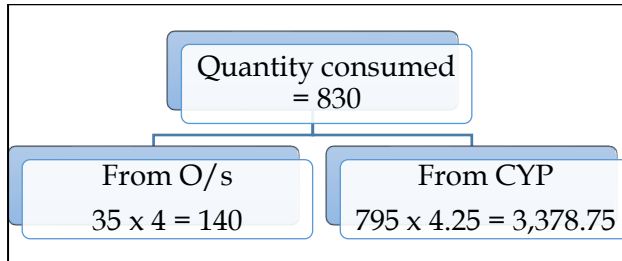
Answer:

Computation table:

Material	SP x SQ	SP x RSQ	SP x AQ	AP x AQ
Material A	4 x 800	4 x 808	4 x 830	3,518.75
Material B	3 x 1,200	3 x 1,212	3 x 1,190	2,995
Total	**6,800**	**6,868**	**6,890**	**6,513.75**

Note 1: Computation of AP x AQ:
- AQ = Opening stock + Purchases – Closing stock
- AQ of A = 35 + 800 – 5 = 830
- AQ of B = 40 + 1,200 – 50 = 1,190

AP x AQ of Material A:
- Value of AP x AQ is 140 + 3,378.75 = 3,518.75

Quantity consumed = 830	
From O/s 35 x 4 = 140	From CYP 795 x 4.25 = 3,378.75

AP x AQ of Material B:
- Value of AP x AQ is 120 + 2,875 = 2,995
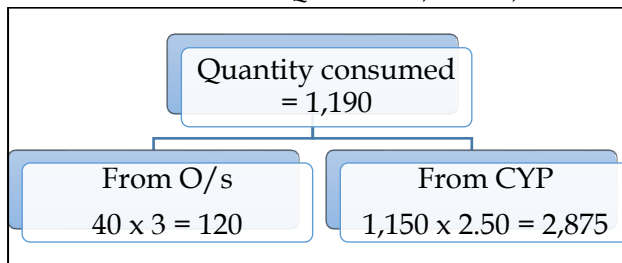
Quantity consumed = 1,190	
From O/s 40 x 3 = 120	From CYP 1,150 x 2.50 = 2,875

Note 2: Computation of RSQ:

Total of AQ = 2,020 (830 + 1,190)	
RSQ of A = 2,020 x 40% = 808	RSQ of B = 2,020 x 60% = 1,212
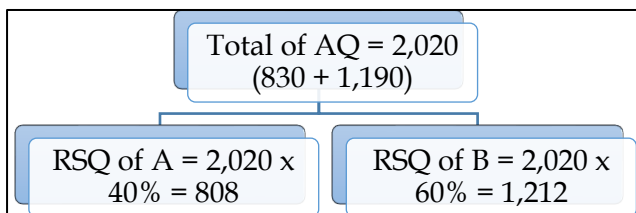
Note 3: Computation of SQ:

$$\text{Standard Quantity} = \text{Actual Output} \times \left(\frac{\text{Input}}{\text{Output}}\right) = 1,700 \times \left(\frac{100}{85}\right) = 2,000$$

SQ = 2,000	
SQ of A = 2,000 x 40% = 800	SQ of B = 2,000 x 60% = 1,200

Note 4: Computation of variances:

Material cost variance =
SP*SQ - AP*AQ = 6,800 -
6,513.75 = 286.25F

Material Price variance =
SP*AQ - AP*AQ = 6,890 -
6,513.75 = 376.25F

Material Usage Variance =
SP*SQ - SP*AQ = 6,800 - 6,890
= 90A

Material Yield Variance =
SP*SQ - SP*RSQ = 6,800 - 6,868
= 68A
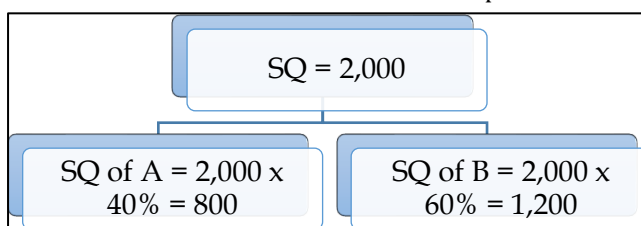
Material Mix Variance =
SP*RSQ - SP*AQ = 6,868 - 6,890
= 22A
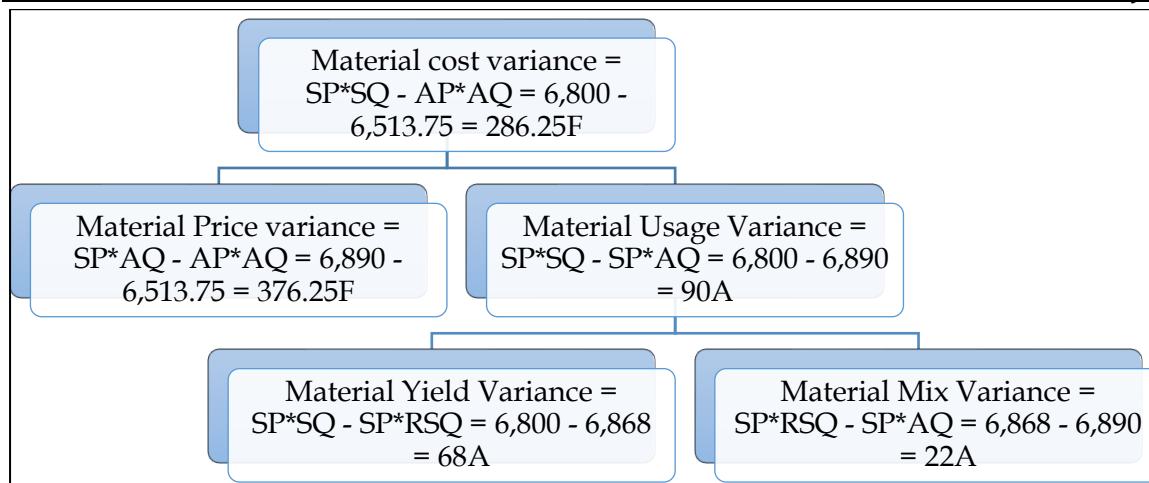
4. Material variances – Missing data:

Compute the missing data indicated by the question marks from the following:

Particulars	A	B
Standard price per unit	12	15
Actual price per unit	15	20
Standard input	50	?
Actual input	?	70
Material price variance	?	?
Material usage variance	?	Rs.300 adverse
Material cost variance	?	?

Material mix variance for both the products together was Rs.45 adverse

Answer:

Computation table:

Material	SP x SQ	SP x RSQ	SP x AQ	AP x AQ
Material A	12 x 50	12 x 55	12 x 40	15 x 40
Material B	15 x 50	15 x 55	15 x 70	20 x 70
Total	**1,350**	**1,485**	**1,530**	**2,000**

Note 1: Computation of SQ of Material B:

Material usage variance = (SP x SQ) − (SP x AQ)

$MUV_B = (15 \text{ x SQ}) − (15 \text{ x } 70)$

$−300 = 15SQ − 1,050; SQ = 50$

Note 2: Computation of AQ of A

- Let us assume AQ of A to be Y
- Total of AQ = (Y + 70)
- RSQ of A = (Y+70)/2
- RSQ of B = (Y+70)/2

Material Mix variance = (SP x RSQ) − (SP x AQ)

$$−45 = \left(12 \text{ x } \frac{(Y + 70)}{2} + 15 \text{ x} \frac{(Y + 70)}{2} \right) − (12Y + 1,050)$$

$$−45 = (6Y + 420 + 7.5Y + 525) − (12Y + 1,050)$$

$$\mathbf{−45 = 1.5Y − 105; Y = \frac{60}{1.5} = 40 \text{ units}}$$

Note 3: Solution:

Particulars	Calculation	Amount
Standard input of B	Note 1	50
Actual input of A	Note 2	40
Material price variance	(SP x AQ) – (AP x AQ)	

A	(12 x 40) – (15 x 40)	120A
B	(15 x 70) – (20 x 70)	350A
Material usage variance	(SP x SQ) – (SP x AQ)	
A	(12 x 50) – (12 x 40)	120F
Material cost variance	(SP x SQ) – (AP x AQ)	
A	(12 x 50) – (15 x 40)	0
B	(15 x 50) – (20 x 70)	650A

5. Computation of material variances:

BCC Limited manufactures Ordinary Portland Cement (OPC). The standard data for the new materials that are used to manufacture OPC are as follows:

Material	Composition (%)	Rate per Metric Ton (Rs.)
Limestone	65	565
Silica	20	4,800
Alumina	5	32,100
Iron ore	5	1,800
Others	5	2,400

During the month of February 2019, A Limited, produced 500 MT OPC. Actual data related with the consumption and costs are as follows:

Material	Quantity (MT)	Total Cost (Rs.)
Limestone	340	1,90,400
Silica	105	5,09,250
Alumina	25	8,12,500
Iron ore	30	53,400
Others	23	51,750

You are required to find out the following variances related with the production of OPC for the month of February 2019:
- Material Price Variance
- Material Mix Variance
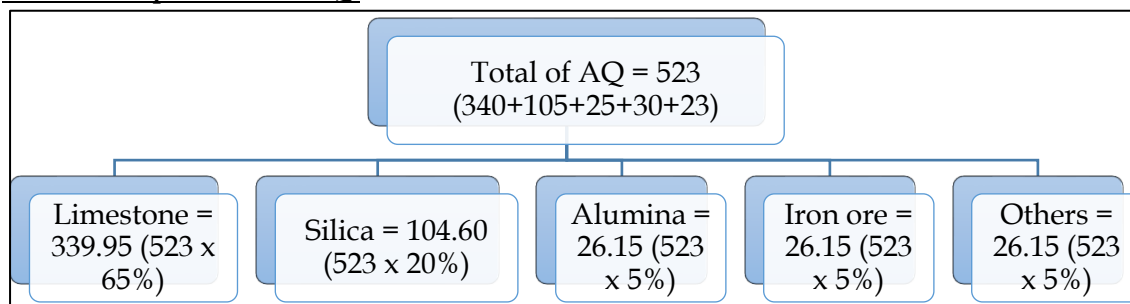- Material Yield variance
- Material Cost Variance

Answer:
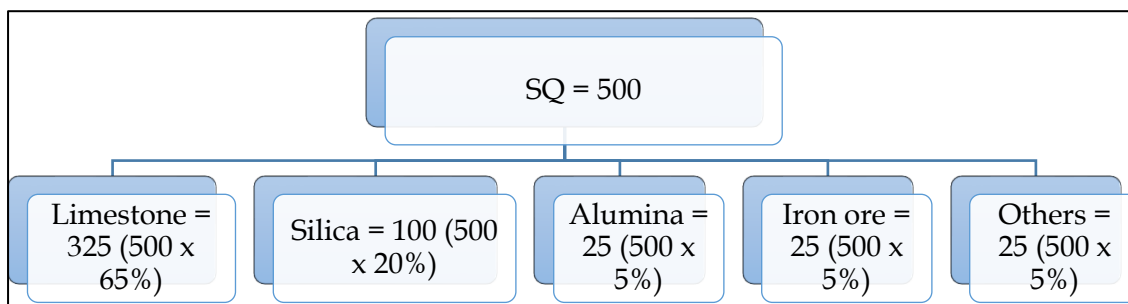**WN 1: Computation of material variances:**
Computation table:

Material	SP x SQ	SP x RSQ	SP x AQ	AP x AQ
Limestone	565 x 325	565 x 339.95	565 x 340	1,90,400
Silica	4,800 x 100	4,800 x 104.60	4,800 x 105	5,09,250
Alumina	32,100 x 25	32,100 x 26.15	32,100 x 25	8,12,500
Iron Ore	1,800 x 25	1,800 x 26.15	1,800 x 30	53,400
Others	2,400 x 25	2,400 x 26.15	2,400 x 23	51,750
Total	**15,71,125**	**16,43,397**	**16,07,800**	**16,17,300**

Note 1: Computation of RSQ:

Total of AQ = 523
(340+105+25+30+23)

Limestone = 339.95 (523 x 65%)

Silica = 104.60 (523 x 20%)

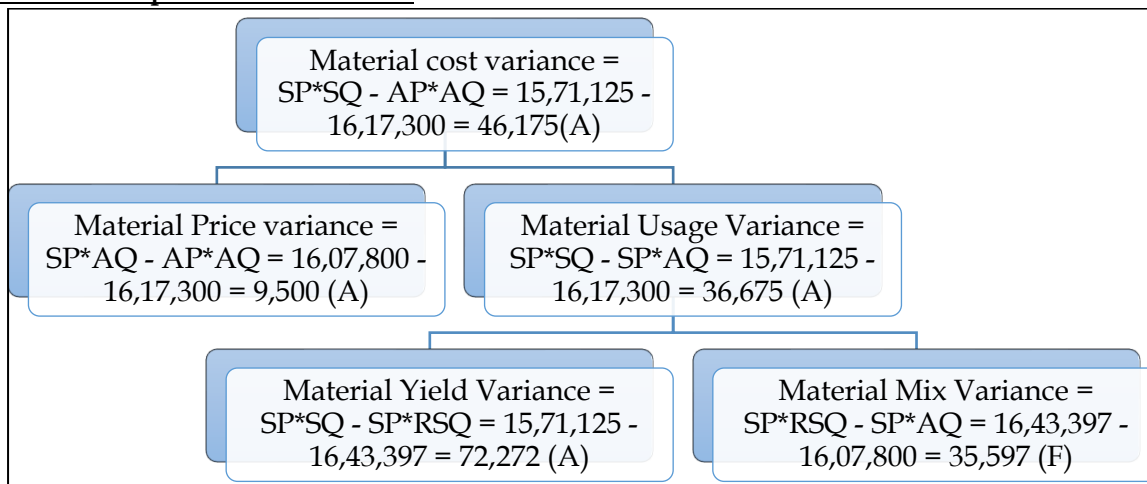Alumina = 26.15 (523 x 5%)

Iron ore = 26.15 (523 x 5%)

Others = 26.15 (523 x 5%)

Note 2: Computation of SQ:

Standard Quantity = Actual Output x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ = 500 x $\left(\dfrac{1}{1}\right)$ = 500 Ton

```
                        ┌─────────────────────┐
                        │      SQ = 500       │
                        └─────────────────────┘
   ┌──────────┬──────────┬──────────┬──────────┬──────────┐
┌──────────┐┌──────────┐┌──────────┐┌──────────┐┌──────────┐
│Limestone=││Silica=100││Alumina = ││Iron ore =││Others =  │
│325 (500 x││(500 x    ││25 (500 x ││25 (500 x ││25 (500 x │
│  65%)    ││  20%)    ││   5%)    ││   5%)    ││   5%)    │
└──────────┘└──────────┘└──────────┘└──────────┘└──────────┘
```

Note 3: Computation of variances:

```
                ┌──────────────────────────────┐
                │ Material cost variance =     │
                │ SP*SQ - AP*AQ = 15,71,125 -  │
                │ 16,17,300 = 46,175(A)        │
                └──────────────────────────────┘
        ┌────────────────────────┴────────────────────────┐
┌────────────────────────┐              ┌────────────────────────┐
│ Material Price variance=│              │ Material Usage Variance=│
│ SP*AQ - AP*AQ = 16,07,800│             │ SP*SQ - SP*AQ = 15,71,125│
│ - 16,17,300 = 9,500 (A) │              │ - 16,17,300 = 36,675 (A)│
└────────────────────────┘              └────────────────────────┘
                              ┌───────────────┴───────────────┐
                    ┌────────────────────────┐  ┌────────────────────────┐
                    │ Material Yield Variance=│  │ Material Mix Variance = │
                    │ SP*SQ - SP*RSQ = 15,71,125│ SP*RSQ - SP*AQ = 16,43,397│
                    │ - 16,43,397 = 72,272 (A)│  │ - 16,07,800 = 35,597 (F)│
                    └────────────────────────┘  └────────────────────────┘
```

6. Material variances:

XYZ Limited produces two products M and N by using two inputs Material A and B. The standard price per unit of Material A is Rs.20 and of Material B is Rs.10. The standard quantities of materials for each product are as follows:

Products	Material A	Material B
M	2	3
N	1	4

The company actually produced 11,000 units of M and 9,000 units of N and used 32,500 units of Material A at a cost of Rs.6,59,750 and 67,000 units of Material B at a cost of Rs.6,83,400.

Calculate:
- Material Price Variance
- Material Usage Variance
- Material Cost Variance

Answer:

WN 1: Computation of material variances:

Computation table:

Material	SP x SQ	SP x RSQ	SP x AQ	AP x AQ
Material A	20 x 31,000	Not required	20 x 32,500	6,59,750
Material B	10 x 69,000	Not required	10 x 67,000	6,83,400
Total	**13,10,000**	**Not required**	**13,20,000**	**13,43,150**

Note 1: Computation of SQ:

Standard Quantity = Actual Output x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$

For material A:

SQ for Product M = 11,000 x $\left(\dfrac{2}{1}\right)$ = 22,000

SQ for Product N = 9,000 x $\left(\dfrac{1}{1}\right)$ = 9,000

SQ of Material A = 22,000 + 9,000 = 31,000

For material B:
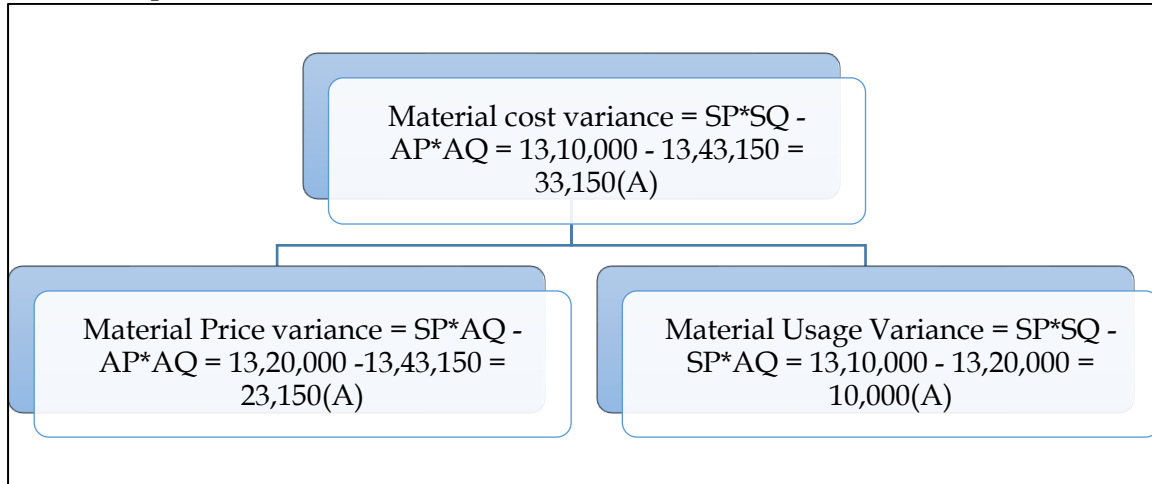
SQ for Product M = 11,000 x $\left(\frac{3}{1}\right)$ = 33,000

SQ for Product N = 9,000 x $\left(\frac{4}{1}\right)$ = 36,000

SQ of Material B = 33,000 + 36,000 = 69,000

Note 2: Computation of variances:

Material cost variance = SP*SQ - AP*AQ = 13,10,000 - 13,43,150 = 33,150(A)

Material Price variance = SP*AQ - AP*AQ = 13,20,000 -13,43,150 = 23,150(A)

Material Usage Variance = SP*SQ - SP*AQ = 13,10,000 - 13,20,000 = 10,000(A)

7. **Material variances:**

Jigyasa Pharmaceuticals Limited is engaged in producing dietary supplement 'Funkids' for growing children. It produces 'Funkids' in a batch of 10 kgs. Stanard material inputs required for 10 kgs. Of 'Funkdids' are as below:

Material	Quantity (in kgs.)	Rate per kg (in rupees)
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 rupees)
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 Limited:

- Material Cost variance
- Material Price Variance
- Material usage variance
- Material Mix variance
- Material Yield Variance

Answer:

Computation table:

Material	SP x SQ	SP x RSQ	SP x AQ	AP x AQ
Vita-X	110 x 2,500	110 x 2,386	110 x 3,000	115 x 3,000
Proto-D	320 x 1,500	320 x 1,432	320 x 1,250	330 x 1,250
Mine-L	460 x 1,500	460 x 1,432	460 x 1,000	405 x 1,000
Total	**14,45,000**	**13,79,420**	**11,90,000**	**11,62,500**

Note 1: Computation of AQ:

AQ of Vita$-$x = 5,000 x $\left(\frac{6}{10}\right)$ = 3,000 KG

AQ of Proto$-$D = 5,000 x $\left(\frac{2.5}{10}\right)$ = 1,250 KG

$$AQ \text{ of Mine} - L = 5,000 \times \left(\frac{2}{10}\right) = 1,000 \text{ KG}$$

Note 2: Computation of RSQ:
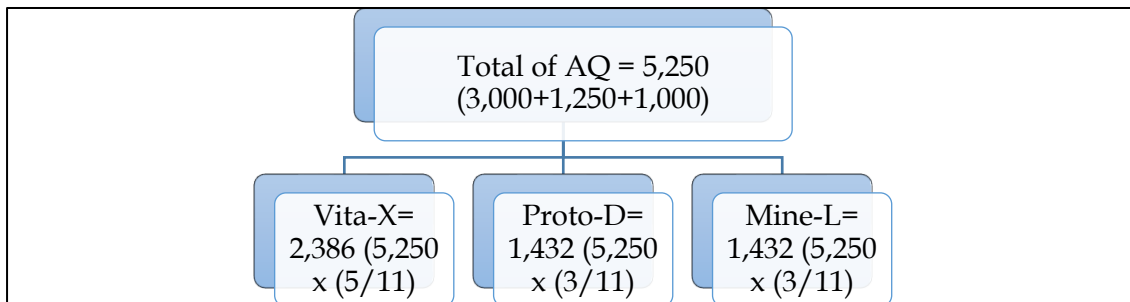
```
                    Total of AQ = 5,250
                    (3,000+1,250+1,000)

       Vita-X=              Proto-D=            Mine-L=
       2,386 (5,250         1,432 (5,250        1,432 (5,250
       x (5/11)             x (3/11)            x (3/11)
```

Note 3: Computation of SQ:

$$\text{Standard Quantity} = \text{Actual Output} \times \left(\frac{\text{Input}}{\text{Output}}\right) = 5,000 \times \left(\frac{11}{10}\right) = 5,500 \text{ KG}$$

```
                         SQ = 5,500

     Vita-x = 2,500  (5,500     Proto-D = 1,500        Mine-L = 1,500  (5,500
          x (5/11))             (5,500 x (3/11)             x (3/11)
```

Note 3: Computation of variances:

```
                    Material cost variance =
                    SP*SQ - AP*AQ = 14,45,000 -
                    11,62,500 = 2,82,500(F)

     Material Price variance =          Material Usage Variance =
     SP*AQ - AP*AQ = 11,90,000 -        SP*SQ - SP*AQ = 14,45,000 -
     11,62,500 = 27,500(F)              11,90,000 = 2,55,000 (F)

              Material Yield Variance =          Material Mix Variance =
              SP*SQ - SP*RSQ = 14,45,000 -       SP*RSQ - SP*AQ = 13,79,420 -
              13,79,420 = 65,580 (F)             11,90,000 = 1,89,420 (F)
```
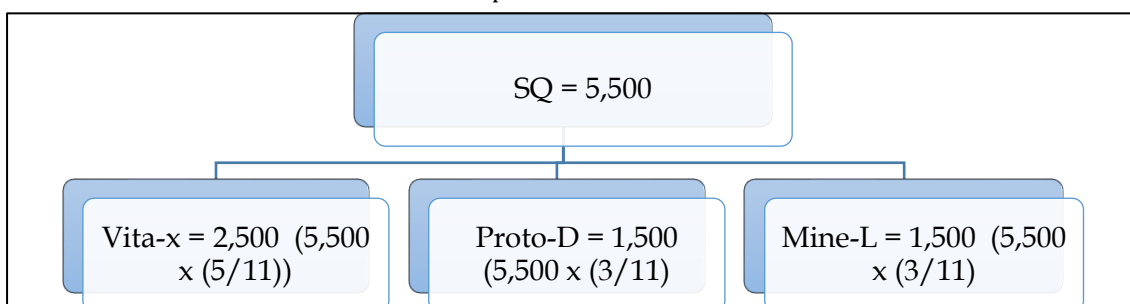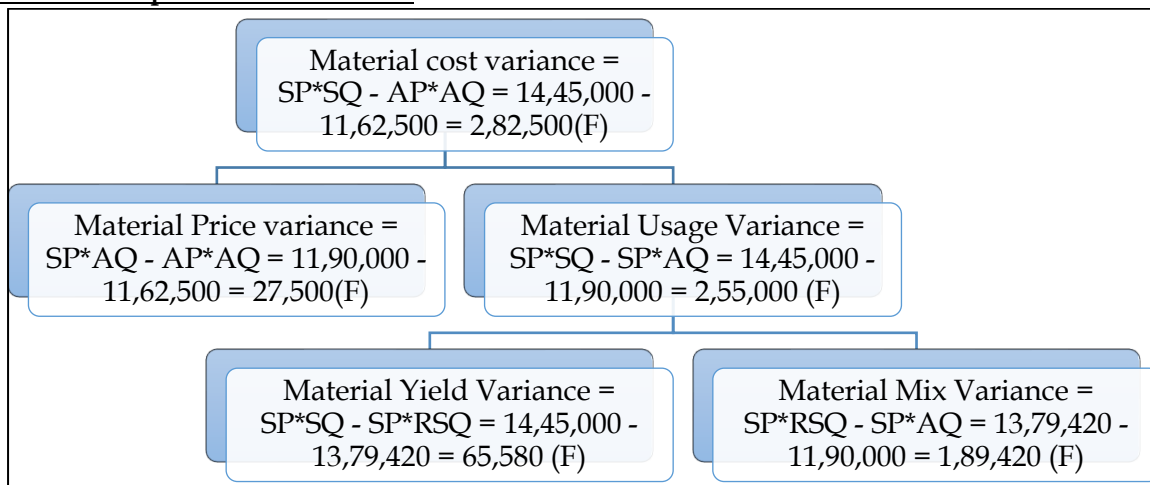
8. **Labour Variances:**

The standard output of product 'EXE' is 25 units per hour in manufacturing department of a company employing 100 workers. The standard wage rate per labour hour is Rs.6. In a 42-hour week, the department produced 1040 units of 'EXE'. The hourly wage rate actually paid were Rs.6.20, Rs.6 and Rs.5.70 respectively to 10,30 and 60 of the workers. Compute relevant variances. Rework if 5% of the time paid was lost due to abnormal reasons.

Answer:

Computation table:

SR x SH	SR x AH	AR x AH
6 x 4,160	6 x 4,200	5.84 x 4,200
24,960	**25,200**	**24,528**

Note 1: Computation of AR:

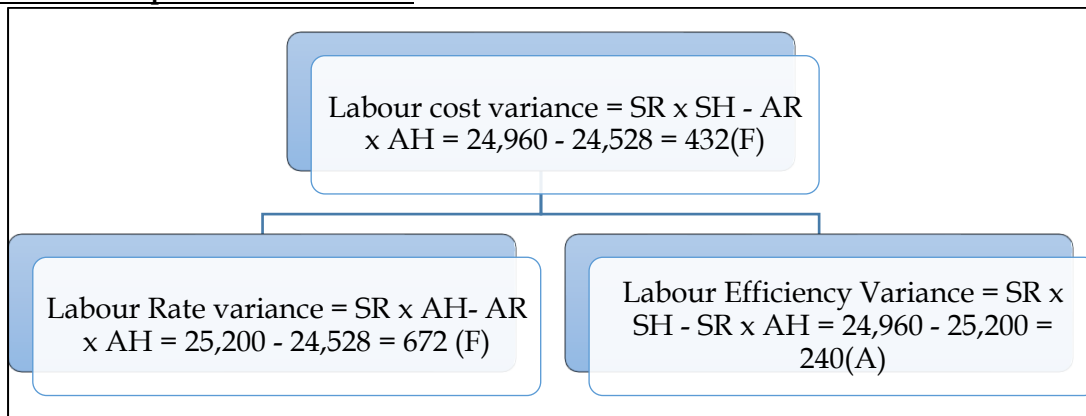$$\text{Actual rate} = \frac{(10 \times 6.20) + (30 \times 6) + (60 \times 5.70)}{10 + 30 + 60} = 5.84$$

Note 2: Computation of AH:
Actual hours = (No of workers x No of hours) = (100 x 42 hours) = 4,200 hours

Note 3: Computation of SH:

100 hours = 25 units
ST = AO
? = 1,040 units
4,160 hours = 1,040 units

Note 4: Computation of variances:

Labour cost variance = SR x SH - AR x AH = 24,960 - 24,528 = 432(F)

Labour Rate variance = SR x AH- AR x AH = 25,200 - 24,528 = 672 (F)

Labour Efficiency Variance = SR x SH - SR x AH = 24,960 - 25,200 = 240(A)

Rework scenario with 5% of the time being lost due to abnormal reasons:
Computation table:

SR x SH	SR x AHW	SR x AHP	AR x AHP
6 x 4,160	6 x 3,990	6 x 4,200	5.84 x 4,200
24,960	**23,940**	**25,200**	**24,528**

Note 1: Computation of AHW and AHP:
- AHP = 42 hours x 100 workers = 4,200 hours
- AHW = 39.90 hours x 100 workers = 3,990 hours

Note 2: Computation of variances:

Labour cost variance = SR x SH - AR x AHP = 24,960 - 24,528 = 432(F)

Labour Rate variance = SR x AHP- AR x AHP = 25,200 - 24,528 = 672 (F)

Labour Efficiency Variance = SR x SH - SR x AHW = 24,960 - 23,940 = 1,020(F)

Labour Idle Time Variance = SR x AHP - AR x AHP = 23,940 - 25,200 = 1,260(A)
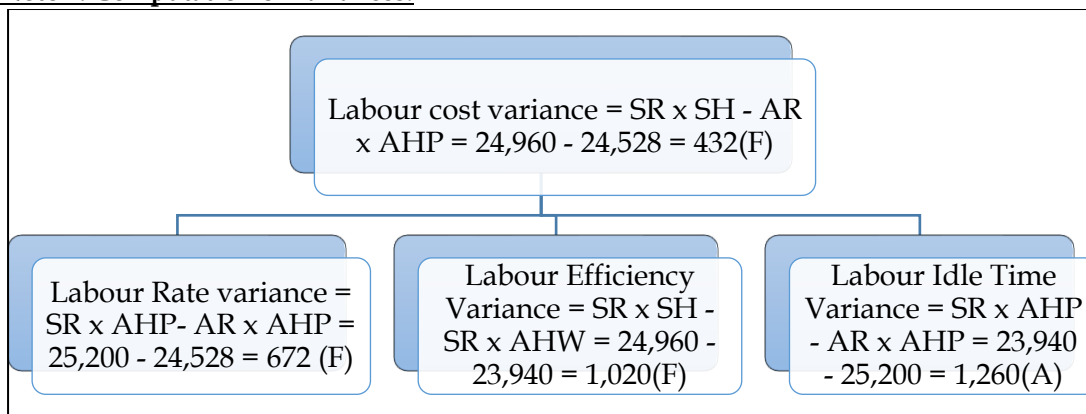
9. **Labour variances:**

Brouhill Furnitures makes curio cabinets for various museums and art galleries. It makes 7 curio cabinets per hour by employing 5 skilled, 10 semiskilled and 20 unskilled workers. The standard wage rate is Rs.24 per labour hour. During the last week workers worked for 56 hours and made 400 Curio cabinets. 2% of the time paid was lost due to the abnormal reasons. The actual hourly rate paid to

skilled, semiskilled and unskilled workers were Rs.30, Rs.24 and Rs.18 respectively. You are required to calculate:

- Labour cost variance
- Labour rate variance
- Labour efficiency variance and
- Idle time variance

Answer:

Computation table:

Labour	SR x SH	SR x RSH	SR x AHW	SR x AHP	AR x AHP
Skilled	24 x 285.71	24 x 274.40	24 x 274.40	24 x 280	30 x 280
Semi-skilled	24 x 571.43	24 x 548.80	24 x 548.80	24 x 560	24 x 560
Unskilled	24 x 1,142.86	24 x 1,097.60	24 x 1,097.60	24 x 1,120	18 x 1,120
Total	48,000	46,099.20	46,099.20	47,040	42,000

Note 1: Computation of AHP:

- AHP = No of workers x Hours paid per worker
- Skilled = 5 x 56 hours = 280 hours
- Semi-skilled = 10 x 56 hours = 560 hours
- Unskilled = 20 x 56 hours = 1,120 hours

Note 2: Computation of AHW:

- AHW = Actual hours paid – Idle Time
- Skilled = 280 hours – 2% = 274.40 hours
- Semi-skilled = 560 hours – 2% = 548.80 hours
- Unskilled = 1,120 hours – 2% = 1,097.60 hours
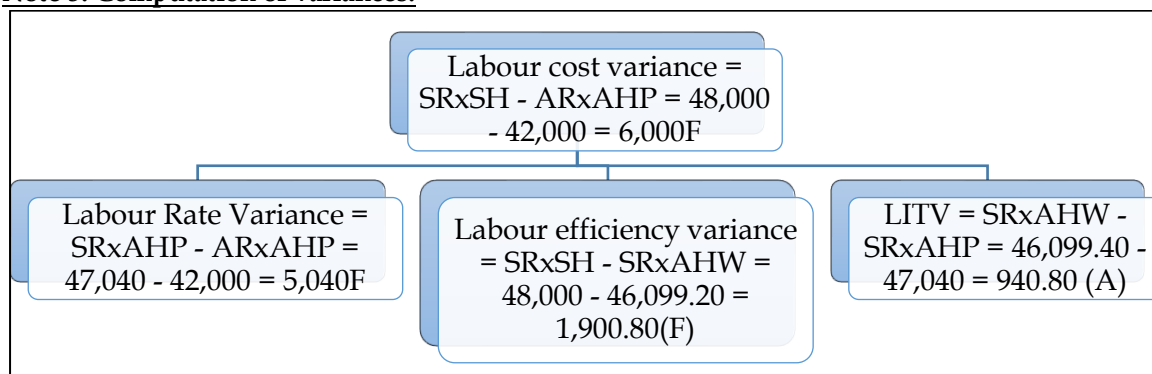
Note 3: Computation of RSH:

- Standard mix has been given in the question. Actual mix was not provided and it was taken same as standard mix. Hence RSH would be equal to AHW

Note 4: Computation of SH:

```
35 hours = 7 units
      ST = AO
       ? = 400 units
2,000 hours = 400 units
```

SH = 2,000 hours

- SH of Skilled = 2,000 x (5/35) = 285.71
- SH of Semi-skilled = 2,000 x (10/35) = 571.43
- SH of unskilled = 2,000 x (20/35) = 1,142.86

Note 5: Computation of variances:

Labour cost variance = SRxSH - ARxAHP = 48,000 - 42,000 = 6,000F

- Labour Rate Variance = SRxAHP - ARxAHP = 47,040 - 42,000 = 5,040F
- Labour efficiency variance = SRxSH - SRxAHW = 48,000 - 46,099.20 = 1,900.80(F)
- LITV = SRxAHW - SRxAHP = 46,099.40 - 47,040 = 940.80 (A)
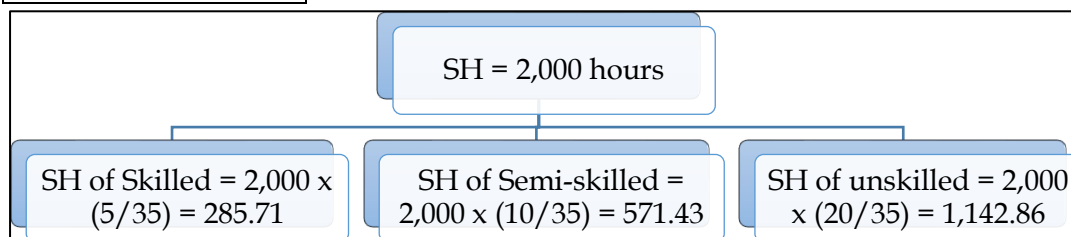
10. Labour variances – Multiple labour

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

Calculate all relevant variances.

Answer:

Computation table:

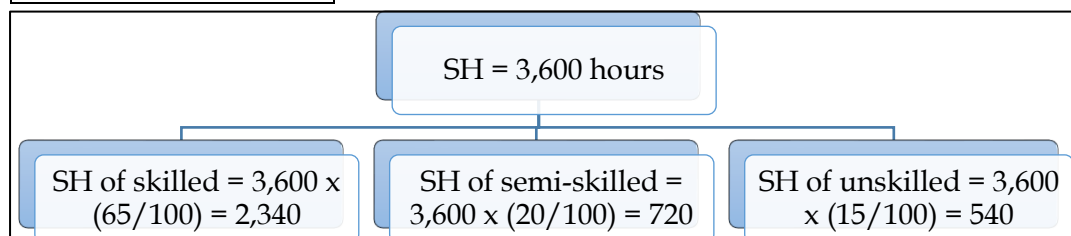| Labour	SR x SH	SR x RSH	SR x AH	AR x AH
Skilled	45 x 2,340	45 x 2,600	45 x 2,000	50 x 2,000
Semi-skilled	30 x 720	30 x 800	30 x 1,200	35 x 1,200
Unskilled	15 x 540	15 x 600	15 x 800	10 x 800
Total	**1,35,000**	**1,50,000**	**1,38,000**	**1,50,000**

Note 1: Computation of AH:
- AH = No of workers x No of hours
- AH for skilled = 50 workers x 40 hours = 2,000 hours
- AH for semi-skilled = 30 workers x 40 hours = 1,200 hours
- AH for unskilled = 20 workers x 40 hours = 800 hours
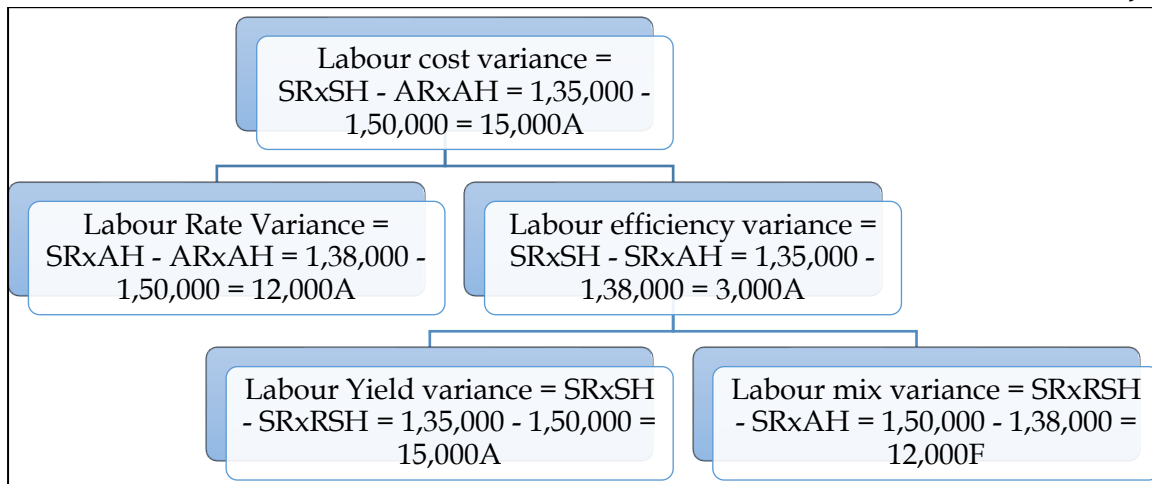
Note 2: Computation of RSH:

Total of AH = 4,000
(2,000 + 1,200 + 800)

RSH of skilled = 4,000 x (65/100) = 2,600

RSH of semi-skilled = 4,000 x (20/100) = 800

RSH of unskilled = 4,000 x (15/100) = 600
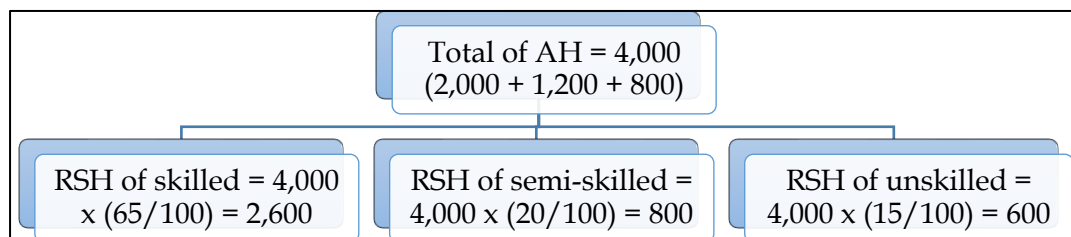
Note 3: Computation of SH:

4,000 hours = 2,000 units
ST = AO
? = 1,800 units
3,600 hours = 1,800 units

SH = 3,600 hours

SH of skilled = 3,600 x (65/100) = 2,340

SH of semi-skilled = 3,600 x (20/100) = 720

SH of unskilled = 3,600 x (15/100) = 540

Note 4: Computation of variances:

Labour cost variance =
SRxSH - ARxAH = 1,35,000 -
1,50,000 = 15,000A

Labour Rate Variance =
SRxAH - ARxAH = 1,38,000 -
1,50,000 = 12,000A

Labour efficiency variance =
SRxSH - SRxAH = 1,35,000 -
1,38,000 = 3,000A

Labour Yield variance = SRxSH
- SRxRSH = 1,35,000 - 1,50,000 =
15,000A

Labour mix variance = SRxRSH
- SRxAH = 1,50,000 - 1,38,000 =
12,000F

11. Labour variances:

A company planned to produce 2,000 units of a product in a week of 40 hours by employing 65 skilled workers. Other relevant information are as follows:

- Standard wages Rate = Rs.45 per hour
- Actual Production = 1,800 units
- Actual number of workers employed = 50 workers in a week of 40 hours
- Actual wages rate = Rs.50 per hour
- Abnormal time loss due to machinery breakdown = 100 hours

You are required to calculate:

- Labour cost, rate, idle time and efficiency variances
- Reconcile the variances

Answer:

Computation table:

SR x SH	SR x AHW	SR x AHP	AR x AHP
45 x 2,340	45 x 1,900	45 x 2,000	50 x 2,000
1,05,300	**85,500**	**90,000**	**1,00,000**

Note 1: Computation of SH:

2,600 hours = 2,000 units
ST = AO
? = 1,800 units
2,340 hours = 1,800 units

Note 2: Computation of AHW and AHP:

- AHP = 40 hours x 50 workers = 2,000 hours
- AHW = 2,000 hours – 100 hours = 1,900 hours

Note 3: Computation of variances:

Labour cost variance = SR x SH - AR
x AHP = 1,05,300 - 1,00,000 =
5,300(F)

Labour Rate variance =
SR x AHP- AR x AHP =
90,000 - 1,00,000 =
10,000 (A)

Labour Efficiency
Variance = SR x SH -
SR x AHW = 1,05,300 -
85,500 = 19,800 (F)

Labour Idle Time
Variance = SR x AHP
- AR x AHP = 85,500
- 90,000 = 4,500 (A)
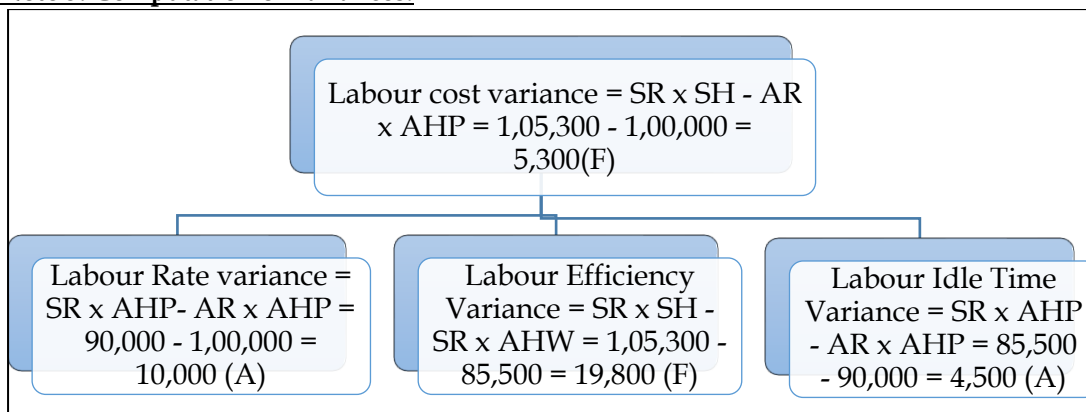
Reconciliation:

Labour cost variance = Labour rate variance + Labour efficiency variance + Labour idle time variance

Labour cost variance = 10,000 (A) + 19,800 (F) + 4,500 (A) = 5,300 (F)

12. **Material cost and labour variances:**

JVG Limited produces a product and operates a standard costing system and value material and finished goods inventories at standard cost. The information related with the product is as follows:

Particulars	Cost per unit
Direct materials (30 kg at Rs.350 per kg)	10,500
Direct labour (5 hours at Rs.80 per hour)	400

The actual information for the month just ended is as follows:

- The budgeted and actual production for the month of September 2019 is 1,000 units
- Direct materials – 5,000 kg at the beginning of the month. The closing balance of direct materials for the month was 10,000 kg. Purchases during the month were made at Rs.365 per kg. The actual utilization of direct materials was 7,200 kg more than the budgeted quantity
- Direct labour – 5,300 hours were utilized at a cost of Rs.4,34,600

Required:

- Direct material price and usage variances
- Direct labour rate and efficiency variances

Answer:

WN 1: Computation of Material Variances:

Computation table:

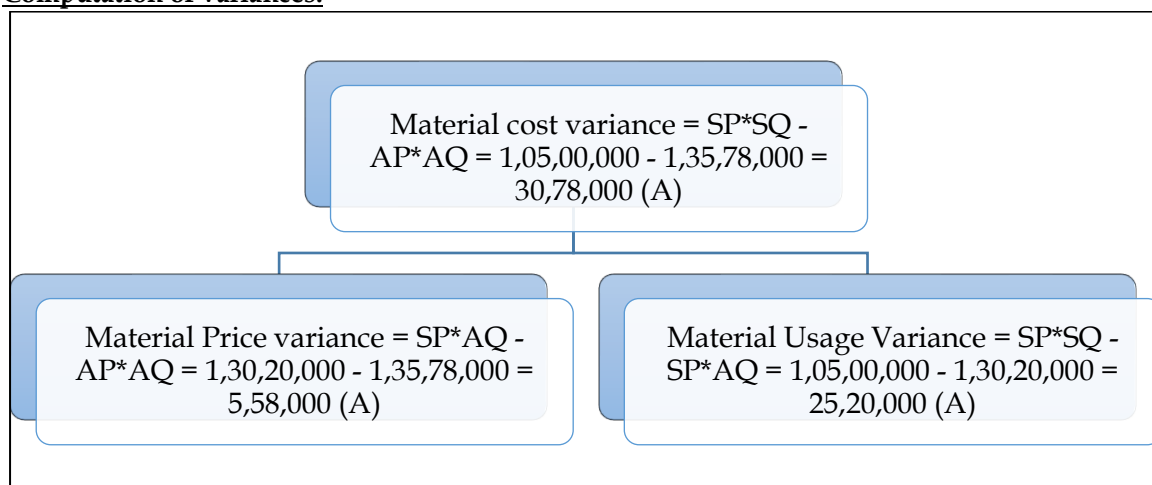| SP x SQ	SP x AQ	AP x AQ
350 x 30,000	350 x 37,200	365 x 37,200
1,05,00,000	**1,30,20,000**	**1,35,78,000**

Note:

1. Computation of Standard Quantity:

$$\text{Standard Quantity} = \text{Actual Output} \times \left(\frac{\text{Input}}{\text{Output}}\right) = 1,000 \times \left(\frac{30}{1}\right) = 30,000 \text{ kgs}$$

2. Computation of Actual Quantity:

- Budgeted quantity and standard quantity is same as budgeted output and actual output is same
- Actual quantity = Budgeted quantity + 7,200 = 30,000 + 7,200 = 37,200 Kg

Computation of variances:

Material cost variance = SP*SQ - AP*AQ = 1,05,00,000 - 1,35,78,000 = 30,78,000 (A)

Material Price variance = SP*AQ - AP*AQ = 1,30,20,000 - 1,35,78,000 = 5,58,000 (A)

Material Usage Variance = SP*SQ - SP*AQ = 1,05,00,000 - 1,30,20,000 = 25,20,000 (A)

WN 2: Computation of Labour Variances:

Computation table:

SR x SH	SR x AH	AR x AH
80 x 5,000	80 x 5,300	4,34,600

4,00,000	4,24,000	4,34,600

Note 1: Computation of SH:

5 hours = 1 unit
ST = AO
? = 1,000 units
5,000 hours = 1,000 units

Note 2: Computation of variances:

Labour cost variance = SR x SH - AR x AH = 4,00,000 - 4,34,600 = 34,600 (A)

Labour Rate variance = SR x AH- AR x AH = 4,24,000 - 4,34,600 = 10,600(A)

Labour Efficiency Variance = SR x SH - SR x AH = 4,00,000 - 4,24,000 = 24,000(A)
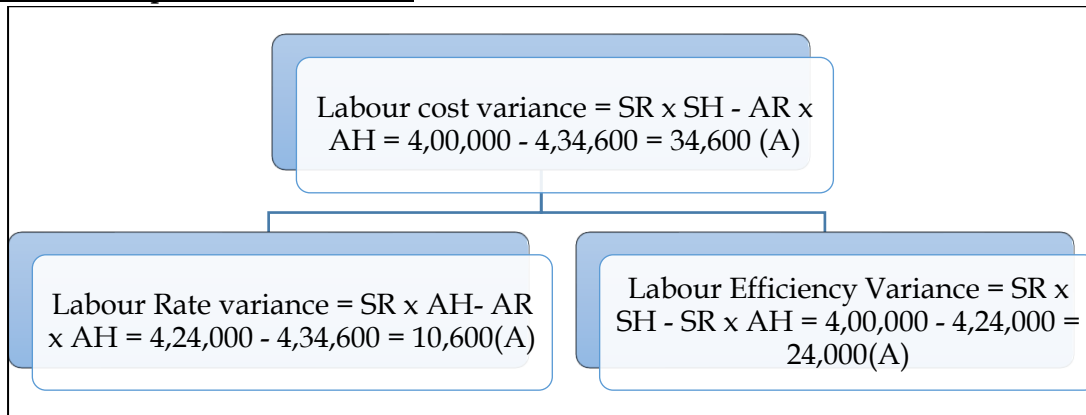
13. **Labour variances:**

The following information has been provided by a company:

Particulars	Amount
Number of units produced and sold	6,000
Standard labour rate per hour	Rs.8
Standard hours required for 6,000 units	-
Actual hours required	17,094 hours
Labour efficiency	105.3%
Labour rate variance	Rs.68,376 (A)

You are required to calculate:

- Actual labour rate per hour
- Standard hours required for 6,000 units
- Labour efficiency variance
- Standard labour cost per unit
- Actual labour cost per unit

Answer:

Computation table:

SR x SH	SR x AH	AR x AH
8 x 18,000	8 x 17,094	12 x 17,094
1,44,000	**1,36,752**	**2,05,128**

Note 1: Computation of Standard Time:

$$\text{Efficiency} = \frac{\text{Standard Time}}{\text{Actual Time}}; 105.3\% = \frac{ST}{17,094}$$

Standard Time = 17,094 x 105.3% = 18,000 hours

Note 2: Computation of Actual Rate:

Labour rate variance = (SR x AH) – (AR x AH)

-68,376 = (8 x 17,094) – (17,094AR)

-68,376 = 1,36,752 – 17,094AR

17,094AR = 2,05,128

AR = Rs.12 per hour

Note 3: Solution:

Particulars	Calculation	Amount

Actual rate per hour	Note 2	12
Standard hours for 6,000 units	Note 1	18,000
Labour efficiency variance	(SR x SH) – (SR x AH) 1,44,000 – 1,36,752	7,248 (F)
Standard Labour cost per unit	(1,44,000/6,000)	24
Actual Labour cost per unit	(2,05,128/6,000)	34.19

14. Labour variances:

Following information is given regarding standard composition and standard rates of a gang of workers:

Standard Composition	Standard Hourly rate
10 Men	62.50
5 women	40.00
5 boys	35.00

According to the given specifications, a week consists of 40 hours and standard output for a week is 1000 units.

In a particular week, gang consisted of 13 men, 4 women, 3 boys and actual wages were paid as follows:
- Men @ Re.60.0 per hour
- Women @ Re.42.5 per hour
- Boys @ Re.32.5 per hour

Two hours were lost in the week due to abnormal idle time. Actual production was 960 units in the week. Calculate labour variances.

Answer:

Computation table:

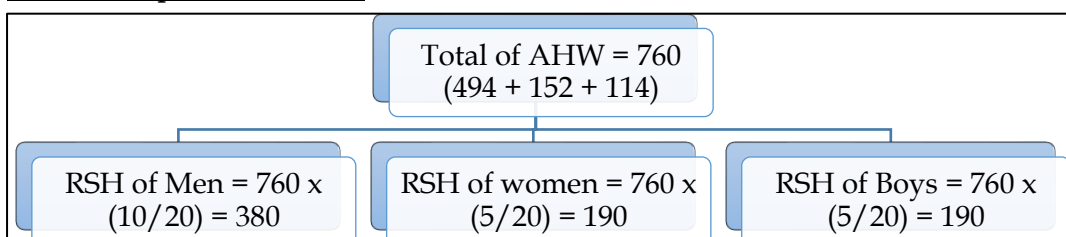| Labour	SR x SH	SR x RSH	SR x AHW	SR x AHP	AR x AHP
Men	62.5 x 384	62.5 x 380	62.5 x 494	62.5 x 520	60 x 520
Women	40 x 192	40 x 190	40 x 152	40 x 160	42.5 x 160
Boys	35 x 192	35 x 190	35 x 114	35 x 120	32.5 x 120
Total	**38,400**	**38,000**	**40,945**	**43,100**	**41,900**

Note 1: Computation of AHP:
- AHP = No of workers x Hours paid per worker
- Men = 13 x 40 hours = 520 hours
- Women = 4 x 40 hours = 160 hours
- Boys = 3 x 40 hours = 120 hours
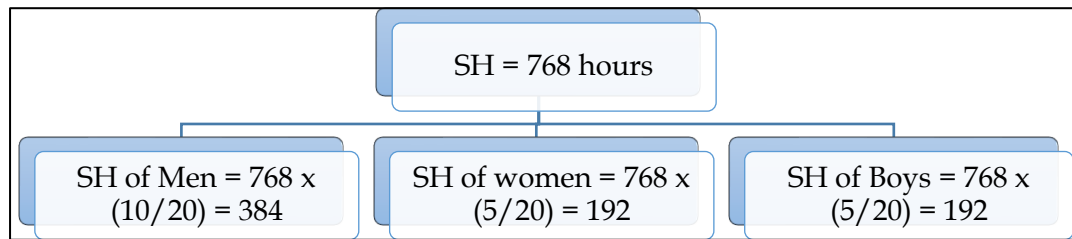
Note 2: Computation of AHW:
- AHW = No of workers x Hours worked per worker
- Men = 13 x 38 hours = 494 hours
- Women = 4 x 38 hours = 152 hours
- Boys = 3 x 38 hours = 114 hours
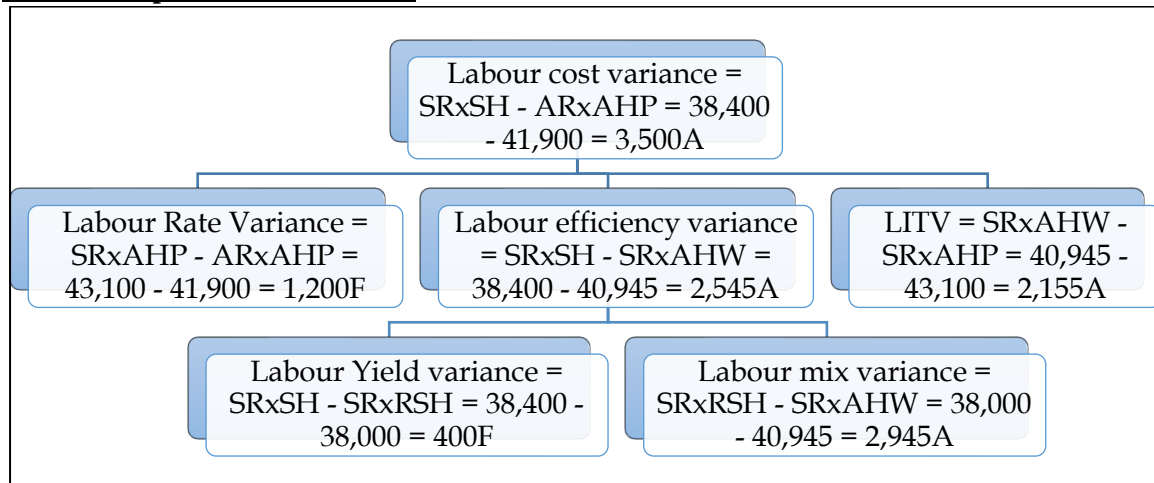
Note 3: Computation of RSH:

Total of AHW = 760 (494 + 152 + 114)

RSH of Men = 760 x (10/20) = 380

RSH of women = 760 x (5/20) = 190

RSH of Boys = 760 x (5/20) = 190

Note 4: Computation of SH:

800 hours = 1,000 units	
ST = AO	
? = 960 units	
768 hours = 1,800 units	

SH = 768 hours

SH of Men = 768 x (10/20) = 384

SH of women = 768 x (5/20) = 192

SH of Boys = 768 x (5/20) = 192

Note 5: Computation of variances:

Labour cost variance = SRxSH - ARxAHP = 38,400 - 41,900 = 3,500A

Labour Rate Variance = SRxAHP - ARxAHP = 43,100 - 41,900 = 1,200F

Labour efficiency variance = SRxSH - SRxAHW = 38,400 - 40,945 = 2,545A

LITV = SRxAHW - SRxAHP = 40,945 - 43,100 = 2,155A

Labour Yield variance = SRxSH - SRxRSH = 38,400 - 38,000 = 400F

Labour mix variance = SRxRSH - SRxAHW = 38,000 - 40,945 = 2,945A

15. Material and labour variances

SB Constructions Limited has entered into a big contract at an agreed price of Rs. 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	Standard		Actual	
	Hours	Hourly rate	Hours	Hourly rate
L1	60,000	15	56,000	18
L2	40,000	30	38,000	35

You are required to:
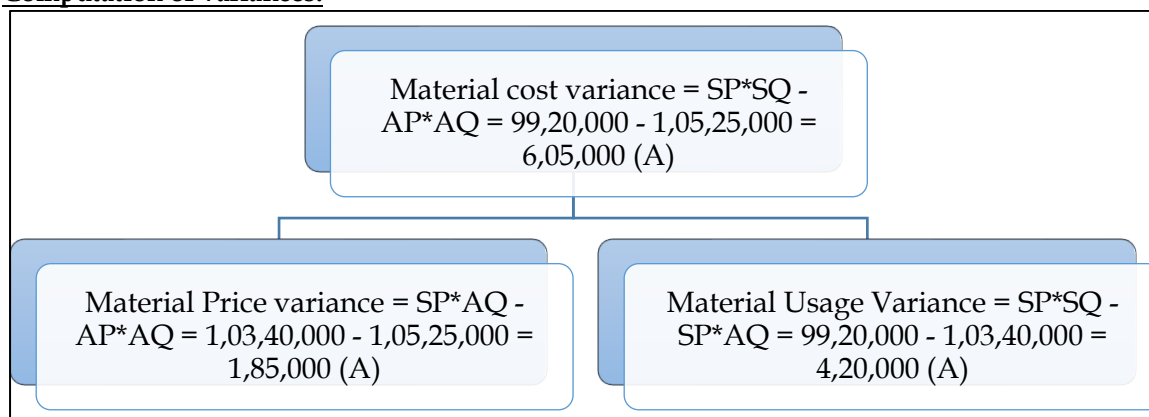**Calculate the following variances and verify them:**
- Material Cost Variance
- Material Price Variance
- Material Usage Variance
- Labour Cost Variance
- Labour Rate Variance
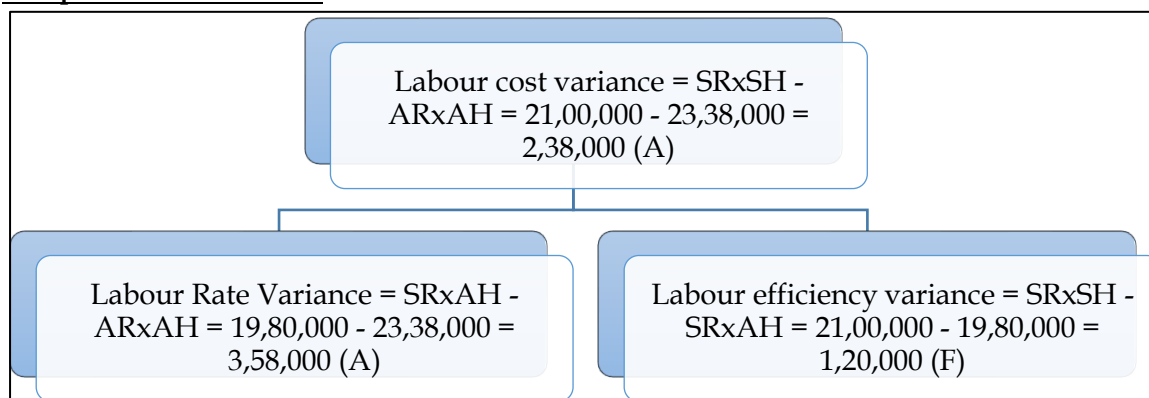- Labour Efficiency Variance.

Answer:
WN 1: Computation of Material Variances:
Computation table:

Material	SP x SQ	SP x RSQ	SP x AQ	AP x AQ
A	1,000 x 3,000	Not required	1,000 x 3,400	1,100 x 3,400
B	800 x 2,400	Not required	800 x 2,300	700 x 2,300
C	4,000 x 500	Not required	4,000 x 600	3,900 x 600
D	30,000 x 100	Not required	30,000 x 90	31,500 x 90
Total	99,20,000	Not required	1,03,40,000	1,05,25,000

Computation of variances:

Material cost variance = SP*SQ - AP*AQ = 99,20,000 - 1,05,25,000 = 6,05,000 (A)

Material Price variance = SP*AQ - AP*AQ = 1,03,40,000 - 1,05,25,000 = 1,85,000 (A)

Material Usage Variance = SP*SQ - SP*AQ = 99,20,000 - 1,03,40,000 = 4,20,000 (A)

WN 2: Computation of Labour Variances:

Computation table:

Labour	SR x SH	SR x RSH	SR x AH	AR x AH
L1	15 x 60,000	Not required	15 x 56,000	18 x 56,000
L2	30 x 40,000	Not required	30 x 38,000	35 x 38,000
Total	**21,00,000**	**Not required**	**19,80,000**	**23,38,000**

Computation of variances:

Labour cost variance = SRxSH - ARxAH = 21,00,000 - 23,38,000 = 2,38,000 (A)

Labour Rate Variance = SRxAH - ARxAH = 19,80,000 - 23,38,000 = 3,58,000 (A)

Labour efficiency variance = SRxSH - SRxAH = 21,00,000 - 19,80,000 = 1,20,000 (F)

16. Material and labour variances

ABC Ltd. has 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 following information has been collected from the cost accounting department:

The company has produced 1,480 kg. finished product by using the following inputs:

	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:
- Material cost variance
- Material price variance
- Material mix variance
- Material yield variance
- Labour cost variance

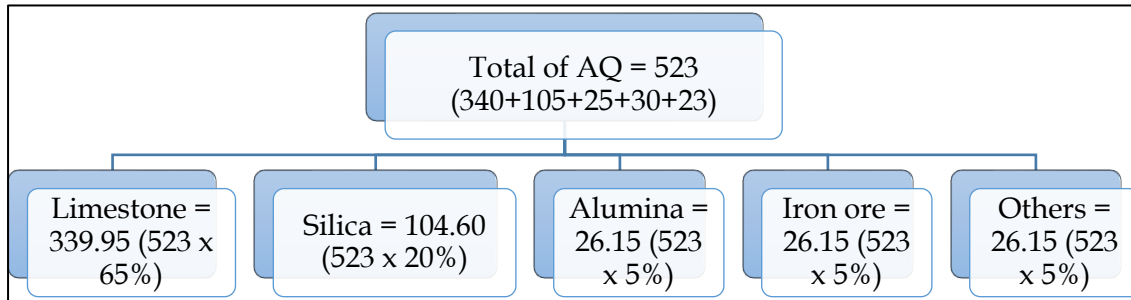- Labour efficiency variance and
- Labour yield variance

Answer:

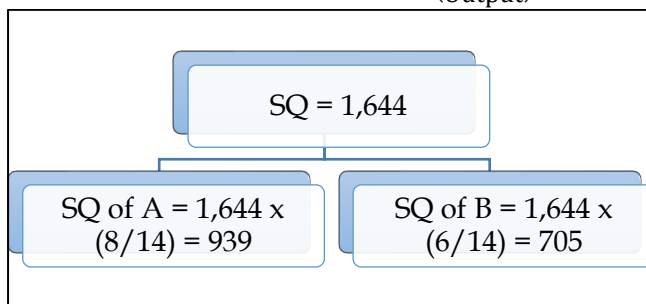**WN 1: Computation of material variances:**

Computation table:

Material	SP x SQ	SP x RSQ	SP x AQ	AP x AQ
Material A	45 x 939	45 x 886	45 x 900	43 x 900
Material B	30 x 705	30 x 664	30 x 650	32.5 x 650
Total	**63,405**	**59,790**	**60,000**	**59,825**

Note 1: Computation of RSQ:

```
                    Total of AQ = 523
                    (340+105+25+30+23)

  Limestone =     Silica = 104.60   Alumina =     Iron ore =    Others =
  339.95 (523 x   (523 x 20%)       26.15 (523    26.15 (523    26.15 (523
  65%)                              x 5%)         x 5%)         x 5%)
```

Note 2: Computation of SQ:

Standard Quantity = Actual Output x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ = 1,480 x $\left(\dfrac{100}{90}\right)$ = 1,644 kg

```
              SQ = 1,644

  SQ of A = 1,644 x        SQ of B = 1,644 x
  (8/14) = 939             (6/14) = 705
```

Note 3: Computation of variances:

```
              Material cost variance =
              SP*SQ - AP*AQ = 63,405 -
              59,825 = 3,580(F)

  Material Price variance =       Material Usage Variance =
  SP*AQ - AP*AQ = 60,000 -        SP*SQ - SP*AQ = 63,405 -
  59,825 = 175(F)                 60,000 = 3,405(F)

          Material Yield Variance =       Material Mix Variance =
          SP*SQ - SP*RSQ = 63,405 -       SP*RSQ - SP*AQ = 59,790 -
          59,790 = 3,615(F)               60,000 = 210(A)
```
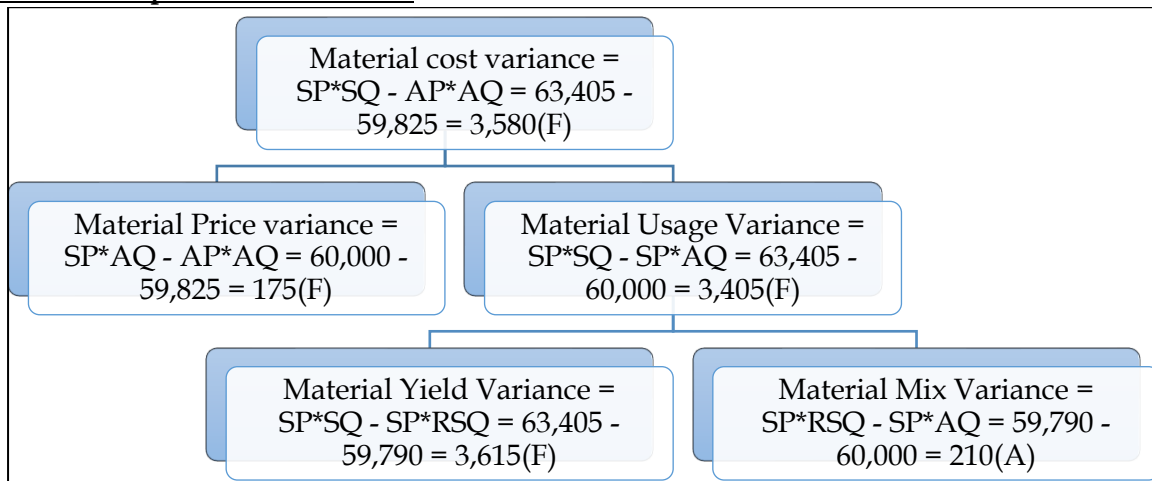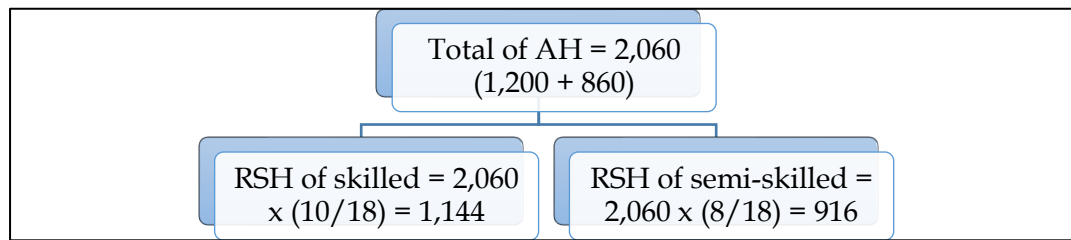
WN 2: Computation of labour variances:

- There is an expected idle time of 5 percent in this question. We are not given data on actual idle time and hence this is a problem without idle time
- Question will fall in the category of multiple labour without idle time

Computation table:

Labour	SR x SH	SR x RSH	SR x AH	AR x AH
Skilled	37.50 x 1,174	37.50 x 1,144	37.50 x 1,200	35.50 x 1,200
Semi-skilled	22.00 x 940	22.00 x 916	22.00 x 860	23.00 x 860

Total	64,705	63,052	63,920	62,380

Note 1: Computation of RSH:

Total of AH = 2,060
(1,200 + 860)

RSH of skilled = 2,060 x (10/18) = 1,144

RSH of semi-skilled = 2,060 x (8/18) = 916

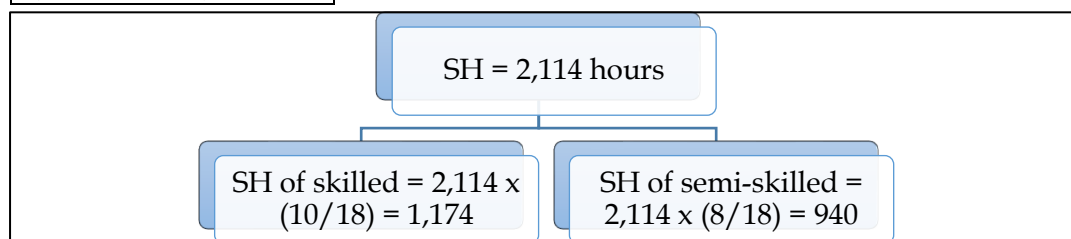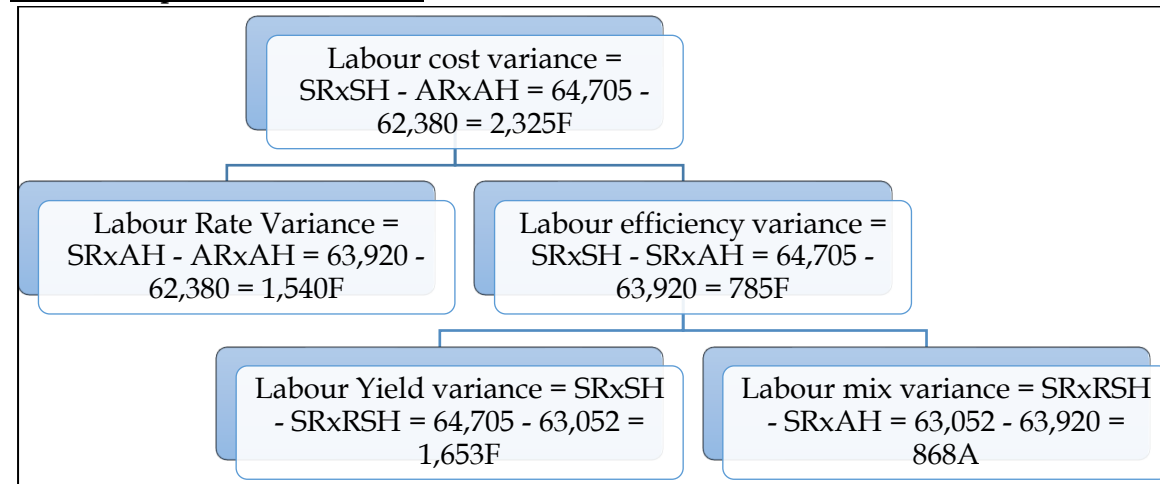**Note 2: Computation of SH:**
- The company had plans of using 1,400 kg of raw material. This would give output of 1,260 kg.
- The company had plans of using 1,800 hours for producing the above 1,260 kg.

1,800 hours = 1,260 units
ST = AO
? = 1,480 units
2,114 hours = 1,800 units

SH = 2,114 hours

SH of skilled = 2,114 x (10/18) = 1,174

SH of semi-skilled = 2,114 x (8/18) = 940

Note 4: Computation of variances:

Labour cost variance = SRxSH - ARxAH = 64,705 - 62,380 = 2,325F

Labour Rate Variance = SRxAH - ARxAH = 63,920 - 62,380 = 1,540F

Labour efficiency variance = SRxSH - SRxAH = 64,705 - 63,920 = 785F

Labour Yield variance = SRxSH - SRxRSH = 64,705 - 63,052 = 1,653F

Labour mix variance = SRxRSH - SRxAH = 63,052 - 63,920 = 868A

17. Variable Overhead Variances:

Following information is obtained from M/s Will and Urvish Co. Ltd.

Budgeted Production for the period	600 units
Budgeted Variable Overhead	Rs.15,600
Standard time for one unit	20 hours
Actual production for the period	500 units
Actual variable overhead	Rs.14,000
Actual hours worked	9,000 hours

Calculate variable overhead variances.

Answer:
Computation of VOH Variances:

SR x SH	SR x AH	AR x AH
1.30 x 10,000	1.30 x 9,000	1.5556 x 9,000
13,000	**11,700**	**14,000**

Note 1: Computation of SR:

$$SR = \frac{\text{Budgeted Variable Overhead}}{\text{Budgeted Hours}} = \frac{15,600}{600 \text{ units x } 20} = 1.30 \text{ per hour}$$
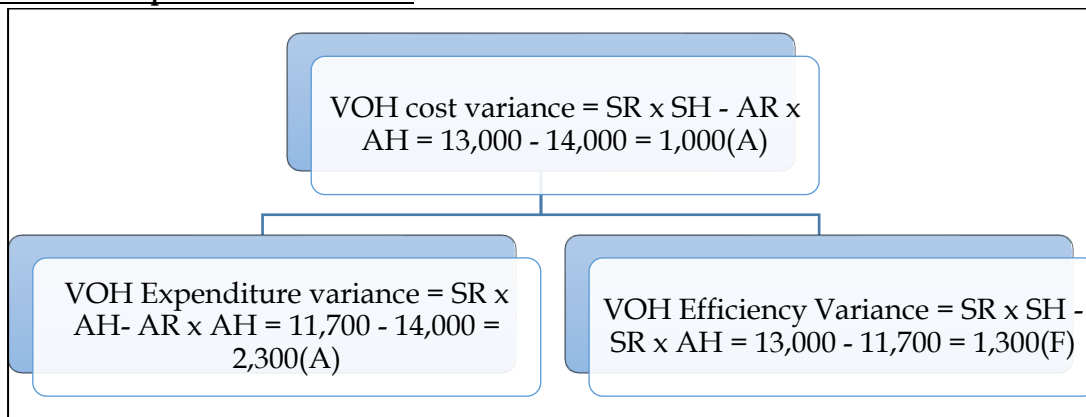
Note 2: Computation of AR:

$$AR = \frac{\text{Actual Variable Overhead}}{\text{Actual Hours}} = \frac{14,000}{9,000} = 1.30 \text{ per hour}$$

Note 3: Computation of SH:

20 hours = 1 unit
ST = AO
? = 500 units
10,000 hours = 500 units

Note 4: Computation of variances:

VOH cost variance = SR x SH - AR x AH = 13,000 - 14,000 = 1,000(A)

VOH Expenditure variance = SR x AH- AR x AH = 11,700 - 14,000 = 2,300(A)

VOH Efficiency Variance = SR x SH - SR x AH = 13,000 - 11,700 = 1,300(F)

Revised computation table with conversion factors:

SR x AO	SR x SO	AVOH
26 x 500	26 x 450	14,000
13,000	**11,700**	**14,000**

Note 1: Computation of SR:

$$SR = \frac{\text{Budgeted Variable Overhead}}{\text{Budgeted Output}} = \frac{15,600}{600 \text{ units}} = 26 \text{ per unit}$$

Note 2: Computation of SO:

20 hours = 1 unit
AT = SO
9,000 hours =?
9,000 hours = 450 units

18. Fixed Overhead Variances:

Cost data given:

Budgeted Data		Actual Data	
Budgeted hours for the period	2,400	Hours worked	2,500
Budgeted no of day	25	Days worked	27
Budgeted fixed overhead	1,200	Overhead cost	1,300
Budgeted production units	1,500	Actual production units	1,600

Calculate fixed overhead variances.

Answer:

Computation table

SR x SH (or) **SR x AO**	SR x AH (or) SR x SO	SR x PH (or) **PFOH**	SR x BH (or) **BFOH**	AFOH
0.80 x 1,600	0.50 x 2,500	1,296	1,200	1,300

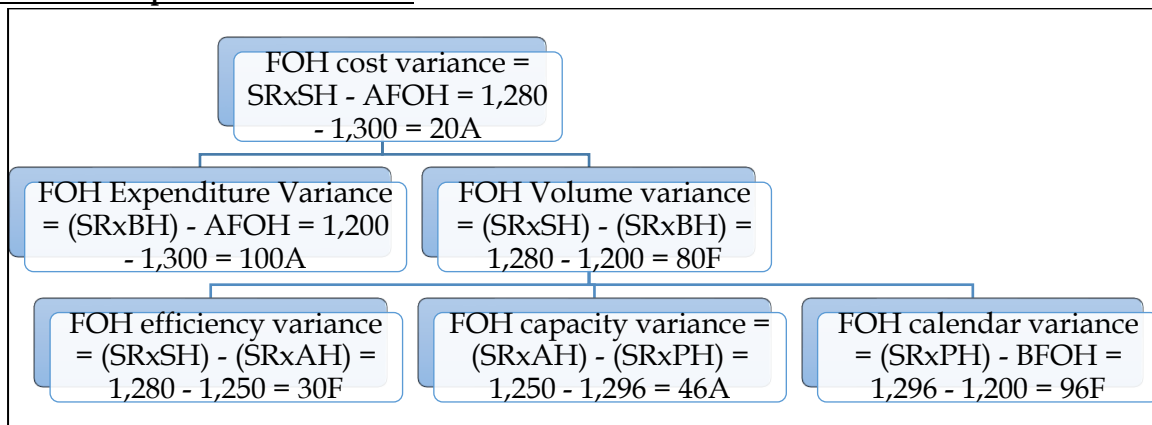| 1,280	1,250	1,296	1,200	1,300

Note 1: Computation of SR:

$$\text{SR per unit} = \frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted Output}} = \frac{1,200}{1,500} = 0.80 \text{ per unit}$$

$$\text{SR per hour} = \frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted hours}} = \frac{1,200}{2,400} = 0.50 \text{ per hour}$$

Note 2: Computation of Possible Fixed Overhead (PFOH):

```
25 days = 1,200
  27 days =?
27 days = 1,296
```

Note 3: Computation of variances:

FOH cost variance = SRxSH - AFOH = 1,280 - 1,300 = 20A

FOH Expenditure Variance = (SRxBH) - AFOH = 1,200 - 1,300 = 100A

FOH Volume variance = (SRxSH) - (SRxBH) = 1,280 - 1,200 = 80F

FOH efficiency variance = (SRxSH) - (SRxAH) = 1,280 - 1,250 = 30F

FOH capacity variance = (SRxAH) - (SRxPH) = 1,250 - 1,296 = 46A

FOH calendar variance = (SRxPH) - BFOH = 1,296 - 1,200 = 96F

19. Fixed Overhead Variances:

From the following cost data, calculate the Fixed Overhead Variances:

Particulars	Budgeted	Actual
No of working days	20	22
Man-hours per day	8,000	8,400
Output for man-hours in units	1.0	0.9
Overhead cost	1,60,000	1,68,000

Answer:

Computation table:

SR x SH (or) SR x AO	SR x AH (or) SR x SO	SR x PH (or) PFOH	SR x BH (or) BFOH	AFOH
1 x 1,66,320	1 x 1,84,800	1,76,000	1,60,000	1,68,000
1,66,320	**1,84,800**	**1,76,000**	**1,60,000**	**1,68,000**

Note 1: Computation of SR:

$$\text{SR per unit} = \frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted Output}} = \frac{1,60,000}{(20 \times 8,000 \times 1)} = 1 \text{ per unit}$$

$$\text{SR per hour} = \frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted hours}} = \frac{1,60,000}{(20 \times 8,000)} = 1 \text{ per hour}$$
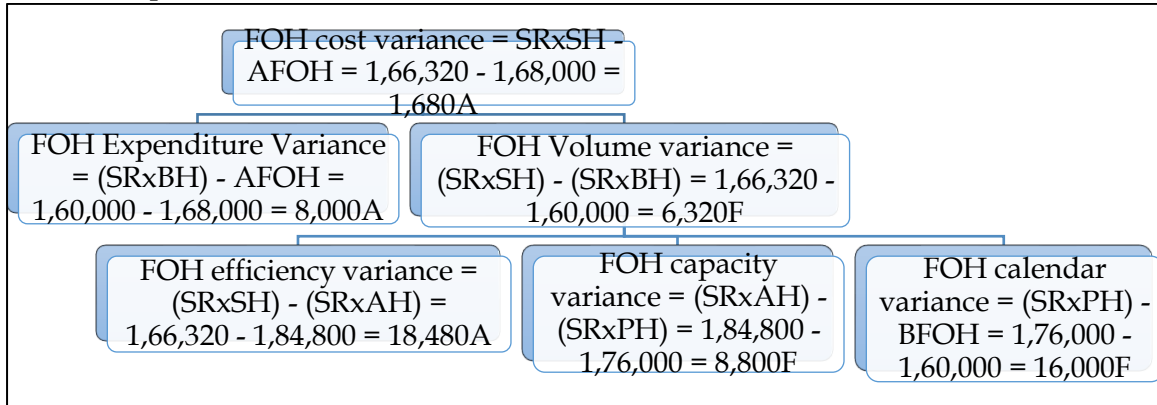
Note 2: Computation of Actual Output:

Actual output = 22 days x 8,400 hours x 0.9 unit per hour = 1,66,320 units

Note 3: Computation of Possible Fixed Overhead (PFOH):

```
20 days = 1,60,000
   22 days =?
22 days = 1,76,000
```

Note 4: Computation of variances:

FOH cost variance = SRxSH - AFOH = 1,66,320 - 1,68,000 = 1,680A

FOH Expenditure Variance = (SRxBH) - AFOH = 1,60,000 - 1,68,000 = 8,000A

FOH Volume variance = (SRxSH) - (SRxBH) = 1,66,320 - 1,60,000 = 6,320F

FOH efficiency variance = (SRxSH) - (SRxAH) = 1,66,320 - 1,84,800 = 18,480A

FOH capacity variance = (SRxAH) - (SRxPH) = 1,84,800 - 1,76,000 = 8,800F

FOH calendar variance = (SRxPH) - BFOH = 1,76,000 - 1,60,000 = 16,000F

20. Overhead Variances:

The following figures are extracted from the books of a company:

Particulars	Budgeted	Actual
Output (in units)	12,000	13,000
Hours	6,000	6,600
Overhead cost – Fixed (Rs.)	2,400	2,500
Overhead cost – Variable (Rs.)	12,000	13,300
No of days	50	54

Compute and analyze the overhead variances.

Answer:

WN 1: Computation of VOH Variances:

SR x SH (or) SR x AO	SR x AH (or) SR x SO	AR x AH (or) AVOH
1 x 13,000	2 x 6,600	13,300
13,000	**13,200**	**13,300**

Note 1: Computation of SR:

$$\text{SR per hour} = \frac{\text{Budgeted Variable Overhead}}{\text{Budgeted Hours}} = \frac{12,000}{6,000} = \text{Rs. 2 per hour}$$

$$\text{SR per unit} = \frac{\text{Budgeted Variable Overhead}}{\text{Budgeted output}} = \frac{12,000}{12,000} = \text{Rs. 1 per unit}$$

Note 2: Computation of variances:
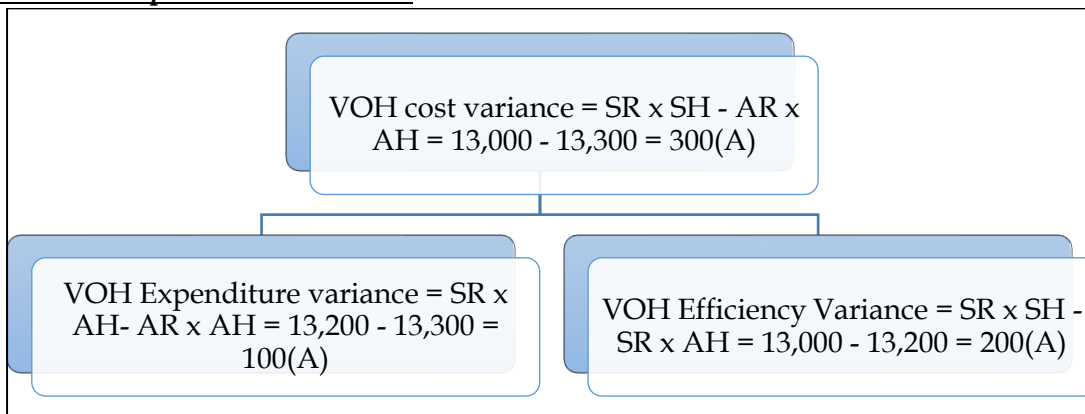
VOH cost variance = SR x SH - AR x AH = 13,000 - 13,300 = 300(A)

VOH Expenditure variance = SR x AH- AR x AH = 13,200 - 13,300 = 100(A)

VOH Efficiency Variance = SR x SH - SR x AH = 13,000 - 13,200 = 200(A)

WN 2: Computation of FOH variances:

SR x SH (or) **SR x AO**	**SR x AH** (or) SR x SO	SR x PH (or) **PFOH**	SR x BH (or) **BFOH**	AFOH
0.20 x 13,000	0.40 x 6,600	2,592	2,400	2,500

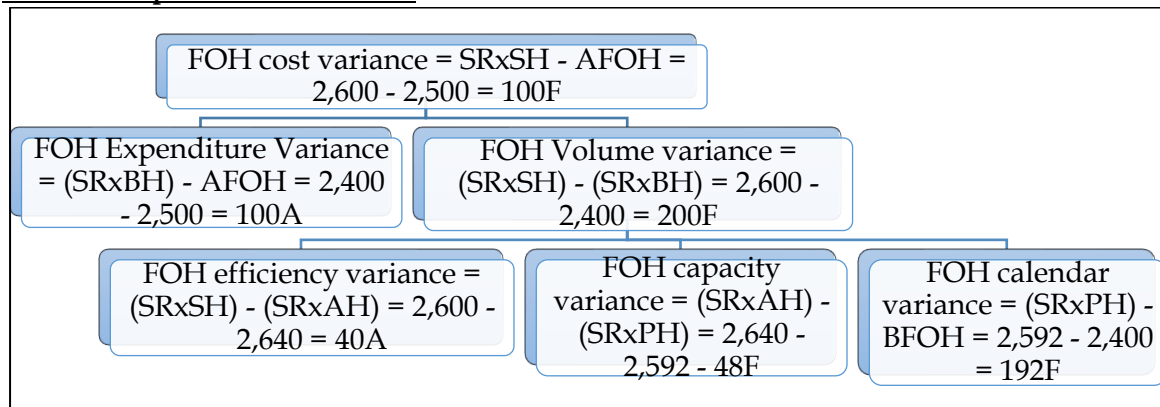| 2,600	2,640	2,592	2,400	2,500

Note 1: Computation of SR:

$$\text{SR per unit} = \frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted Output}} = \frac{2,400}{12,000} = 0.20 \text{ per unit}$$

$$\text{SR per hour} = \frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted hours}} = \frac{2,400}{6,000} = 0.40 \text{ per hour}$$

Note 2: Computation of Possible Fixed Overhead (PFOH):

50 days = 2,400
54 days =?
54 days = 2,592

Note 3: Computation of variances:

FOH cost variance = SRxSH - AFOH = 2,600 - 2,500 = 100F

FOH Expenditure Variance = (SRxBH) - AFOH = 2,400 - 2,500 = 100A

FOH Volume variance = (SRxSH) - (SRxBH) = 2,600 - 2,400 = 200F

FOH efficiency variance = (SRxSH) - (SRxAH) = 2,600 - 2,640 = 40A

FOH capacity variance = (SRxAH) - (SRxPH) = 2,640 - 2,592 - 48F

FOH calendar variance = (SRxPH) - BFOH = 2,592 - 2,400 = 192F

21. **FOH Ratios:**

A company manufactures two products X and Y. Product X requires 8 hours to produce while product Y requires 12 hours. In April, of 22 effective working days of 8 hours a day, 1200 units of X and 800 units of Y were produced. The company employs 100 workers in production department to produce X and Y. The budgeted hours are 186000 for the year and the company works for 20 days in a year. Calculate capacity activity and efficiency ratio and establish their inter relationship.

Answer:

Computation table:

Standard Hours	Actual Hours	Possible Hours	Budgeted Hours
(1,200 x 8) + (800 x 12)	100 workers x 22 hours x 8 days	17,050 (Note 1)	1,86,000/12
19,200	17,600	17,050	15,500

Note 1: Computation of Possible Hours:

- 20 days = 15,500 hours
- 22 days = ?
- 22 days = 17,050 hours

Note 2: Computation of FOH Ratios:

$$\text{Efficiency Ratio} = \frac{\text{Standard Time}}{\text{Actual Time}} \times 100 = \frac{19,200}{17,600} \times 100 = 109.09\%$$

$$\text{Capacity Ratio} = \frac{\text{Actual Time}}{\text{Possible Hours}} \times 100 = \frac{17,600}{17,050} \times 100 = 103.23\%$$

$$\text{Calendar Ratio} = \frac{\text{Possible Hours}}{\text{Budgeted Hours}} \times 100 = \frac{17,050}{15,500} \times 100 = 110\%$$

$$\text{Activity Ratio} = \frac{\text{Standard Hours}}{\text{Budgeted Hours}} \times 100 = \frac{19,200}{15,500} \times 100 = 123.87\%$$

Activity Ratio = Efficiency Ratio x Capacity Ratio x Calendar Ratio

Activity Ratio = 109.09% x 103.23% x 110% = 123.87%

22. **Overhead Variances:**

A cost accountant of a company was given the following information regarding the overheads for February –

1. Overheads cost variance Rs.1400 adverse
2. Overheads volume variance Rs. 1000 adverse
3. Budgeted hours for February 1200 hours
4. Budgeted overheads for February Rs.6000
5. Actual rate of recovery of overheads Rs.8 per hours

You are required to compute the following:

- Overheads expenditure variance
- Actual overheads incurred
- Actual hours worked
- Overheads capacity variance
- Overheads efficiency variance
- Standard hours to be worked

Answer:

- OH volume variance is given in the question and hence this should be taken as Fixed overhead
- Actual days and budgeted days are not available and hence this is a problem of FOH variance without calendar

Computation table:

SR x SH (or) SR x AO	SR x AH (or) SR x SO	SR x BH (or) BFOH	AFOH
5 x 1,000	5 x 800	6,000	8 x 800
5,000	**4,000**	**6,000**	**6,400**

Note 1: Computation of SR:

$$\text{SR per hour} = \frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted hours}} = \frac{6,000}{1,200} = \text{Rs. 5 per hour}$$
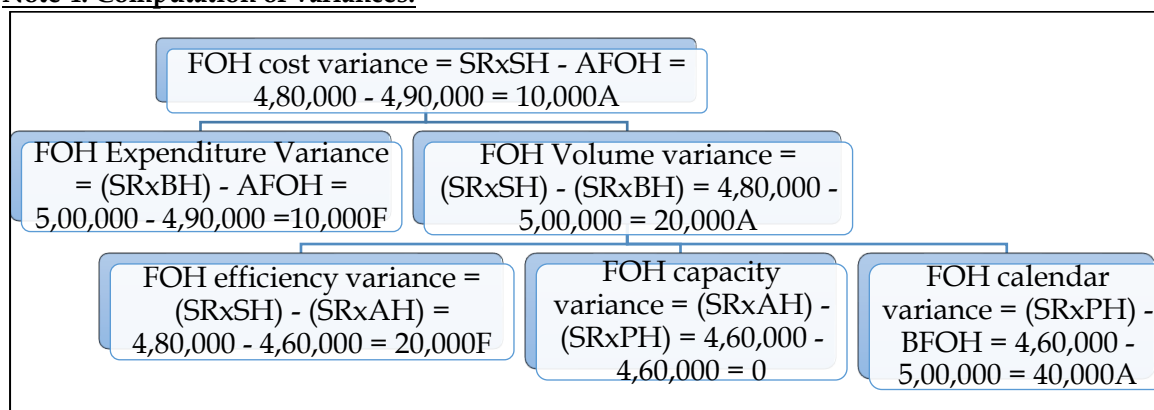
Note 2: Computation of SR x SH:

- Overhead volume variance = (SR x SH) – BFOH
- -1,000 = (SR x SH) – 6,000
- (SR x SH) = 5,000

Note 3: Computation of AFOH

- Overhead cost variance = (SR x SH) – AFOH
- -1,400 = 5,000 – AFOH
- **AFOH = Rs.6,400**

Note 4: Computation of Actual Hours:

$$\text{Actual hours} = \frac{\text{Actual Fixed Overhead}}{\text{Actual Rate}} = \frac{6,400}{8} = 800 \text{ hours}$$

Note 5: Solution:

Particulars	Calculation	Amount
Overhead expenditure variance	(SR x BH) -AFOH 6,000 – 6,400	400A
Actual Overheads	Refer Note 3	6,400
Actual hours worked	Refer Note 4	800
Overhead capacity variance	(SR x AH) – (SR x BH) 4,000 – 6,000	2,000A
Overhead efficiency variance	(SR x SH) – (SR x AH) 5,000 – 4,000	1,000F
Standard hours	Computation table	1,000

23. **Fixed overhead variances:**

A manufacturing concern has provided following information relating to fixed overheads:

Particulars	Standard	Actual
Output in a month	5,000 units	4,800 units
Working days in a month	25 days	23 days
Fixed overheads	5,00,000	4,90,000

Compute:
- Fixed overhead variance
- Fixed overhead expenditure variance
- Fixed overhead volume variance
- Fixed overhead efficiency variance

Answer:
- The term standard in the question has been interpreted as budgeted

Computation of FOH variances:

SR x SH (or) SR x AO	SR x AH (or) SR x SO	SR x PH (or) PFOH	SR x BH (or) BFOH	AFOH (or) AR x AH
100 x 4,800	4,60,000	4,60,000	5,00,000	4,90,000
4,80,000	**4,60,000**	**4,60,000**	**5,00,000**	**4,90,000**

Note 1: Computation of SR:

$$SR \text{ per unit} = \frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted Output}} = \frac{5,00,000}{5,000} = 100 \text{ per unit}$$

Note 2: Computation of Possible Fixed Overhead (PFOH):

25 days = 5,00,000
23 days =?
23 days = 4,60,000

Note 3: SR x AH
- It is assumed that Actual Hours is equal to Possible hours and hence SR x AH would be equal to PFOH

Note 4: Computation of variances:

FOH cost variance = SRxSH - AFOH = 4,80,000 - 4,90,000 = 10,000A

FOH Expenditure Variance = (SRxBH) - AFOH = 5,00,000 - 4,90,000 =10,000F

FOH Volume variance = (SRxSH) - (SRxBH) = 4,80,000 - 5,00,000 = 20,000A

FOH efficiency variance = (SRxSH) - (SRxAH) = 4,80,000 - 4,60,000 = 20,000F

FOH capacity variance = (SRxAH) - (SRxPH) = 4,60,000 - 4,60,000 = 0

FOH calendar variance = (SRxPH) - BFOH = 4,60,000 - 5,00,000 = 40,000A

24. Comprehensive variances:

Z Limited uses standard costing system in manufacturing of its single product 'M'. The standard cost per unit of M is as follows:

Particulars	Amount
Direct material – 2 metres @ Rs.6 per metre	12.00
Direct Labour – 1 hour @ Rs.4.40 per hour	4.40
Variable overhead – 1 hour @ Rs.3 per hour	3.00

During July, 2016, 6,000 units of M were produced and the related data are as under:
- Direct material acquired – 19,000 metres @ 5.70 per metre
- Material consumed – 12,670 meters

- Direct labour - ? hours @ Rs. ? per hour = Rs.27,950
- Variable overheads incurred = Rs.20,475

The variable overhead efficiency variance is Rs.1,500 adverse. Variable overheads are based on direct labour hours. There was no stock of the material in the beginning. You are required to compute the missing figures and work out all the relevant variances.

Answer:

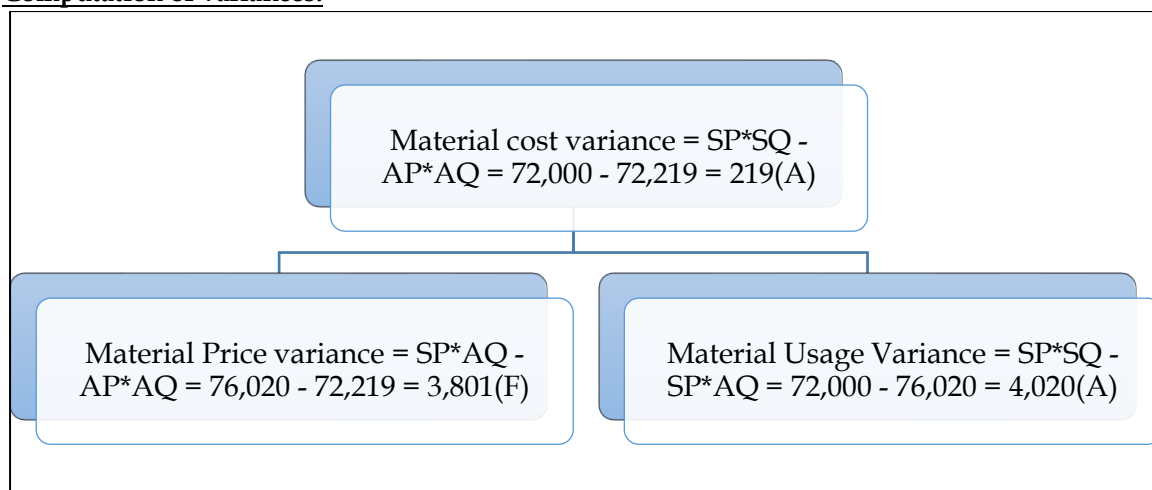**WN 1: Computation of material variances:**

Computation table:

SP x SQ	SP x AQ	AP x AQ
6 x 12,000	6 x 12,670	5.70 x 12,670
72,000	**76,020**	**72,219**

Note:

1. Computation of Standard Quantity:

$$\text{Standard Quantity} = \text{Actual Output} \times \left(\frac{\text{Input}}{\text{Output}}\right) = 6,000 \times \left(\frac{2}{1}\right) = 12,000 \text{ metres}$$

Computation of variances:

Material cost variance = SP*SQ - AP*AQ = 72,000 - 72,219 = 219(A)

Material Price variance = SP*AQ - AP*AQ = 76,020 - 72,219 = 3,801(F)

Material Usage Variance = SP*SQ - SP*AQ = 72,000 - 76,020 = 4,020(A)

WN 2: Computation of VOH Variances:

Computation table:

SR x SH	SR x AH	AR x AH
3 x 6,000	3 x 6,500	20,475
18,000	**19,500**	**20,475**

Note 1: Computation of SH:

1 hour = 1 unit
ST = AO
? = 6,000 units
6,000 hours = 6,000 units

Note 2: Computation of AH:

- Variable overhead efficiency variance = (SR x SH) – (SR x AH)
- -1,500 = 18,000 – 3AH
- 3AH = 19,500
- AH = 6,500 hours

Note 2: Computation of variances:

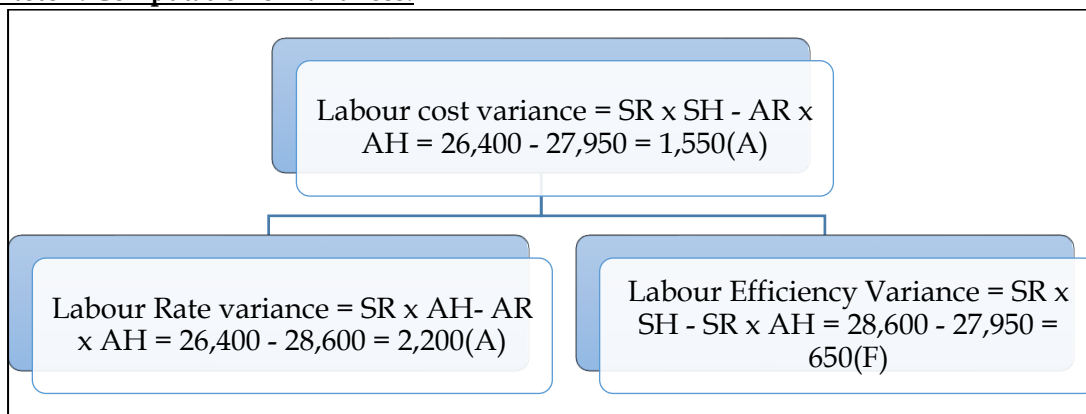VOH cost variance = SR x SH - AR x AH = 18,000 - 20,475 = 2,475 (A)

VOH Expenditure variance = SR x AH- AR x AH = 19,500 - 20,475 = 975(A)

VOH Efficiency Variance = SR x SH - SR x AH = 18,000 - 19,500= 1,500 A
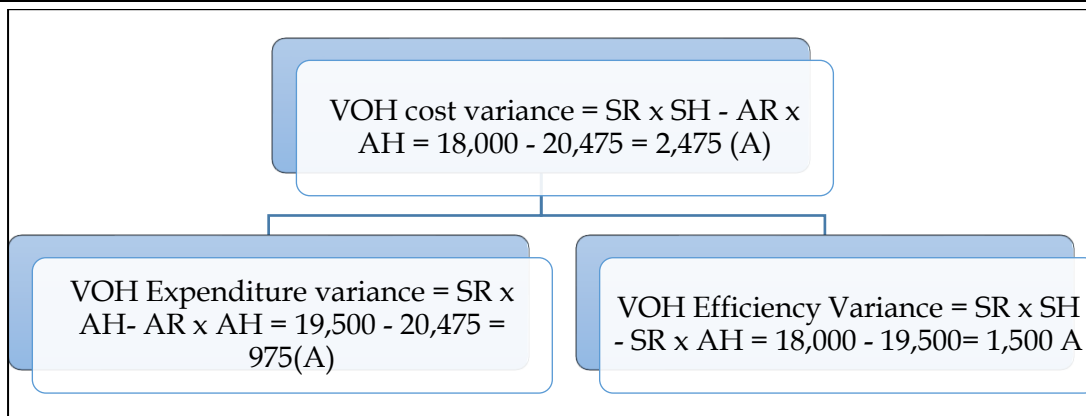
WN 3: Computation of Labour Variances:
Computation table:

SR x SH	SR x AH	AR x AH
4.40 x 6,000	4.40 x 6,500	4.30 x 6,500
26,400	**28,600**	**27,950**

Note 1: Computation of AR:

$$\text{Actual Rate} = \frac{\text{Actual Labour Cost}}{\text{Actual Hours}} = \frac{27,950}{6,500} = 4.30 \text{ per hour}$$

Note 2: Computation of variances:

Labour cost variance = SR x SH - AR x AH = 26,400 - 27,950 = 1,550(A)

Labour Rate variance = SR x AH- AR x AH = 26,400 - 28,600 = 2,200(A)

Labour Efficiency Variance = SR x SH - SR x AH = 28,600 - 27,950 = 650(F)

25. Overhead variances

SJ Ltd. has furnished the following information:

Particulars	Amount
Standard overhead absorption rate per unit	Rs.20
Standard rate per hour	Rs.4
Budgeted production	12,000 units
Actual production	15,560 units

- Actual overheads were Rs. 2,95,000 out of which Rs. 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 (Rs.)	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:

- Variable overhead efficiency and expenditure variance
- Fixed overhead efficiency and capacity variance.

Answer:
WN 1: VOH Variances:

SR x SH	SR x AH	AR x AH

3 x 77,800	3 x 74,000	2,32,500
2,33,400	**2,22,000**	**2,32,500**

Note 1: Computation of SR:

Particulars	Per unit	Per hour
Total overhead	20	4
Fixed overhead	5	1
Variable overhead	15	3

$$\text{VOH per unit} = \frac{\text{Change in total cost}}{\text{Change in units}} = \frac{2,10,000 - 1,80,000}{10,000 - 8,000} = 15 \text{ per unit}$$

Note 2: Computation of standard Time:

1 unit = Rs.20
1 hours = Rs.4
Std equation:
1 unit = 5 hours
     AO = ST
     15,560 =?
15,560 = 77,800 hours

Note 2: Computation of variances:

VOH cost variance = SR x SH - AR x AH = 2,33,400 - 2,32,500 = 900F

VOH Expenditure variance = SR x AH- AR x AH = 2,22,000 - 2,32,500 = 10,500A

VOH Efficiency Variance = SR x SH - SR x AH = 2,33,400 - 2,22,000 = 11,400F
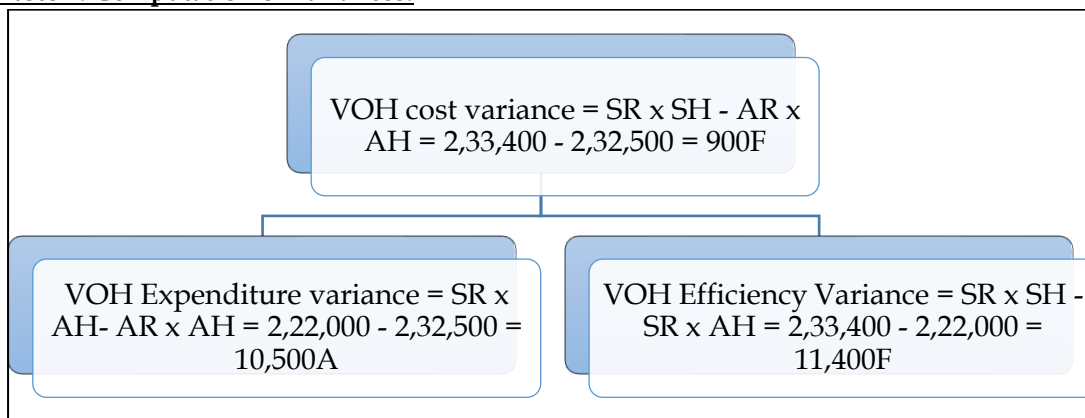
WN 2: FOH variances:

SR x SH	SR x AH	SR x BH (or) BFOH	AFOH
1 x 77,800	1 x 74,000	1 x 60,000	62,500
77,800	**74,000**	**60,000**	**62,500**

Computation of FOH Variances:

FOH cost variance = SRxSH - AFOH = 77,800 - 62,500 = 15,300F

FOH Expenditure Variance = (SRxBH) - AFOH = 60,000 - 62,500 = 2,500A

FOH Volume variance = (SRxSH) - (SRxBH) = 77,800 - 60,000 = 17,800F

FOH efficiency variance = (SRxSH) - (SRxAH) = 77,800 - 74,000 = 3,800F

FOH capacity variance = (SRxAH) - (SRxBH) = 74,000 - 60,000 = 14,000F
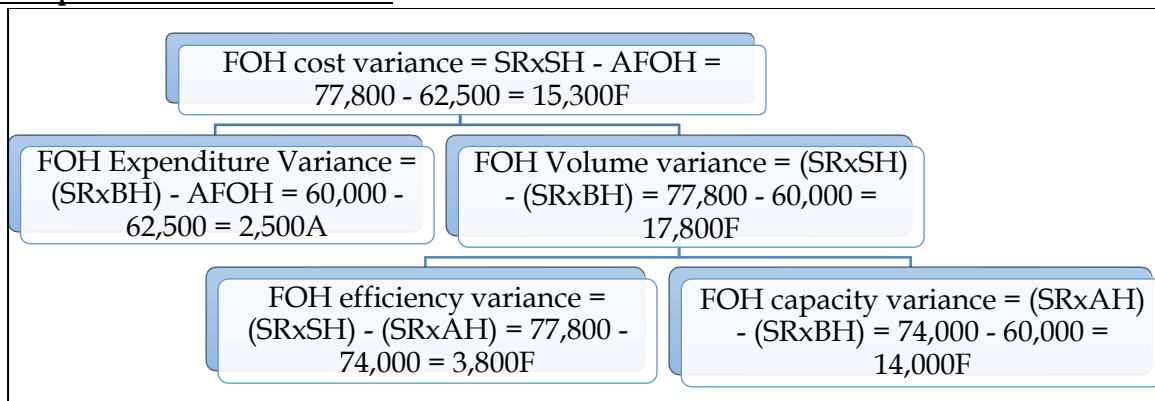
26. **Comprehensive variances:**

Arnav Limited manufactures a product Q, the standard cost of which is as follows:

Particulars	Standard Cost per unit
Direct Material	600
Direct Labour:	
Skilled @ Rs.80 per hour	120
Unskilled @ Rs.60 per hour	90
Variable overheads	75
Fixed Overheads	30
Total	**915**

During the month just ended 4,000 units of Q were produced. The actual labour cost was as follows:

Particulars	Rate per hour (Rs.)	Cost (Rs.)
Skilled	87.50	5,77,500
Unskilled	55.00	2,97,000

10% of the labour time was lost due to idle time. The standard idle time was 7.5% of labour time. Arnav Limited has budgeted to produced 4,200 units of Q. Aranv Limited absorbs its overheads on direct labour hours (effective hours) basis. Actual fixed and variable overheads incurred were Rs.1,55,000 and Rs.2,85,000 respectively.

Calculate:

- Labour rate variance
- Labour efficiency variance
- Labour mix variances
- Labour yield variance
- Labour idle time variance
- Variable overhead expenditure variance and
- Variable overhead efficiency variance

Answer:

WN 1: Computation of labour variances:

- This is a problem on multiple labour as we have skilled and unskilled labour in the question
- Actual idle time is 10 percent whereas expected idle time is 7.5 percent. This would mean that extra 2.5 percent is abnormal idle time and hence this is a problem on multiple labour with idle time

Computation table:

Labour	SR x SH	SR x RSH	SR x AHW	SR x AHP	AR x AHP
Skilled	80 x 6,000	80 x 5,850	80 x 6,435	80 x 6,600	87.50 x 6,600
Unskilled	60 x 6,000	60 x 5,850	60 x 5,265	60 x 5,400	55.00 x 5,400
Total	**8,40,000**	**8,19,000**	**8,30,700**	**8,52,000**	**8,74,500**

Note 1: Computation of AHP:

$$AHP = \frac{\text{Actual Labour Cost}}{\text{Actual Rate}}$$

AHP for skilled $= \dfrac{5,77,500}{87.50} = 6,600$ hours

AHP for unskilled $= \dfrac{2,97,000}{55.00} = 5,400$ hours
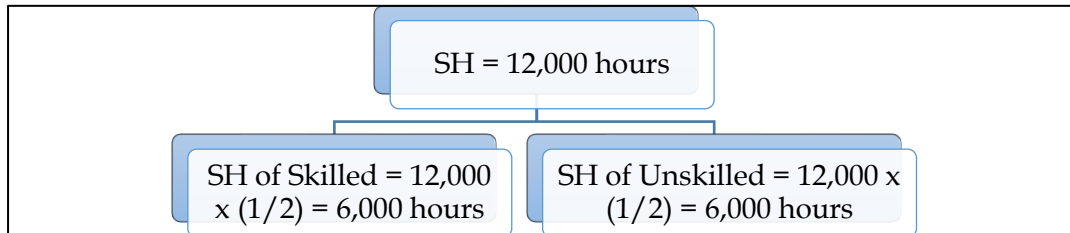
Note 2: Computation of AHW:

- AHW = Actual hours paid – 2.5% idle time
- **AHW for skilled = 6,600 – (2.5% x 6,600) = 6,435**
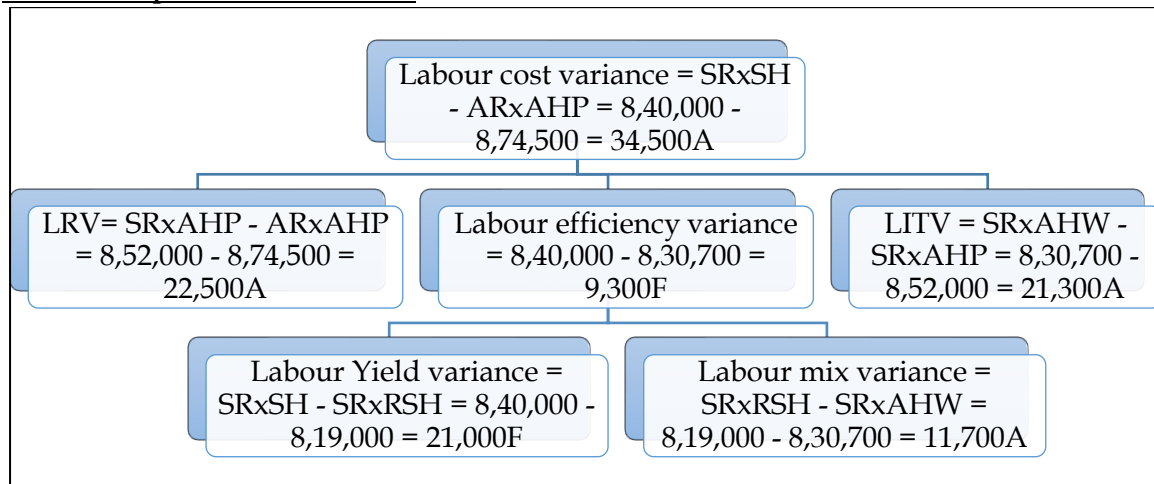- **AHW for unskilled = 5,400 – (2.5% x 5,400) = 5,265**

Note 3: Computation of RSH:

Total of AHW = 6,435 + 5,265 = 11,700 hours

RSH of skilled = 11,700 x (1/2) = 5,850 hours

RSH of unskilled = 11,700 x (1/2) = 5,850 hours
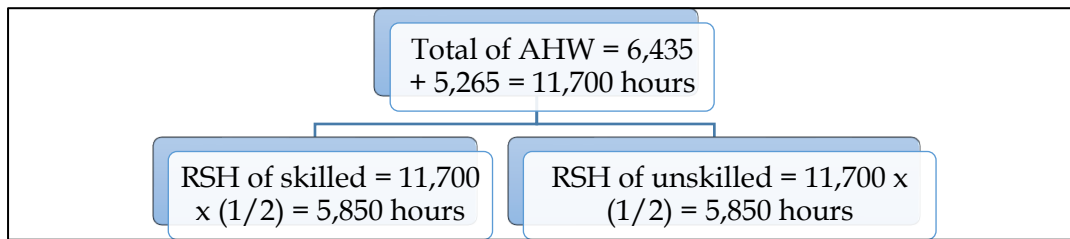
Note 4: Computation of SH:

3 hours = 1 unit
ST = AO
? = 4,000 units
12,000 hours = 4,000 units

SH = 12,000 hours

SH of Skilled = 12,000 x (1/2) = 6,000 hours

SH of Unskilled = 12,000 x (1/2) = 6,000 hours

Note 5: Computation of variances:

Labour cost variance = SRxSH - ARxAHP = 8,40,000 - 8,74,500 = 34,500A

LRV= SRxAHP - ARxAHP = 8,52,000 - 8,74,500 = 22,500A

Labour efficiency variance = 8,40,000 - 8,30,700 = 9,300F

LITV = SRxAHW - SRxAHP = 8,30,700 - 8,52,000 = 21,300A

Labour Yield variance = SRxSH - SRxRSH = 8,40,000 - 8,19,000 = 21,000F

Labour mix variance = SRxRSH - SRxAHW = 8,19,000 - 8,30,700 = 11,700A

WN 2: Computation of VOH Variances:

SR x SH (or) SR x AO	SR x AH (or) SR x SO	AR x AH (or) AVOH
25 x 12,000	25 x 11,700	2,85,000
3,00,000	2,92,500	2,85,000

Note1: Computation of SR

$$\text{SR per hour} = \frac{75}{3 \text{ hours}} = \text{Rs. } 25 \text{ per hour}$$

Computation of variances:

VOH Cost Variance = SR x SH - AR x AH = 3,00,000 - 2,85,000 = 15,000F

VOH Exp variance = SR x AH- AR x AH = 2,92,500 - 2,85,000 = 7,500F

VOH Efficiency Variance = SR x SH - SR x AH = 3,00,000 - 2,92,500 - 7,500F
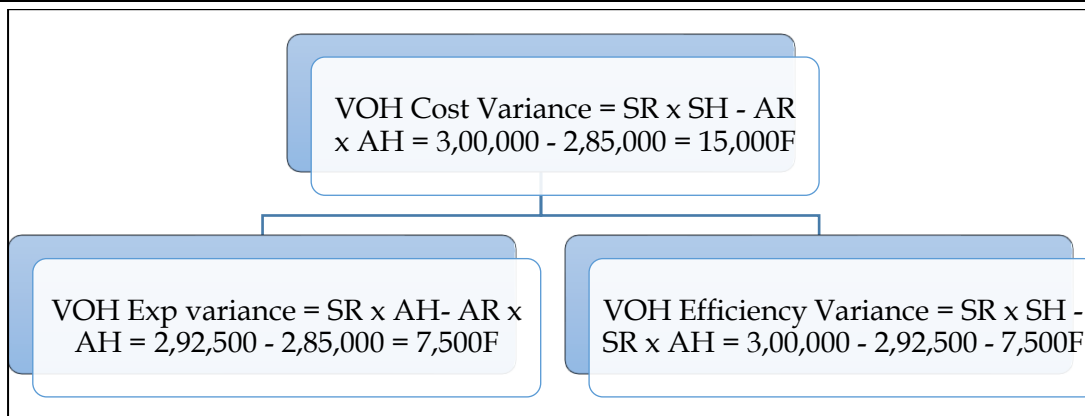
27. Comprehensive variances:

X Associates undertake to prepare income tax returns for individual for a fee. They use the weighted average method and actual costs for the financial reporting purposes. However, for internal reporting, they use a standard costs system. The standards, based on equivalent performance, have been established as follows:

- Labour per return = 5 hours @ Rs.40 per hour
- Overhead per return = 5 hours @ Rs.20 per hour

For March 2015 performance, budgeted overhead is Rs.98,000 for standard labour hours allowed. The following additional information pertains to the month of March 2015:

March 1	Returns in process (25% complete)	200 Nos
	Returns started in March	825 Nos
March 31	Returns in process (80% complete)	125 Nos
Cost Data:		
March 1	Returns in process labour	12,000
	Returns in process overheads	5,000
March 1 to 31	Labour: 4,000 hours	1,78,000
	Overheads	90,000

You are required to compute:
- For each element, equivalent units of performance and the actual cost per equivalent unit
- Actual cost of returns in process on March 31
- The standard cost per return
- The labour rate and labour efficiency variance as well as overhead volume and overhead expenditure variance.

Answer:

WN 1: Computation of returns completed:
- Opening returns in process = 200
- Returns started in March = 825
- Total Returns in process = 1,025
- Closing Returns in process = 125
- **Returns completed = 900 (1,025 – 125)**

WN 2: Statement of Equivalent units (Average Cost Method)

Particulars	Returns	Labour		Overheads	
		DOC	EU	DOC	EU
Returns completed	900	100%	900	100%	900
Closing Returns in Process	125	80%	100	80%	100
Total Equivalent Units			**1,000**		**1,000**

WN 3: Statement of Cost per Return (Average cost Method):

Particulars	Labour	Overheads
Opening WIP	12,000	5,000

Current month cost	1,78,000	90,000
Total Cost	**1,90,000**	**95,000**
No of returns	1,000	1,000
Cost per Return	**190**	**95**

WN 4: Valuation of returns in process as on March 31:
- Returns in process = (100 x 190) + (100 x 95) = Rs.28,500

WN 5: Computation of standard cost per return:
- Standard cost = (5 hours x 40) + (5 hours x 20) = Rs.300 per return

WN 6: Computation of Actual Output for the purposes of variances:
- We have computed equivalent units using Average Cost Method.
- Under Average Cost Method, opening WIP is also taken into account for computing cost per unit. Actual Labour cost for Average cost method was Rs.1,90,000. However, we cannot split this into actual hours and actual rate. This is because actual hours for opening WIP is not given in the question
- In order to compute variances, we shall calculate equivalent units as per FIFO method and then compute variances.

Particulars	Returns	Labour		Overheads	
		DOC	EU	DOC	EU
Opening Returns in Process	200	75%	150	75%	150
Returns started and completed	700	100%	700	100%	700
Closing Returns in Process	125	80%	100	80%	100
Total Equivalent Units			**950**		**950**

WN 7: Computation of Labour Variances:
Computation table:

SR x SH	SR x AH	AR x AH
40 x 4,750	40 x 4,000	44.50 x 4,000
1,90,000	**1,60,000**	**1,78,000**

Note 1: Computation of SH:

5 hours = 1 Return
ST = AO
? = 950 Returns
4,750 hours = 950 Returns

Note 2: Computation of variances:

Labour cost variance = SR x SH - AR x AH = 1,90,000 - 1,78,000 = 12,000F

Labour Rate variance = SR x AH- AR x AH = 1,60,000 - 1,78,000 = 18,000A

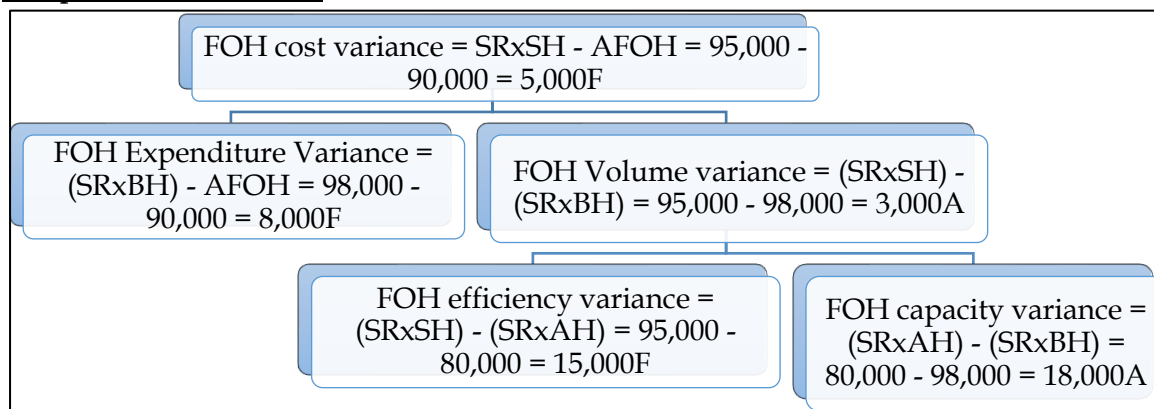Labour Efficiency Variance = SR x SH - SR x AH = 1,90,000 - 1,60,000 = 30,000F
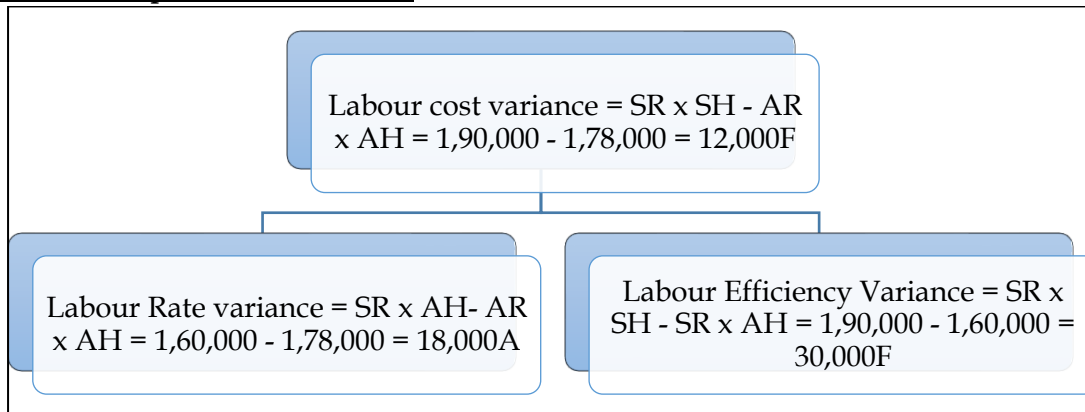
WN 8: Computation of overhead variances:
Computation table:

SR x SH	SR x AH	SR x BH	AFOH

(or) SR x AO	(or) SR x SO	(or) BFOH	
20 x 4,750	20 x 4,000	98,000	90,000
95,000	**80,000**	**98,000**	**90,000**

Computation of variances:

FOH cost variance = SRxSH - AFOH = 95,000 - 90,000 = 5,000F

FOH Expenditure Variance = (SRxBH) - AFOH = 98,000 - 90,000 = 8,000F

FOH Volume variance = (SRxSH) - (SRxBH) = 95,000 - 98,000 = 3,000A

FOH efficiency variance = (SRxSH) - (SRxAH) = 95,000 - 80,000 = 15,000F

FOH capacity variance = (SRxAH) - (SRxBH) = 80,000 - 98,000 = 18,000A

28. Comprehensive variances

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:

Particulars	Unit cost
Direct Material (5 Kgs @ Rs.4.20)	21
Direct labour (3 hours @ Rs.3.00)	9
Factory overhead (1.20 per labour hour)	3.60
Total Cost	**33.60**

The production schedule for the month of June 2007 required completion of 40000 units. However, 40960 units were completed during the month without opening and closing work-in-process inventories.

Purchases during the month of June, 2007, 225000 kgs of material at the rate of Rs.4.50 per kg. Production and sales records for the month showed the following actual results.

Particulars	Amount
Material used	2,05,600 kgs
Direct labour 1,21,200 hours	3,87,480
Total factory overhead cost incurred	1,00,000
Sales	40,000 units

Selling price to be fixed as to allow a mark-up of 20 percent on the selling price

Required:
- i) Material variances based on consumption of material
- ii) Labour variances and total variances for factory overhead
- iii) Income statement for June 2007 showing actual gross margin
- iv) An incentive scheme is in operation in the company whereby employees are paid a bonus of 50% of direct labour hour saved at standard direct labour hour rate. Calculate the Bonus amount
- v) Compute material purchase price variance

Answer:

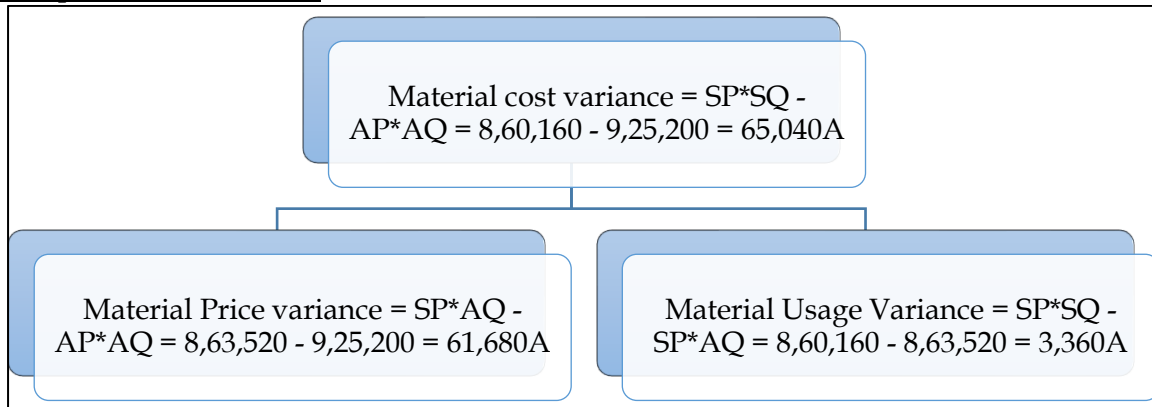**WN 1: Computation of Material Variances:**

Computation table:

SP x SQ	SP x AQ	AP x AQ
4.20 x 2,04,800	4.20 x 2,05,600	4.50 x 2,05,600
8,60,160	**8,63,520**	**9,25,200**

Note:

1. Computation of Standard Quantity:

$$\text{Standard Quantity} = \text{Actual Output x} \left(\frac{\text{Input}}{\text{Output}}\right) = 40,960 \text{ x} \left(\frac{5}{1}\right) = 2,04,800 \text{ kgs}$$
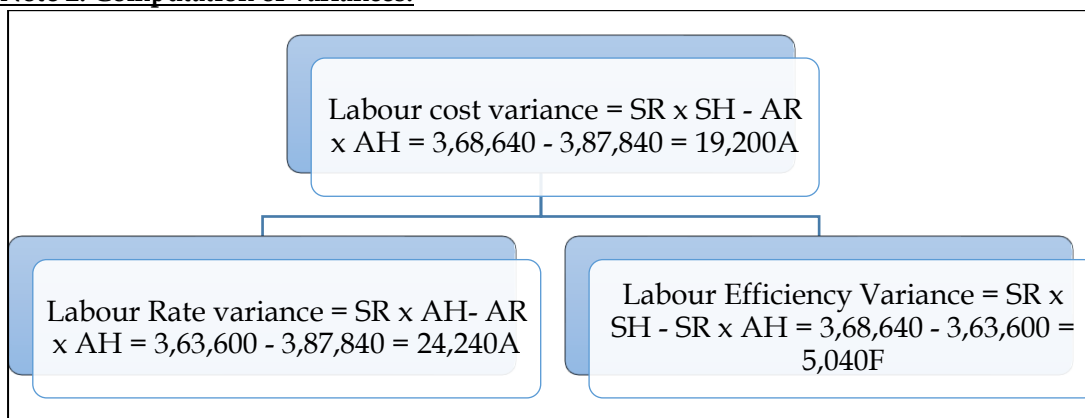
Computation of variances:

Material cost variance = SP*SQ - AP*AQ = 8,60,160 - 9,25,200 = 65,040A

Material Price variance = SP*AQ - AP*AQ = 8,63,520 - 9,25,200 = 61,680A

Material Usage Variance = SP*SQ - SP*AQ = 8,60,160 - 8,63,520 = 3,360A

WN 2: Labour variances:
Computation table:

SR x SH	SR x AH	AR x AH
3 x 1,22,880	3 x 1,21,200	3,87,840
3,68,640	**3,63,600**	**3,87,840**

Note 1: Computation of SH:

3 hours = 1 unit
ST = AO
? = 40,960 units
1,22,880 hours = 40,960 units

Note 2: Computation of variances:

Labour cost variance = SR x SH - AR x AH = 3,68,640 - 3,87,840 = 19,200A

Labour Rate variance = SR x AH- AR x AH = 3,63,600 - 3,87,840 = 24,240A

Labour Efficiency Variance = SR x SH - SR x AH = 3,68,640 - 3,63,600 = 5,040F

WN 3: Computation of factory overhead variances:
- It is assumed that factory overhead is a variable overhead

Computation table:

SR x SH (or) SR x AO	SR x AH (or) SR x SO	AR x AH (or) AVOH
1.20 x 1,22,880	1.20 x 1,21,200	1,00,000
1,47,456	**1,45,440**	**1,00,000**

Note 1: Computation of variances:

VOH Cost Variance = SR x SH - AR x AH = 1,47,456 - 1,00,000 = 47,456F

VOH Exp variance = SR x AH- AR x AH = 1,45,440 - 1,00,000 = 45,440F

VOH Efficiency Variance = SR x SH - SR x AH = 1,47,456 - 1,45,440 = 2,016F
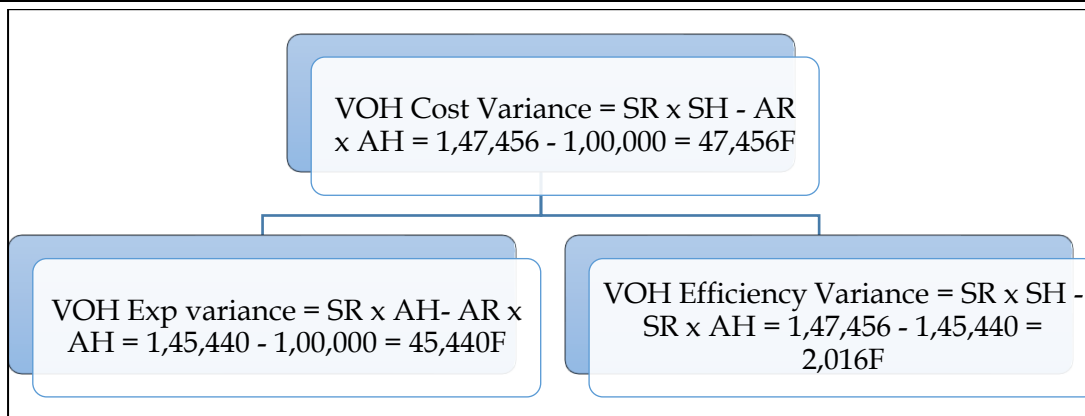
WN 4: Preparation of income statement:
- Standard Cost per unit = Rs.33.60
- Profit per unit = 1/5 on sales = 1/4 on cost = (1/4 x 33.60) = Rs.8.40
- Selling Price = 33.60 + 8.40 = Rs.42 per unit

Particulars	Calculation	Amount
Direct Material		9,25,200
Direct Labour		3,87,840
Factory overheads		1,00,000
Cost of Production (40,960 units)		**14,13,040**
Less: Closing stock (960 units)	960 x 33.60	(32,256)
Cost of Goods sold (40,000 units)		**13,80,784**
Profit	**Balancing figure**	**2,99,216**
Sales	**40,000 x 42**	**16,80,000**

Alternative income statement:

Particulars	Amount	Amount
Budgeted profit (40,000 x 8.40)		3,36,000
Add: Favorable variances:		
Labour efficiency variance	5,040	
VOH expenditure variance	45,440	
VOH efficiency variance	2,016	52,496
Less: Adverse variances:		
Material price variance	61,680	
Material usage variance	3,360	
Labour rate variance	24,240	(89,280)
Actual Profit		**2,99,216**

WN 5: Computation of bonus:
- Bonus = 50% of Time saved x Rate per hour
- Time saved = Standard Time – Actual Time = 1,22,880 – 1,21,200 = 1,680 hours
- **Bonus = 50% x 1,680 x Rs.3 = Rs.2,520**

WN 6: Computation of Material Purchase Price Variance:
- Material Purchase Price Variance = (SP x AQP) – (AP x AQP)
- **MPPV = (4.20 x 2,25,000) – (4.50 x 2,25,000) = 67,500A**

29. Production volume and overhead expense variance:
XYZ company has established the following standards for factory overheads
- Variable overheads per unit = Rs.10
- Fixed overheads per month = Rs.1,00,000

Capacity of the plant 20,000 units per month
The actual data for the month are as follows:
- Actual overheads incurred = Rs.3,00,000

- Actual Output (Units) = 15,000 units

Calculate Production Volume variance and Overhead expense variance

Answer:
- Production overhead volume variance is related only to fixed overheads

Computation of Production OH Volume Variance:
- FOH Volume Variance = (SR x AO) – (BFOH)
- SR per unit = BFOH/Budgeted Output = 1,00,000/20,000 = Rs.5 per unit
- **FOH Volume Variance = (5 x 15,000) – 1,00,000 = 25,000A**

Computation of Overhead expense variance:
- Overhead Expense Variance = Standard Expenditure – Actual Expenditure
- Standard expenditure is always computed with the help of Actual Output
- **Standard Expenditure for 15,000 units = (15,000 x 10) + 1,00,000 = Rs.2,50,000**
- **Overhead Expense Variance = 2,50,000 – 3,00,000 = 50,000A**

30. **Comprehensive variances:**

Shinestar Limited company manufactures a commercial product for which the standard cost per unit is as follows:

Particulars	Amount
Material (5 Kgs @ Rs.4 per Kg)	20
Labour (3 hours @ Rs.10 per hour)	30
Overhead	
Variable (3 hours @ RS.1)	3
Fixed (3 hours @ Rs.0.50)	1.50
Total	**54.50**

During January 2010, 600 units of the product were manufactured at the cost shown below:

Particulars	Amount
Material purchased (5,000 kgs @ Rs.4.10 per kg)	20,500
Materials used: 3,500 kgs	-
Direct Labour: (1,700 hours @ Rs.9)	15,300
Variable overhead	1,900
Fixed overhead	900
Total	**38,600**

The flexible budget required 1,800 direct labour hours for operation at the monthly activity level used to set the fixed overhead rate.

Calculate:
- Material price variance
- Material usage variance
- Labour rate variance
- Labour efficiency variance
- Fixed overhead expenditure variance
- Variable overhead efficiency variance
- Fixed overhead expenditure variance
- Fixed overhead volume variance
- Fixed overhead capacity variance
- Fixed overhead efficiency variance
- Reconcile the standard and actual cost of production

Answer:

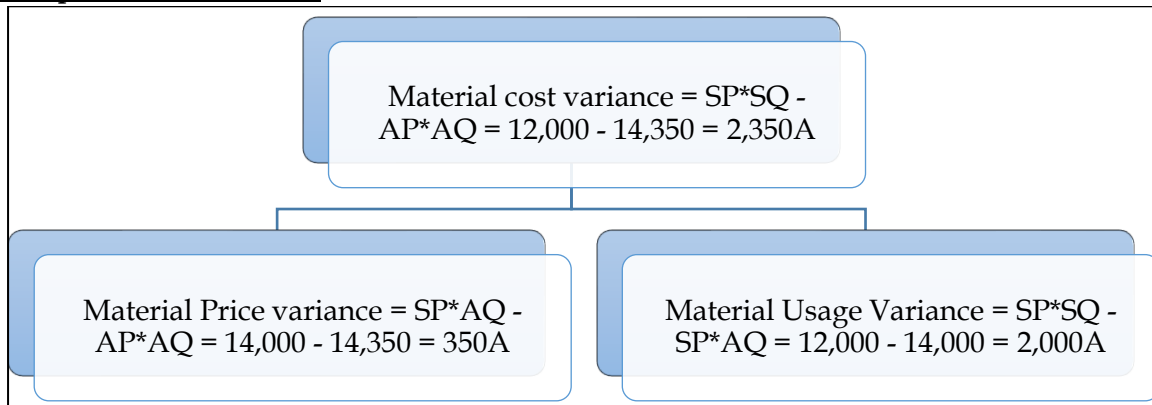**WN 1: Computation of Material Variances:**

Computation table:

SP x SQ	SP x AQ	AP x AQ
4 x 3,000	4 x 3,500	4.10 x 3,500
12,000	**14,000**	**14,350**

Note:

1. Computation of Standard Quantity:

Standard Quantity = Actual Output x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ = 600 x $\left(\dfrac{5}{1}\right)$ = 3,000 kgs

Computation of variances:

Material cost variance = SP*SQ - AP*AQ = 12,000 - 14,350 = 2,350A

Material Price variance = SP*AQ - AP*AQ = 14,000 - 14,350 = 350A

Material Usage Variance = SP*SQ - SP*AQ = 12,000 - 14,000 = 2,000A

WN 2: Labour variances:

Computation table:

SR x SH	SR x AH	AR x AH
10 x 1,800	10 x 1,700	9 x 1,700
18,000	**17,000**	**15,300**

Note 1: Computation of SH:

3 hours = 1 unit
ST = AO
? = 600 units
1,800 hours = 600 units

Note 2: Computation of variances:
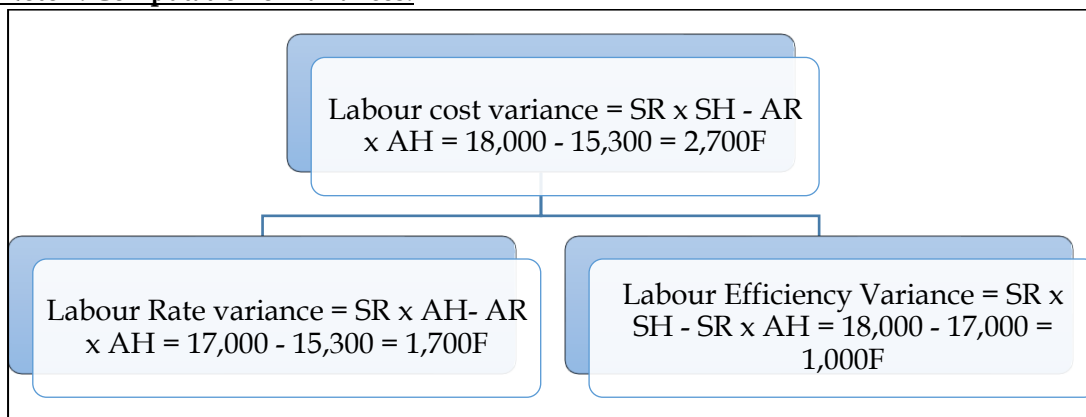
Labour cost variance = SR x SH - AR x AH = 18,000 - 15,300 = 2,700F

Labour Rate variance = SR x AH- AR x AH = 17,000 - 15,300 = 1,700F

Labour Efficiency Variance = SR x SH - SR x AH = 18,000 - 17,000 = 1,000F

WN 3: Computation of factory overhead variances:

Computation table:

SR x SH (or) SR x AO	SR x AH (or) SR x SO	AR x AH (or) AVOH
1 x 1,800	1 x 1,700	1,900
1,800	**1,700**	**1,900**

Note 1: Computation of variances:

VOH Cost Variance = SR x SH - AR x AH = 1,800 - 1,900 = 100A

VOH Exp variance = SR x AH - AR x AH = 1,700 - 1,900 = 200A

VOH Efficiency Variance = SR x SH - SR x AH = 1,800 - 1,700 = 100F
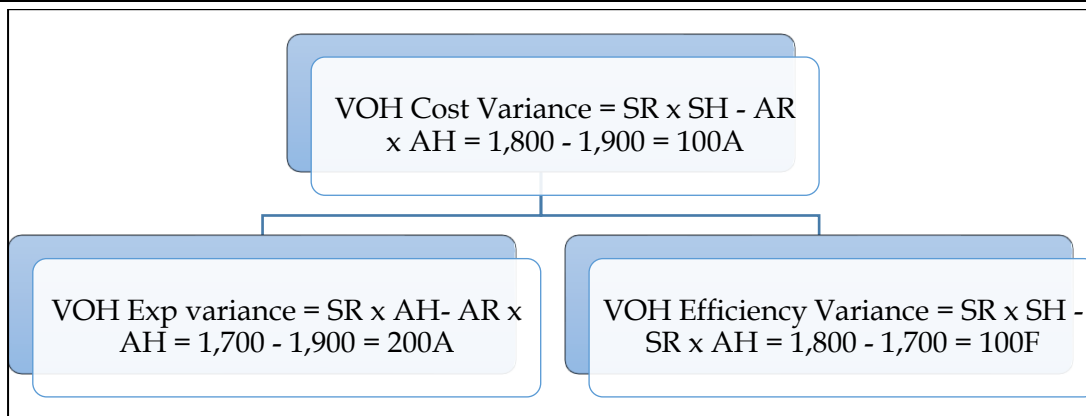
WN 4: Computation of Fixed Overhead Variances

Computation table:

SR x SH (or) SR x AO	SR x AH (or) SR x SO	SR x BH (or) BFOH	AFOH
0.50 x 1,800	0.50 x 1,700	0.50 x 1,800	900
900	**850**	**900**	**900**

Computation of variances:

FOH cost variance = SRxSH - AFOH = 900 - 900 = 0

FOH Expenditure Variance = (SRxBH) - AFOH = 900 - 900 = 0

FOH Volume variance = (SRxSH) - (SRxBH) = 900 - 900 = 0

FOH efficiency variance = (SRxSH) - (SRxAH) = 900 - 850 = 50F

FOH capacity variance = (SRxAH) - (SRxBH) = 850 - 900 = 50A
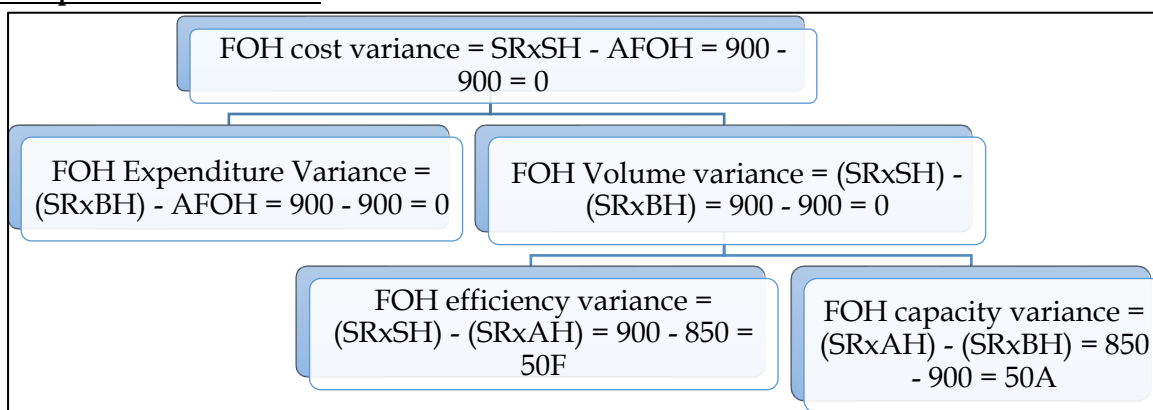
WN 5: Reconciliation of Standard and actual cost of production:
- Standard Cost of Production = 600 units x 54.50 = Rs.32,700
- Actual cost of production = 14,350 + 15,300 + 1,900 + 900 = Rs.32,450

Particulars	Amount	Amount
Standard cost of production		32,700
Add: Adverse variances		
Material price variance	350	
Material usage variance	2,000	
Variable OH expenditure variances	200	2,550
Less: Favourable variances		
Labour rate variance	1,700	
Labour efficiency variance	1,000	
Variable OH efficiency variance	100	(2,800)
Actual cost of production		**32,450**

31. **Comprehensive variances:**

The following information is available from the cost records of a company for the month of July, 2016:

Material purchased	22,000 pieces	90,000
Material consumed	21,000 pieces	
Actual wages paid for	5,150 hours	25,750
Fixed factory overhead incurred		46,000
Fixed factory overhead budgeted		42,000

Units produced		1,900
Standard rates and prices are:		
Direct material		Rs.4.50 per piece
Standard input		10 pieces per unit
Direct labour rate		Rs.6 per hour
Standard requirement		2.5 hours per unit
Overheads		Rs.8 per labour hour

You are required to calculate the following variances:

- Material price variance
- Material usage variance
- Labour rate variance
- Labour efficiency variance
- Fixed overhead expenditure variance
- Fixed overhead efficiency variance
- Fixed overhead capacity variance

Answer:
WN 1: Computation of Material Variances:
Computation table:

SP x SQ	SP x AQ	AP x AQ
4.50 x 19,000	4.50 x 21,000	4.0909 x 21,000
85,500	**94,500**	**85,909**

Note:
1. Computation of Standard Quantity:

$$\text{Standard Quantity} = \text{Actual Output} \times \left(\frac{\text{Input}}{\text{Output}}\right) = 1,900 \times \left(\frac{10}{1}\right) = 19,000 \text{ pieces}$$

2. Computation of Actual Rate

$$\text{Actual Rate} = \frac{90,000}{22,000} = 4.0909$$

Computation of variances:

Material cost variance = SP*SQ - AP*AQ = 85,500 - 85,909 = 409A

Material Price variance = SP*AQ - AP*AQ = 85,500 - 94,500 = 9,000A

Material Usage Variance = SP*SQ - SP*AQ = 94,500 - 85,909 = 8,591F
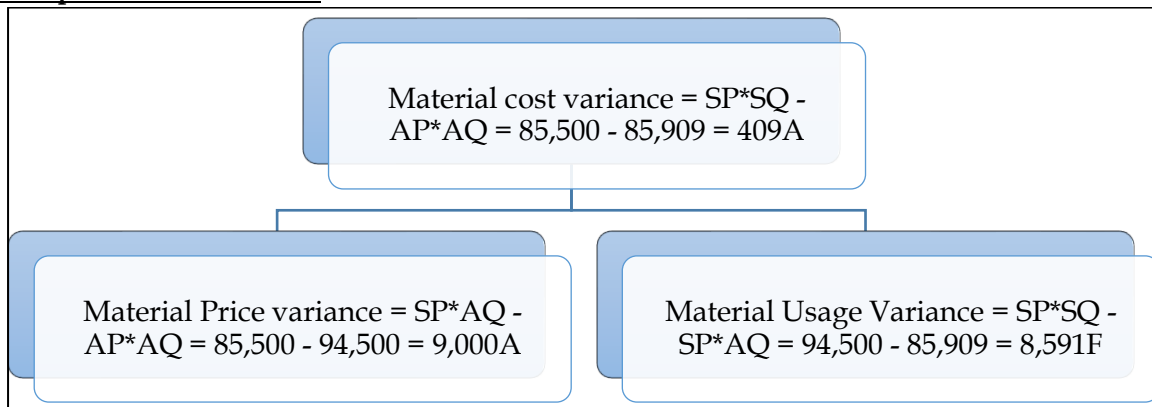
WN 2: Labour variances:
Computation table:

SR x SH	SR x AH	AR x AH
6 x 4,750	6 x 5,150	25,750
28,500	**30,900**	**25,750**

Note 1: Computation of SH:

2.5 hours = 1 unit
ST = AO
? = 1,900 units
4,750 hours = 1,900 units

Note 2: Computation of variances:
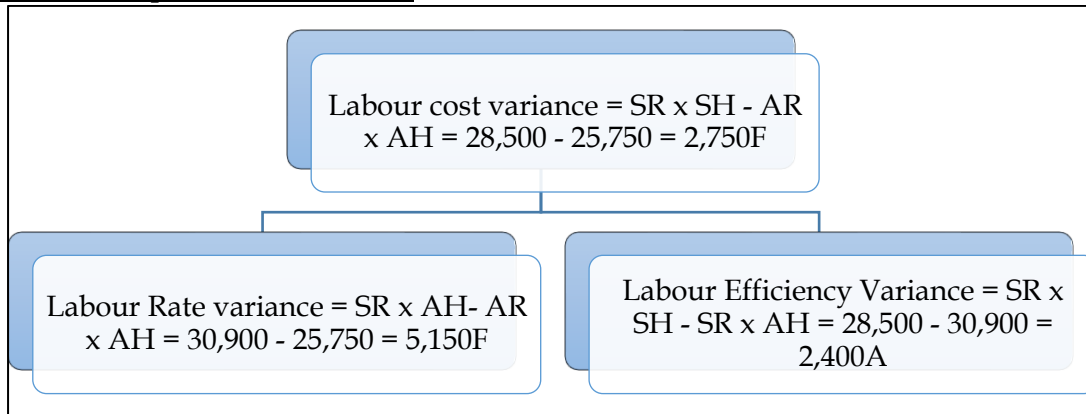
Labour cost variance = SR x SH - AR x AH = 28,500 - 25,750 = 2,750F

Labour Rate variance = SR x AH- AR x AH = 30,900 - 25,750 = 5,150F

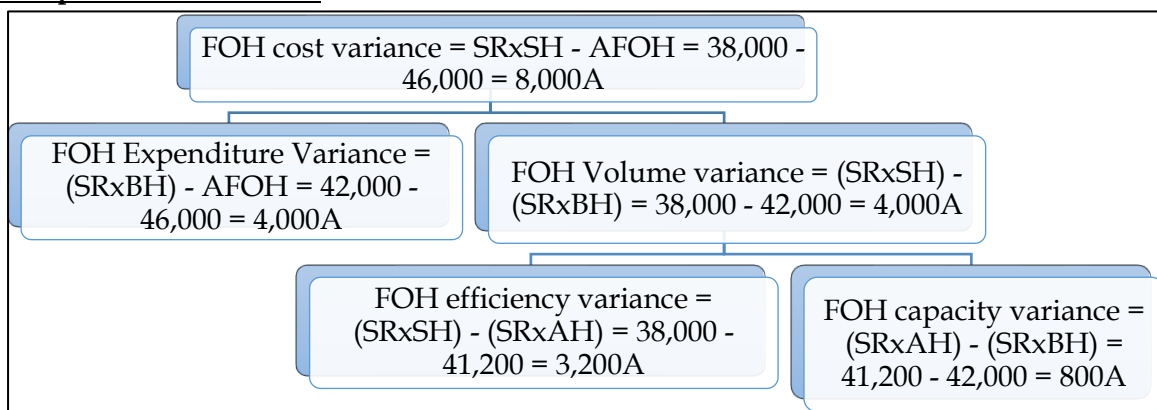Labour Efficiency Variance = SR x SH - SR x AH = 28,500 - 30,900 = 2,400A

WN 3: Computation of Fixed Overhead Variances

Computation table:

SR x SH (or) SR x AO	SR x AH (or) SR x SO	SR x BH (or) BFOH	AFOH
8 x 4,750	8 x 5,150	42,000	46,000
38,000	**41,200**	**42,000**	**46,000**

Computation of variances:

FOH cost variance = SRxSH - AFOH = 38,000 - 46,000 = 8,000A
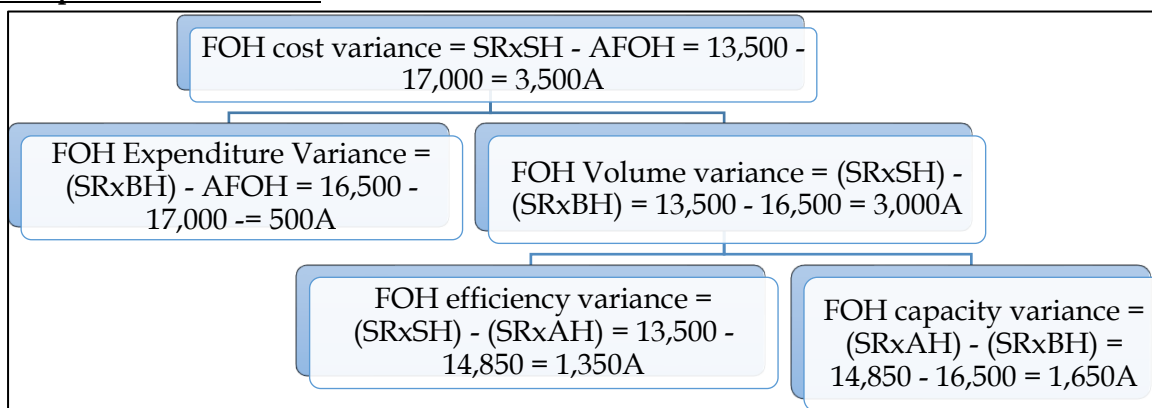
FOH Expenditure Variance = (SRxBH) - AFOH = 42,000 - 46,000 = 4,000A

FOH Volume variance = (SRxSH) - (SRxBH) = 38,000 - 42,000 = 4,000A

FOH efficiency variance = (SRxSH) - (SRxAH) = 38,000 - 41,200 = 3,200A

FOH capacity variance = (SRxAH) - (SRxBH) = 41,200 - 42,000 = 800A

32. Partial plan versus single plan:

Material purchased 10,000 pieces at Rs.1.10	Rs.11,000
Material consumed 9,500 pieces at Rs.1.10	10,450
Actual wages paid 2,475 hours at Rs.3.50	Rs.8662.50
Actual factory expenses incurred	Rs.17000
Budgeted factory overheads	Rs.16500
Units produced and sold	900 units @ Rs.60 per unit
Standard rates and prices are as under:	
Direct material	Rs.1.00 per piece
Standard input	10 pieces per unit
Direct labour rate	Rs.3.00 per hour
Standard labour requirement	2.5 hours per unit
Overheads	Rs.6.00 per labour hour

Pass journal entries and prepare ledger accounts under partial and single plan.

Answer:

WN 1: Computation of Material Variances:

Computation table:

SP x SQ	SP x AQ	AP x AQ
1 x 9,000	1 x 9,500	1.10 x 9,500
9,000	**9,500**	**10,450**

Note:

1. Computation of Standard Quantity:

Standard Quantity = Actual Output x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ = 900x $\left(\dfrac{10}{1}\right)$ = 9,000 pieces

Computation of variances for partial plan

Material cost variance = SP*SQ - AP*AQ = 9,000 - 10,450 = 1,450A

Material Price variance = SP*AQ - AP*AQ = 9,500 - 10,450 = 950A

Material Usage Variance = SP*SQ - SP*AQ = 9,000 - 9,500 = 500A
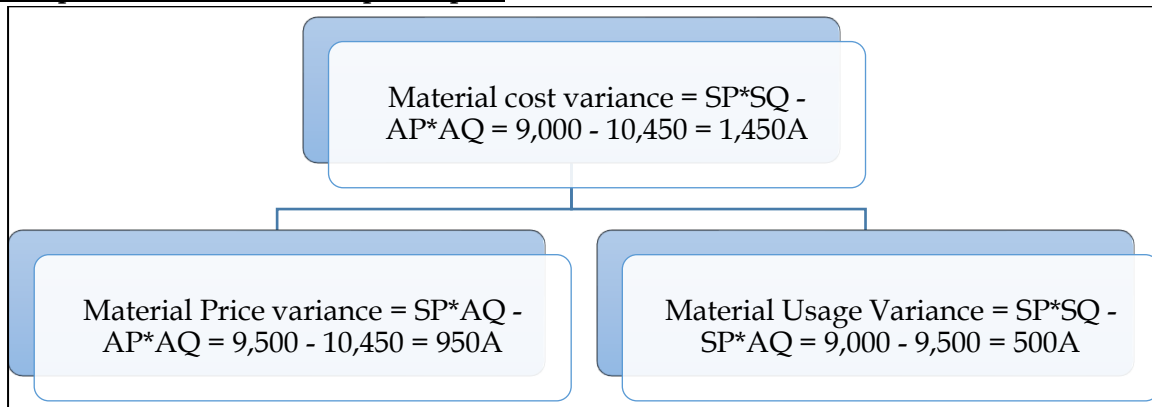
Variances under single plan:

- Material usage variance = 500A
- Material price variance = (SP x Actual Quantity Purchased) – (AP x Actual Quantity Purchased)
- Material price variance = (1 x 10,000) – (1.10 x 10,000) = 1,000A
- Material cost variance = 500A + 1,000A = 1,500A

WN 2: Labour variances:

Computation table:

SR x SH	SR x AH	AR x AH
3 x 2,250	3 x 2,475	3.50 x 2,475
6,750	**7,425**	**8,662.50**

Note 1: Computation of SH:

2.5 hours = 1 unit
ST = AO
? = 900 units
2,250 hours = 900 units

Note 2: Computation of variances:
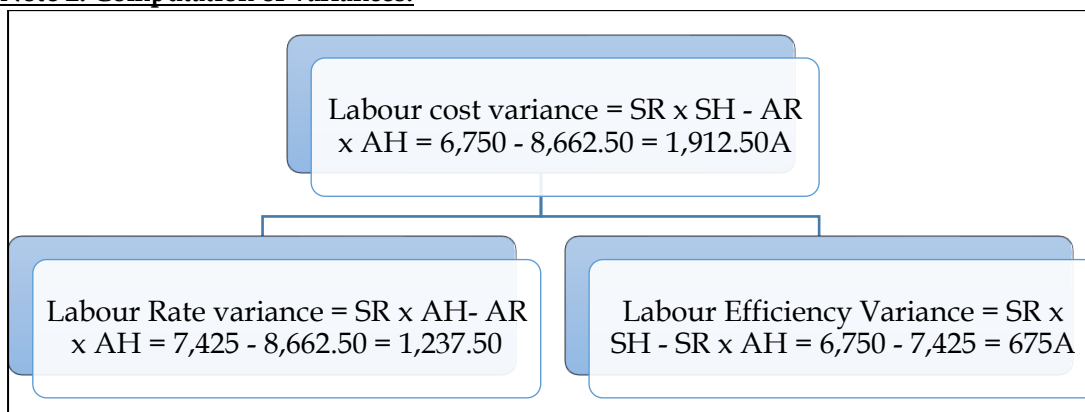
Labour cost variance = SR x SH - AR x AH = 6,750 - 8,662.50 = 1,912.50A

Labour Rate variance = SR x AH- AR x AH = 7,425 - 8,662.50 = 1,237.50

Labour Efficiency Variance = SR x SH - SR x AH = 6,750 - 7,425 = 675A

WN 3: Computation of Fixed Overhead Variances

Computation table:

SR x SH (or) SR x AO	SR x AH (or) SR x SO	SR x BH (or) BFOH	AFOH
6 x 2,250	6 x 2,475	16,500	17,000

13,500	14,850	16,500	17,000

Computation of variances:

FOH cost variance = SRxSH - AFOH = 13,500 - 17,000 = 3,500A

FOH Expenditure Variance = (SRxBH) - AFOH = 16,500 - 17,000 -= 500A

FOH Volume variance = (SRxSH) - (SRxBH) = 13,500 - 16,500 = 3,000A

FOH efficiency variance = (SRxSH) - (SRxAH) = 13,500 - 14,850 = 1,350A

FOH capacity variance = (SRxAH) - (SRxBH) = 14,850 - 16,500 = 1,650A

WN 4: Journal Entries under Single Plan

Transaction	Journal Entry	Amount	Amount
Purchase of RM	RM Control A/c MPV A/C To GL Adjustment A/c	10,000 1,000	 11,000
Issue of raw material to stores	WIP Control A/c MUV A/c To RM Control A/c	9,000 500	 9,500
Recognition of MPV and MUV	Already recognized		

Disposal of MPV and MUV	Costing P & L A/c
	   To MPV A/c
	   To MUV A/c
		1,500	
			1,000
			500

Payment of wages	Wages control A/c LRV A/c To GL Adjustment A/c	7,425 1,237.50	 8,662.50
Transfer of wages to WIP	WIP Control A/c LEV A/c To Wages Control A/c	6,750 675	 7,425
Recognition of LRV and LEV	Already recognized		

Disposal of LRV and LEV	Costing P& L A/c
	   To LRV A/c
	   To LEV A/c
		1,912.50	
			1,237.50
			675

Payment of Factory OH	FOH control A/c FOH Exp Variance A/c To GL Adjustment A/c	16,500 500	 17,000
Absorption of FOH to WIP	WIP Control A/c FOH Eff var A/c FOH Cap Var A/c To FOH Control A/c	13,500 1,350 1,650	 16,500
Recognition of FOH Variances	Already recognized		

Disposal of FOH variances	Costing P& L A/c
	   To FOH Exp Var A/c
	   To FOH Cap Var A/c
	   To FOH Eff Var A/c
		3,500	
			500
			1,650
			1,350

WN 5: Journal Entries Under Partial Plan:

Transaction	Journal Entry	Amount	Amount
Purchase of RM	RM Control A/c To GL Adjustment A/c	11,000	 11,000
Issue of raw material to stores	WIP Control A/c To RM Control A/c	10,450	 10,450

Transaction	Journal Entry	Amount	Amount
Recognition of MPV and MUV	MPV A/c	950	
	MUV A/c	500	
	To WIP Control A/c		1,450
Disposal of MPV and MUV	Costing P & L A/c	1,450	
	To MPV A/c		950
	To MUV A/c		500
Payment of wages	Wages control A/c	8,662.50	
	To GL Adjustment A/c		8,662.50
Transfer of wages to WIP	WIP Control A/c	8662.50	
	To Wages Control A/c		8662.50
Recognition of LRV and LEV	LRV A/c	1,237.50	
	LEV A/c	675	
	To WIP Control A/c		1,912.50
Disposal of LRV and LEV	Costing P& L A/c	1,912.50	
	To LRV A/c		1,237.50
	To LEV A/c		675
Payment of Factory OH	FOH control A/c	17,000	
	To GL Adjustment A/c		17,000
Absorption of FOH to WIP	WIP Control A/c	17,000	
	To FOH Control A/c		17,000
Recognition of FOH Variances	FOH Exp Var A/c	500	
	FOH Eff Var A/c	1,350	
	FOH Cap Var A/c	1,650	
	To WIP Control A/c		3,500
Disposal of FOH variances	Costing P& L A/c	3,500	
	To FOH Exp Var A/c		500
	To FOH Cap Var A/c		1,650
	To FOH Eff Var A/c		1,350

WN 6: Ledger Accounts under Single and Partial Plan:

RM Control Account

Particulars	Single	Partial	Particulars	Single	Partial
To GL Adjustment A/c	10,000	11,000	By WIP Control A/c	9,000	10,450
			By MUV A/c	500	
			By Balance C/d	500	550
Total	**10,000**	**11,000**		**10,000**	**11,000**

Material Price Variance A/c

Particulars	Single	Partial	Particulars	Single	Partial
To GL Adjustment A/c	1,000		By Costing P&L A/c	1,000	950
To WIP Control A/c		950			
Total	**1,000**	**950**	**Total**	**1,000**	**950**

Material Usage Variance A/c

Particulars	Single	Partial	Particulars	Single	Partial
To RM Control A/c	500		By Costing P&L A/c	500	500
To WIP Control A/c		500			
Total	**500**	**500**	**Total**	**500**	**500**

Wages Control A/c

Particulars	Single	Partial	Particulars	Single	Partial
To GL Adjustment A/c	7,425	8,662.50	By WIP Control A/c	6,750	8,662.50
			By LEV A/c	675	
Total	**7,425**	**8,662.50**		**7,425**	**8,662.50**

Labour Rate Variance

Particulars	Single	Partial	Particulars	Single	Partial
To GL Adjustment A/c	1,237.50		By Costing P&L A/c	1,237.50	1,237.50
To WIP Control A/c		1,237.50			
Total	**1,237.50**	**1,237.50**	**Total**	**1,237.50**	**1,237.50**

Labour Efficiency Variance

Particulars	Single	Partial	Particulars	Single	Partial
To Wages Control A/c	675		By Costing P&L A/c	675	675
To WIP Control A/c		675			
Total	**1,237.50**	**1,237.50**	**Total**	**1,237.50**	**1,237.50**

FOH Control A/c

Particulars	Single	Partial	Particulars	Single	Partial
To GL Adjustment A/c	16,500	17,000	By WIP Control A/c	13,500	17,000
			By FOH Eff Var A/c	1,350	
			By FOH Cap Var A/c	1,650	
Total	**16,500**	**17,000**		**16,500**	**17,000**

FOH Exp Variance A/c

Particulars	Single	Partial	Particulars	Single	Partial
To GL Adjustment A/c	500		By Costing P&L A/c	500	500
To WIP Control A/c		500			
Total	**1,237.50**	**1,237.50**	**Total**	**1,237.50**	**1,237.50**

FOH Eff Variance A/c

Particulars	Single	Partial	Particulars	Single	Partial
To FOH Control A/c	1,350		By Costing P&L A/c	1,350	1,350
To WIP Control A/c		1,350			
Total	**1,350**	**1,350**	**Total**	**1,350**	**1,350**

FOH Cap Variance A/c

Particulars	Single	Partial	Particulars	Single	Partial
To FOH Control A/c	1,650		By Costing P&L A/c	1,650	1,650
To WIP Control A/c		1,650			
Total	**1,350**	**1,350**	**Total**	**1,350**	**1,350**

WIP Control A/c

Particulars	Single	Partial	Particulars	Single	Partial
To RM Control A/c	9,000	10,450	By MPV A/c		950
To Wages Control A/c	6,750	8,662.50	By MUV A/c		500
To FOH Control A/c	13,500	17,000	By LRV A/c		1,237.50
			By LEV A/c		675
			By FOH Exp Var A/c		500
			By FOH Eff Var A/c		1,350
			By FOH Cap Var A/c		1,650
			By FG Control A/c	29,250	29,250
Total	**29,250**	**36,112.50**		**10,000**	**36,112.50**

Additional Homework Problems

1. Material variances:

Following are the details of the product Phomex for the month of April 2013:

Particulars	Amount
Standard quantity of material required per unit	5 Kg
Actual output	1,000 units
Actual cost of materials used	Rs.7,14,000
Material price variance	Rs.51,000 (F)

Actual price per kg of material is found to be less than standard price per kg of material by Rs. 10.

You are required to calculate:
- (i) Actual quantity and Actual price of materials used.
- (ii) Material Usage Variance
- (iii) Material Cost Variance.

Answer:

Computation table:

SP x SQ	SP x AQ	AP x AQ
150 x 5,000	150 x 5,100	140 x 5,100
7,50,000	**7,65,000**	**7,14,000**

Note:

1. Computation of Standard Quantity:

Standard Quantity = Actual Output x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ = 1,000 x $\left(\dfrac{5}{1}\right)$ = 5,000 kgs

2. Computation of Actual Quantity:

Material Price Variance = (SP x AQ) – (AP x AQ)

51,000 = (SP – AP) x AQ

51,000 = 10AQ

AQ = 5,100 kg

3. Computation of Actual Price:

Actual Price $= \dfrac{\text{Actual Material Cost}}{\text{Actual Quantity}} = \dfrac{7,14,000}{5,100} = 140$

Computation of variances

```
                    Material cost variance = SP*SQ -
                    AP*AQ = 7,50,000 - 7,14,000 = 36,000F

         Material Price variance = SP*AQ -              Material Usage Variance = SP*SQ -
         AP*AQ = 7,65,000 - 7,14,000 = 51,000F          SP*AQ = 7,50,000 - 7,65,000 = 15,000A
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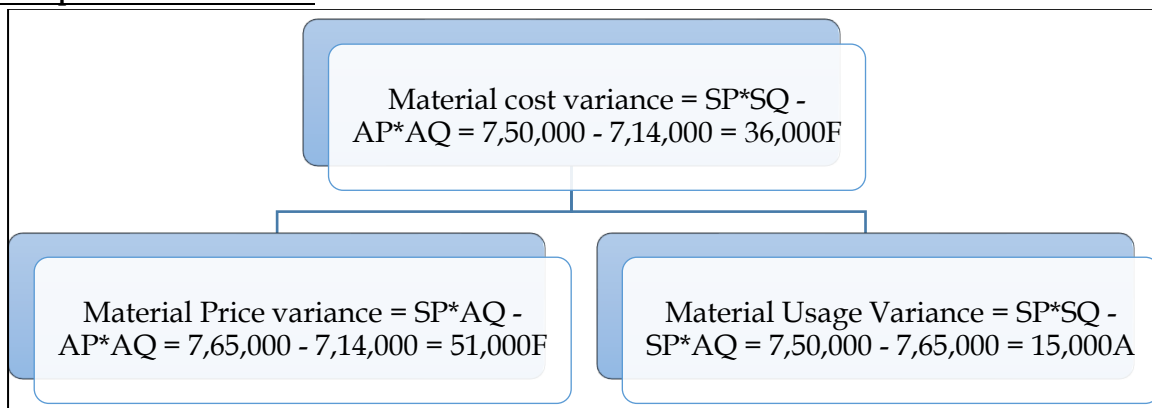
2. Labour variances:

The standard labour employment and the actual labour engaged in a week for a job are as under:

Particulars	Skilled workers	Semi-skilled workers	Unskilled workers
Standard no of workers in the gang	32	12	6
Actual no of workers employed	28	18	4
Standard wage rate per hour	3	2	1
Actual wage rate per hour	4	3	2

During the 40 hours working week, the gang produced 1,800 standard labour hours of work. Calculate:
- Labour Cost Variance
- Labour Rate Variance
- Labour Efficiency Variance
- Labour Mix Variance
- Labour Yield Variance

Answer:

Computation table:

Labour	SR x SH	SR x RSH	SR x AH	AR x AH
Skilled	3 x 1,152	3 x 1,280	3 x 1,120	4 x 1,120

Semi-skilled	2 x 432	2 x 480	2 x 720	3 x 720
Unskilled	1 x 216	1 x 240	1 x 160	2 x 160
Total	**4,536**	**5,040**	**4,960**	**6,960**

Note 1: Computation of AH:
- AH = No of workers x No of hours
- AH for skilled = 28 workers x 40 hours = 1,120 hours
- AH for semi-skilled = 18 workers x 40 hours = 720 hours
- AH for unskilled = 4 workers x 40 hours = 160 hours

Note 2: Computation of RSH:

Total of AH = 2,000 (1,120 + 720 + 160)

RSH of skilled = 2,000 x (32/50) = 1,280

RSH of semi-skilled = 2,000 x (12/50) = 480

RSH of unskilled = 2,000 x (6/50) = 240

Note 3: Computation of SH:

SH = 1,800 hours

SH of skilled = 1,800 x (32/50) = 1,152

SH of semi-skilled = 1,800 x (12/50) = 432

SH of unskilled = 1,800 x (6/50) = 216

Note 4: Computation of variances:

Labour cost variance = SRxSH - ARxAH = 4,536 - 6,960 = 2,424A

Labour Rate Variance = SRxAH - ARxAH = 4,960 - 6,960 = 2,000A

Labour efficiency variance = SRxSH - SRxAH = 4,536 - 4,960 = 424A

Labour Yield variance = SRxSH - SRxRSH = 4,536 - 5,040 = 504A

Labour mix variance = SRxRSH - SRxAH = 5,040 - 4,960 = 80F

3. **Material and labour variances:**

The following standards have been set to manufacture a product:

Particulars	Amount
Direct Material	
2 units of A @ Rs. 4 per unit	8.00
3 units of B @ Rs. 3 per unit	9.00
15 units of C @ Rs. 1 per unit	15.00
Total	**32.00**
Direct Labour: 3 hrs @ Rs. 8 per hour	24.00
Total cost	**56.00**

The company manufactured and sold 6,000 units of the product during the year. Direct material costs were as follows:

- 12,500 units of A at Rs. 4.40 per unit
- 18,000 units of B at Rs. 2.80 per unit
- 88,500 units of C at Rs. 1.20 per unit

The company worked 17,500 direct labour hours during the year. For 2,500 of these hours, the company paid at Rs. 12 per hour while for the remaining, the wages were paid at standard rate. Calculate materials price variance and usage variance and labour rate and efficiency variances.

Answer:

WN 1: Computation of Material Variances:

Computation table:

Material	SP x SQ	SP x RSQ	SP x AQ	AP x AQ
A	4 x 12,000	Not required	4 x 12,500	4.40 x 12,500
B	3 x 18,000	Not required	3 x 18,000	2.80 x 18,000
C	1 x 90,000	Not required	1 x 88,500	1.20 x 88,500
Total	1,92,000	Not required	1,92,500	2,11,600

Note:

1. Computation of Standard Quantity:

Standard Quantity = Actual Output x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$

SQ of A = 6,000 x $\left(\dfrac{2}{1}\right)$ = 12,000 KG

SQ of B = 6,000 x $\left(\dfrac{3}{1}\right)$ = 18,000 KG

SQ of A = 6,000 x $\left(\dfrac{15}{1}\right)$ = 90,000 KG

Computation of variances

Material cost variance = SP*SQ - AP*AQ = 1,92,000 - 2,11,600 = 19,600A

Material Price variance = SP*AQ - AP*AQ = 1,92,500 - 2,11,600 = 19,100A

Material Usage Variance = SP*SQ - SP*AQ = 1,92,000 - 1,92,500 = 500A
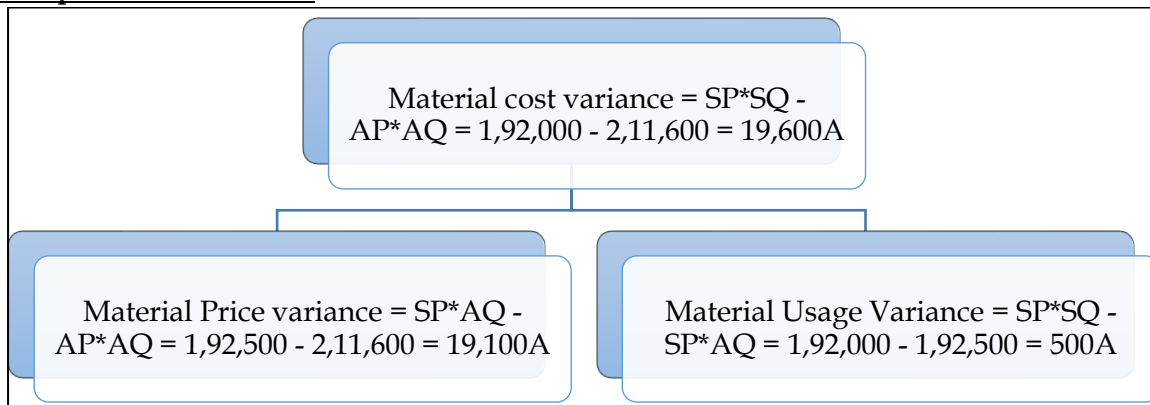
WN 2: Computation of Labour Variances:

Computation table:

SR x SH	SR x AH	AR x AH
8 x18,000	8 x 17,500	8 x 15,000
		12 x 2,500
1,44,000	1,40,000	1,50,000

Note 1: Computation of SH:

3 hours = 1 unit
ST = AO
? = 6,000 units
18,000 hours = 6,000 units

Note 2: Computation of variances:

Labour cost variance = SR x SH - AR
x AH = 1,44,000 - 1,50,000 = 6,000A

Labour Rate variance = SR x AH- AR
x AH = 1,40,000 - 1,50,000 = 10,000A

Labour Efficiency Variance = SR x
SH - SR x AH = 1,44,000 - 1,40,000 =
4,000F
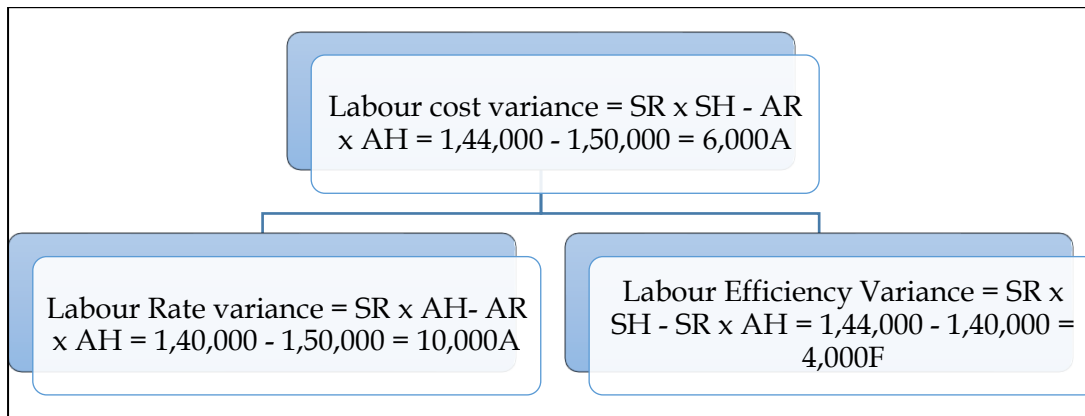
4. Material and labour variances:

The following information is available from the cost records of Vatika & Co. For the month of August, 2013:

- Material purchased 24,000 kg Rs. 1,05,600
- Material consumed 22,800 kg
- Actual wages paid for 5,940 hours Rs. 29,700
- Unit produced 2,160 units.
- Standard rates and prices are:
  a. Direct material rate is Rs. 4.00 per unit
  b. Direct labour rate is Rs. 4.00 per hour
  c. Standard input is 10 kg. for one unit
  d. Standard labour requirement is 2.5 hours per unit.

Calculate all material and labour variances for the month of August, 2013.

Answer:

WN 1: Computation of Material Variances:

Computation table:

SP x SQ	SP x AQ	AP x AQ
4 x 21,600	4 x 22,800	4.40 x 22,800
86,400	**91,200**	**1,00,320**

Note:

1. Computation of Standard Quantity:

$$\text{Standard Quantity} = \text{Actual Output} \times \left(\frac{\text{Input}}{\text{Output}}\right) = 2,160 \times \left(\frac{10}{1}\right) = 21,600 \text{ KG}$$

2. Computation of Actual Price:

$$\text{Actual Price} = \frac{\text{Actual Purchase Cost}}{\text{Actual Quantity Purchased}} = \frac{1,05,600}{24,000} = 4.40 \text{ per KG}$$

Computation of variances

Material cost variance = SP*SQ -
AP*AQ = 86,400 - 1,00,320 = 13,920A

Material Price variance = SP*AQ -
AP*AQ = 91,200 - 1,00,320 = 9,120A

Material Usage Variance = SP*SQ -
SP*AQ = 86,400 - 91,200 = 4,800A
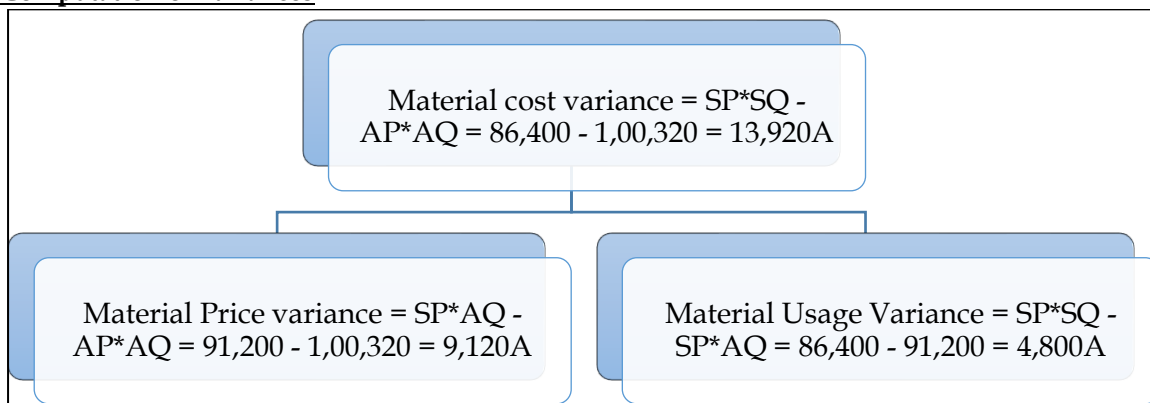
WN 2: Computation of Labour Variances:

Computation table:

SR x SH	SR x AH	AR x AH
4 x 5,400	4 x 5,940	29,700
21,600	**23,760**	**29,700**

Note 1: Computation of SH:

2.5 hours = 1 unit
ST = AO
? = 2,160 units
5,400 hours = 2,160 units

Note 2: Computation of variances:

Labour cost variance = SR x SH - AR x AH = 21,600 - 29,700 = 8,100A

Labour Rate variance = SR x AH- AR x AH = 23,760 - 29,700 = 5,940A

Labour Efficiency Variance = SR x SH - SR x AH = 21,600 - 23,760 = 2,160A
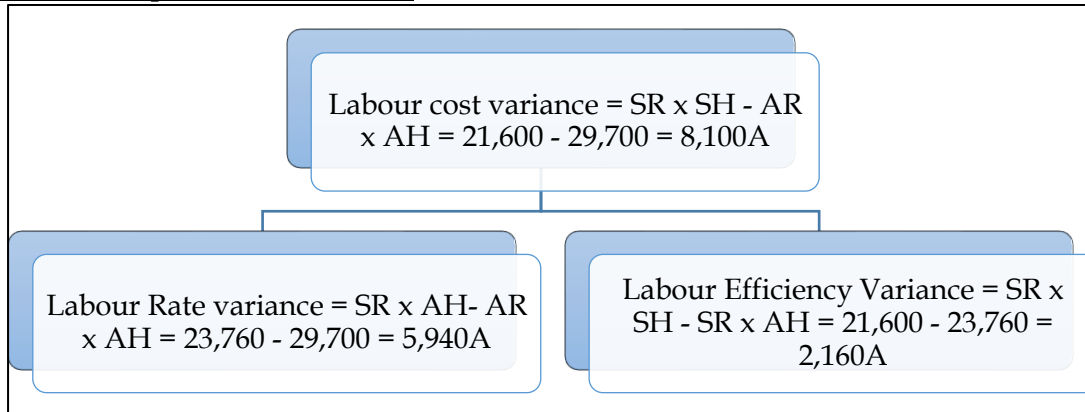
5. **Cost Variances**

Gama Ltd. has furnished the following standard cost data per' unit of production:
- Material 10 kg @ Rs. 10 per kg.
- Labour 6 hours @ Rs. 5.50 per hour
- Variable overhead 6 hours @ Rs. 10 per hour.
- Fixed overhead Rs. 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 Rs. 5,25,000.
- Labour paid Rs. 1,55,000 for 31,000 hours worked
- Variable overheads = Rs. 2,93,000
- Fixed overheads = Rs. 4,70,000
- Actual production = 4,800 units.

Calculate:
- Material Cost Variance.
- Labour Cost Variance.
- Fixed Overhead Cost Variance.
- Variable Overhead Cost Variance.

Answer:
Computation of Material Cost Variance:
Material Cost Variance = (SP x SQ) – (AP x AQ)
Material Cost Variance = (10 x (4,800 x 10)) – 5,25,000 = 4,80,000 – 5,25,000 = 45,000A

Computation of Labour cost Variance:
Labour cost Variance = (SR x SH) – (AR x AH)
Labour cost variance = (5.50 x (4,800 x 6)) – 1,55,000 = 1,58,400 – 1,55,000 = 3,400F

Computation of Fixed Overhead Cost Variance:
Fixed Overhead Cost Variance = (SR x SH) – (AFOH)

$$SR \text{ per hour} = \frac{\text{Budgeted Fixed Overhead}}{\text{Budgeted hours}} = \frac{4,50,000}{30,000} = 15 \text{ per hour}$$

Fixed Overhead Cost Variance = (15 x (4,800 x 6) – (4,70,000) = 4,32,000 – 4,70,000 = 38,000A

Computation of Variable Overhead Cost Variance:
Variable Overhead Cost Variance = (SR x SH) – (AVOH)
Variable Overhead Cost Variance = (10 x (4,800 x 6) – (2,93,000) = 5,000A

6. **Material variances:**
J.K. Ltd. manufactures NXE by mixing three raw materials. For every batch of 100 kg. of NXE, 125 kg. of raw materials are used. In April, 2012, 60 batches were prepared to produce an output of 5,600 kg. of NXE. The standard and actual particulars for April, 2012, are as follows:

Particulars	Standard Mix (%)	Standard Price	Actual Mix (%)	Actual Price (Rs.)	Quantity bought (Kg)
A	50	20	60	21	5,000
B	30	10	20	8	2,000
C	20	5	20	6	1,200

Calculate all variances.
Answer:
Computation table:

Material	SP x SQ	SP x RSQ	SP x AQ	AP x AQ
A	20 x 3,500	20 x 3,750	20 x 4,500	21 x 4,500
B	10 x 2,100	10 x 2,250	10 x 1,500	8 x 1,500
C	5 x 1,400	5 x 1,500	5 x 1,500	6 x 1,500
Total	**98,000**	**1,05,000**	**1,12,500**	**1,15,500**

Note 1: Computation of AQ:
Actual Quantity = 60 batches x 125 = 7,500
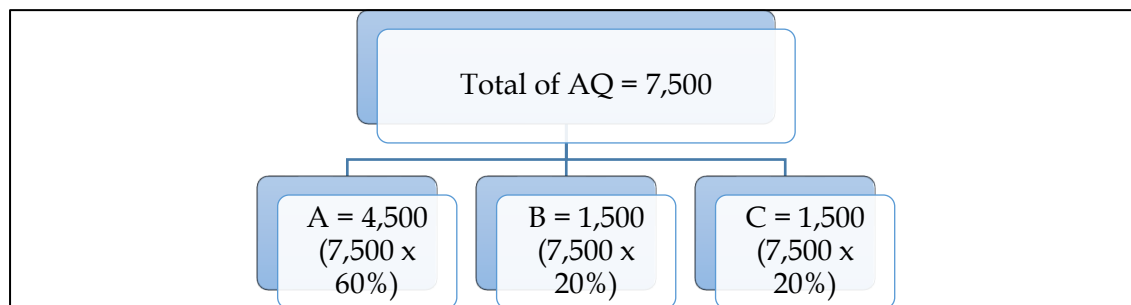
Note 2: Computation of RSQ:
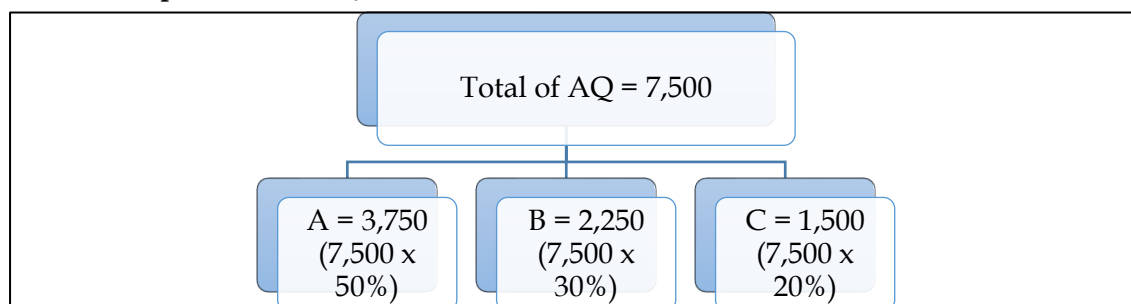
Note 3: Computation of SQ:

Standard Quantity = Actual Output x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ = 5,600 x $\left(\dfrac{125}{100}\right)$ = 7,000 KG

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                    ┌─────────────────────────┐
                    │       SQ = 7,500         │
                    └─────────────────────────┘
          ┌──────────────────┬──────────────────┐
  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐
  │  A = 3,500   │   │  B = 2,100   │   │  C = 1,400   │
  │  (7,000 x    │   │  (7,000 x    │   │  (7,000 x    │
  │    50%)      │   │    30%)      │   │    20%)      │
  └──────────────┘   └──────────────┘   └──────────────┘
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Note 3: Computation of variances:

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                  ┌────────────────────────────────┐
                  │  Material cost variance =      │
                  │  SP*SQ - AP*AQ = 98,000 -      │
                  │  1,15,500 = 17,500A            │
                  └────────────────────────────────┘
          ┌──────────────────────┴──────────────────────┐
┌────────────────────────────┐   ┌────────────────────────────┐
│ Material Price variance =  │   │ Material Usage Variance =  │
│ SP*AQ - AP*AQ = 1,12,500 - │   │ SP*SQ - SP*AQ = 98,000 -   │
│ 1,15,500 = 3,000A          │   │ 1,12,500 = 14,500A         │
└────────────────────────────┘   └────────────────────────────┘
                        ┌──────────────────┴──────────────────┐
            ┌────────────────────────────┐   ┌────────────────────────────┐
            │ Material Yield Variance =  │   │ Material Mix Variance =    │
            │ SP*SQ - SP*RSQ = 98,000 -  │   │ SP*RSQ - SP*AQ = 1,05,000 -│
            │ 1,05,000 = 7,000A          │   │ 1,12,500 = 7,500A          │
            └────────────────────────────┘   └────────────────────────────┘
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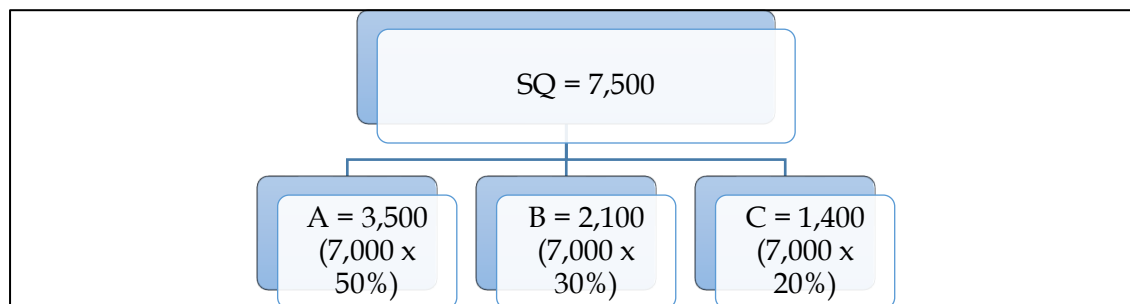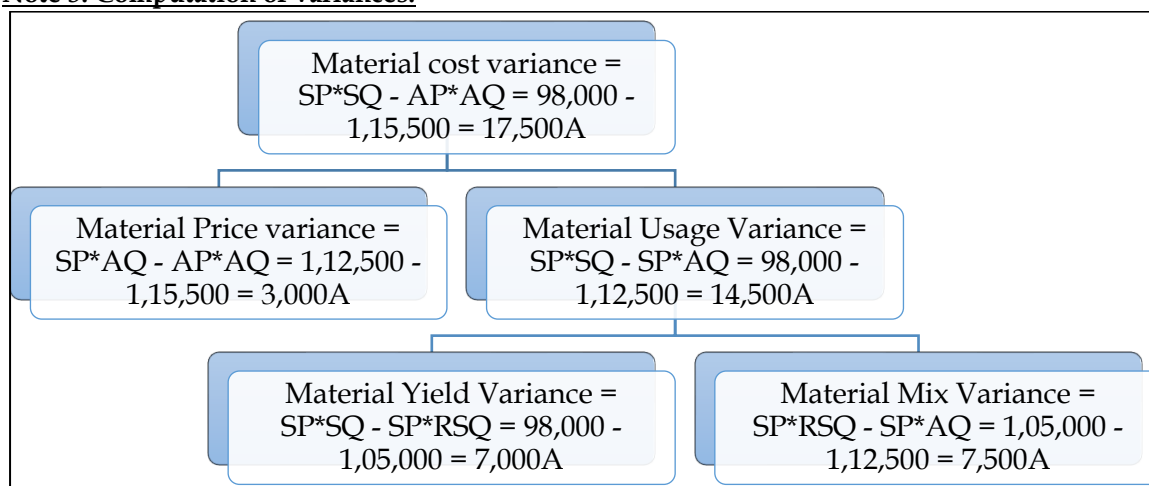
7. **Multiple variances:**

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:

Particulars	Amount
Direct materials 10 kg @ Rs. 45 per kg	450
Direct labour 8 hours @ Rs.50 per hour	400
Variable overhead 8 hours @ Rs.10 per hour	80
Fixed overhead	200
Total cost	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 is as follows:

Particulars	Amount
Direct Materials 8,900 Kg @ Rs. 46 per Kg.	4,09,400
Direct Labour 7,000 hours @ Rs. 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.

Answer:

WN 1: Computation of Material Variances:

Computation table:

SP x SQ	SP x AQ	AP x AQ
45 x 9,000	45 x 8,900	46 x 8,900

4,05,000	4,00,500	4,09,400

Note:
1. Computation of Standard Quantity:

Standard Quantity = Actual Output x $\left(\dfrac{\text{Input}}{\text{Output}}\right)$ = 9,000 x $\left(\dfrac{10}{10}\right)$ = 9,000 KG

Computation of variances

Material cost variance = SP*SQ - AP*AQ = 4,05,000 - 4,09,400 = 4,400A

Material Price variance = SP*AQ - AP*AQ = 4,00,500 - 4,09,400 = 8,900A

Material Usage Variance = SP*SQ - SP*AQ = 4,05,000 - 4,00,500 = 4,500F
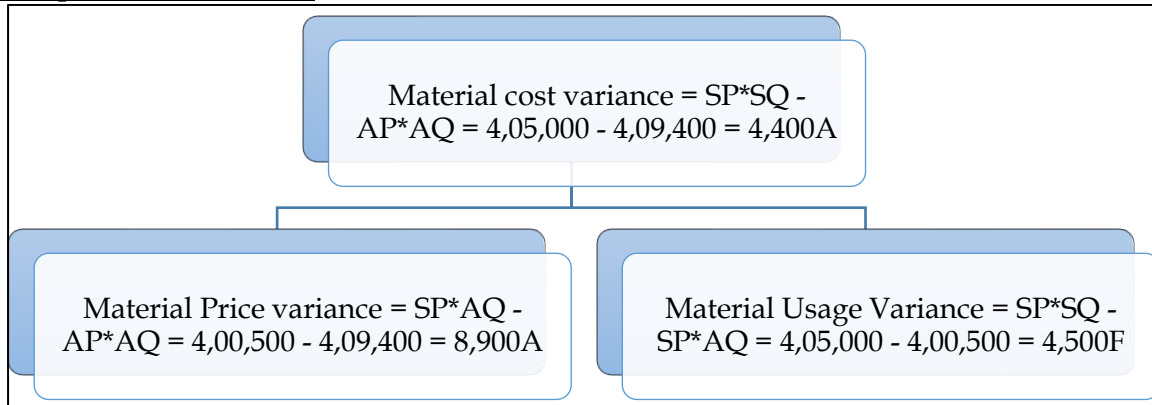
WN 2: Computation of Labour Variances:
Computation table:

SR x SH	SR x AH	AR x AH
50 x 7,200	50 x 7,000	52 x 7,000
3,60,000	**3,50,000**	**3,64,000**

Note 1: Computation of SH:

8 hours = 10 unit	
ST = AO	
? = 9,000 units	
7,200 hours = 9,000 units	

Note 2: Computation of variances:

Labour cost variance = SR x SH - AR x AH = 3,60,000 - 3,64,000 = 4,000A

Labour Rate variance = SR x AH- AR x AH = 3,50,000 - 3,64,000 = 14,000A

Labour Efficiency Variance = SR x SH - SR x AH = 3,60,000 - 3,50,000 = 10,000F
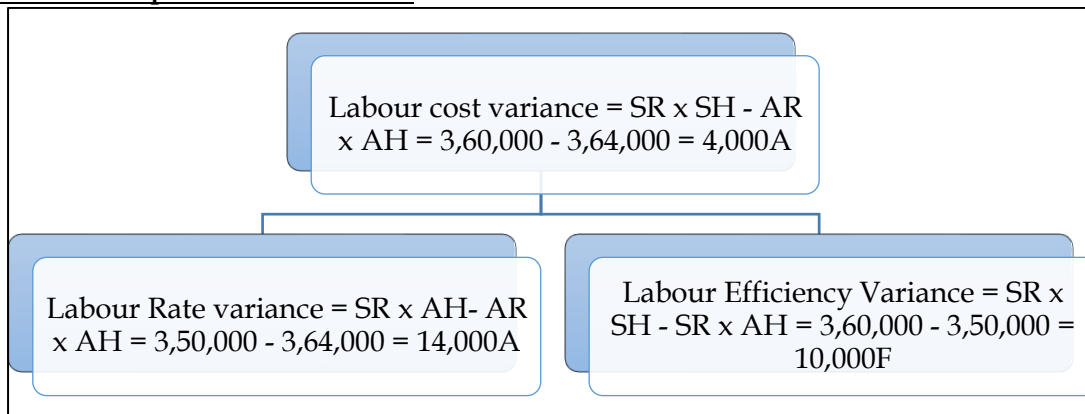
WN 3: Computation of overhead variances:
Computation of Fixed Overhead Cost Variance:
Fixed Overhead Cost Variance = (SR x AO) – (AFOH)
Fixed Overhead Cost Variance = (200 x 900 packets) – (1,92,000) = 1,80,000 – 1,92,000 = 12,000A

Computation of Variable Overhead Cost Variance:
Variable Overhead Cost Variance = (SR x AO) – (AVOH)
Variable Overhead Cost Variance = (80 x 900 packets) – (72,500) = 72,000 – 72,500 = 500A

8.   **Production volume and overhead expense variance**

The overhead expense budget for a factory producing to a capacity of 200 units per month is as follows:

Description of overhead	Fixed cost per unit	Variable cost per unit	Total Cost per unit
Power and fuel	1,000	500	1,500
Repair and maintenance	500	250	750
Printing and stationary	500	250	750
Other overheads	1,000	500	1,500
Total cost	**3,000**	**1,500**	**4,500**

The factory has actually produced only 100 units in a particular month. Details of overheads actually incurred have been provided by the accounts department and are as follows:

Description of overhead	Actual cost
Power and fuel	4,00,000
Repair and maintenance	2,00,000
Printing and stationary	1,75,000
Other overheads	3,75,000

You are required to compute the production volume variance and the overhead expenses variance.
Answer:
- Production overhead volume variance is related only to fixed overheads

Computation of Production OH Volume Variance:
- FOH Volume Variance = (SR x AO) – (BFOH)
- BFOH = 200 units x 3,000 = Rs.6,00,000
- **FOH Volume Variance = (3,000 x 100) – 6,00,000 = 3,00,000A**

Computation of Overhead expense variance:
- Overhead Expense Variance = Standard Expenditure – Actual Expenditure
- Standard expenditure is always computed with the help of Actual Output
- **Standard Expenditure for 100 units = (1,500 x 100) + 6,00,000 = Rs.7,50,000**
- **Overhead Expense Variance = 11,50,000 – 7,00,000 = 4,00,000A**

CHAPTER 14: MARGINAL COSTING

1. What is marginal cost, marginal costing, differential and incremental cost? **[Category A]**

Marginal cost:
- ❖ Marginal cost is the incremental cost of production arising due to one-unit increase in the production quantity
- ❖ Variable costs have directly relationship with volume whereas fixed costs remains constant irrespective of the volume of production. Hence variable cost can be considered as marginal cost

Marginal costing:
- ❖ It is a costing system where products or services and inventories are valued at variable costs
- ❖ This system does not take into consideration fixed costs for valuation of inventory

Differential and incremental cost:
- ❖ Differential cost is the difference between the costs of two different production levels. It is relative representation of costs for two different levels and can either be increase or decrease in cost
- ❖ Incremental cost is the cost increase due to change in volume or process of production activities

2. What are the characteristics of marginal costing? **[Category C]**
- ❖ All elements of costs are classified into fixed and variable components. Semi-variable costs are also analysed into fixed and variable costs
- ❖ Marginal or variable costs are treated as the cost of product
- ❖ Finished goods and work-in-progress is valued only based on variable production costs
- ❖ Fixed costs are treated as period costs and are charged to profit and loss account for the period for which they are incurred
- ❖ Prices are determined based on marginal costs and contribution margin
- ❖ Profitability of products and departments is determined on the basis of contribution margin

3. How is the profit statement prepared under marginal costing? **[Category B]**

Particulars	Per Unit	Total (XXX Units)
Sales	XXX	XXX
Less: Variable costs	(XXX)	(XXX)
Contribution	**XXX**	**XXX**
Less: Fixed costs		(XXX)
Profit		**XXX**

4. What are the key differences between marginal costing and absorption costing? **[Category A]**

Marginal costing	Absorption costing
Variable costs are considered for product costing and inventory valuation	Fixed and variable costs are considered for production costing and inventory valuation
Fixed costs are considered as period costs	Fixed production costs are charged to the cost of production and hence becomes a product cost
Cost data highlight total contribution of each product	Net profit of each product is determined post subtracting fixed cost as well as variable cost
Difference in the magnitude of opening stock and closing stock does not affect the unit cost of production	Unit cost of production is impacted due to difference in opening and closing stock due to impact of related fixed cost
Cost per unit remains same irrespective of the production	Cost per unit reduces as the production increases due to reduction in fixed cost per unit

5. Show the detailed profitability statement under absorption and marginal costing? **[Category A]**

Income statement under absorption costing:

Particulars	Calculation	Amount
Variable manufacturing costs	Units produced * Cost per unit	XXX
Fixed manufacturing costs (absorbed)	Units produced * OAR	XXX
Cost of production		**XXX**

Add: Opening FG	Units * Cost per unit	XXX
Less: Closing FG	Units * Cost per unit	(XXX)
Cost of goods sold		**XXX**
Variable non-manufacturing costs	Units sold * Cost per unit	XXX
Fixed non-manufacturing costs		XXX
Cost of sales		**XXX**
Add/Less: Under/over absorbed overheads		XXX
Revised cost of sales		**XXX**
Profit (Balancing figure)		XXX
Sales		**XXX**

Income statement under marginal costing:

Particulars	Calculation	Amount
Sales	Units sold * Selling Price	XXX
Less: Variable costs	Note 1	(XXX)
Contribution		**XXX**
Less: Fixed costs	Fixed manufacturing + fixed non-manufacturing costs	XXX
Profit		**XXX**

Working Note 1: Calculation of Variable costs:

Particulars	Calculation	Amount
Variable manufacturing costs	Units produced * Cost per unit	XXX
Add: Opening FG	Units * Cost per unit	XXX
Less: Closing FG	Units * Cost per unit	(XXX)
Variable cost of goods sold		**XXX**
Add: Variable non-manufacturing costs	Units sold * Cost per unit	XXX
Total costs		**XXX**

6.   What are the advantages and limitations of marginal costing? **[Category C]**

Advantages	Limitations
❖ Simplified pricing policy ❖ Proper recovery of overheads ❖ Shows realistic profit ❖ Helps in deciding how much to produce ❖ More control over expenditure ❖ Helps in decision making ❖ Short term profit planning	❖ Difficulty in classifying fixed and variable components ❖ Dependence on key factors ❖ Scope for low profitability ❖ Faulty valuation ❖ Unpredictable nature of cost ❖ Marginal costing ignores time factor and investment ❖ Understating of Work in Process

7.   What is cost-volume profit analysis? **[Category B]**
   ❖ It is a managerial tool showing the relationship between various ingredients of profit planning (cost, volume and profit)
   ❖ Understanding of CVP analysis is extremely useful to management in budgeting and profit planning

8.   What is Profit Volume Ratio? **[Category A]**
   ❖ PVR measures the extent of change in contribution/profit on account of change in sales. Net profit ratio keeps on changing for different sale amounts whereas PVR is constant.
   ❖ PVR is the true indicator of the profitability of the product

PVR = Contribution / sales	**PVR = Change in contribution / Change in sales**
PVR = Contribution per unit / SP	**PVR = Change in profit / change in sales**

9.   What is break-even point? **[Category A]**
   ❖ BEP refers to the sales level at which the company earns no profit and no loss. This can be either expressed in units or rupees.
   ❖ If expressed in units it is called BEP and if expressed in rupees it is called Break even sales.

- ❖ Moreover at BEP, contribution = fixed cost and sales = total cost

BEP in units = Fixed cost / Contribution per unit	BEP in Rs. = Fixed cost / PVR
BEP in Rupees = BEP in units * Selling Price	

10. What is margin of safety (MOS)? **[Category A]**
- ❖ MOS is the difference between the actual sales and break even sales. It is the extent of allowable drop in sales before the company starts incurring losses
- ❖ MOS can be expressed in rupees or in units or as a percentage of total sales

MOS in units = Profit / Contribution per unit	MOS in Rs. = Profit/ PVR
MOS in Rupees = MOS in units * Selling Price	
Sales in rupees = BEP in rupees + MOS in rupees	

11. How break-even point is computed for multiple products? **[Category A]**
- ❖ BEP is computed using fixed cost and PVR/Contribution per unit. However in case of multiple products there will be multiple PVR/Contribution per unit
- ❖ BEP for multiple products (in units) = TFC/Contribution per set. It would be assumed that one set would contain the product mix as given in the question
- ❖ BEP for multiple products (in rupees) = TFC/Composite PVR. Composite PVR would be calculated as overall contribution/overall sales

12. What is shut-down point? [Category B]
- ❖ In case of adverse economic conditions a company might have to make a decision on whether to continue their business or temporarily shut the business unless the demand revives
- ❖ Shut-down point (in units) = $\dfrac{\text{Normal Fixed costs} - (\text{FC during shutdown} + \text{Add. FC for shutdown})}{\text{Contribution per unit}}$

- ❖ Shut-down point (in Rs.)   = Same Numerator / PVR
- ❖ If the expected sales volume is less than the shutdown point then the company should close their business or else continue producing

13. What is break-even chart? **[Category B]**
- ❖ Break-even chart records costs and revenues on the vertical axis and the level of activity on the horizontal axis
- ❖ Lines representing fixed costs, total costs and revenues at maximum level shall be drawn next
- ❖ BEP is the point where the sales revenue line intersects the total cost line. Other measures like MOS and profit can also be measured from the chart

14. What is contribution breakeven chart? **[Category B]**
- ❖ The breakeven chart cannot assess in computing the contribution for any level of activity
- ❖ Under this chart lines representing fixed costs, variable costs, total costs and revenues shall be drawn
- ❖ Contribution can be read as the difference between sales revenue line and variable cost line

15. What is profit-volume chart? **[Category B]**
- ❖ Vertical axis represent profits and losses and the horizontal axis represent level of activity
- ❖ The level of profits and losses are recorded at every level of activity and the point at which zero profit is made is considered as break-even point

16. What is angle of incidence? **[Category A]**
- ❖ Angle of incidence is the intersection of sales line and total line at the break-even point
- ❖ Angle shows the rate at which profit is earned once the break-even point is reached. The wider the angle the greater is the rate of earning profits
- ❖ A larger angle of incidence with a high margin of safety indicates extremely favourable position

17. What are the decisions which can be done with CVP analysis? **[Category B]**
- ❖ Decisions related with excess supply, such as:
  - o Processing of export order
  - o Determination of price for stimulating demand

- o Local versus export sale
- o Determination of minimum price for price quotations
- o Shut-down or continue decision
- ❖ Decisions related with excess demand, such as:
  - o Make or Buy/ in-house processing versus outsourcing
  - o Product mix decision under resource constraints
  - o Sales mix decisions
  - o Sale or further processing

18. What is limiting factor?
- ❖ Limiting factor is one which acts as a bottleneck and limits the company's ability to serve the demand of the external market
- ❖ Limiting factor is a situation where in the demand for the limiting factor is always greater than the supply for the limiting factor
- ❖ **Example:** RM availability, Labour availability, Machine availability

Steps for solving Limiting factor problems:

1. Identify the limiting factor – Limiting factor is one whose demand is more than supply
2. Calculate the contribution per unit of limiting factor and rank the products with maximum contribution being top ranked product

Particulars	Product A	Product B	Product C
Selling Price	XXX	XXX	XXX
Less: Variable cost	(XXX)	(XXX)	(XXX)
Contribution per unit (A)	**XXX**	**XXX**	**XXX**
No. of limiting factors required per unit (B)	XXX	XXX	XXX
Contribution per unit of limiting factor (A/B)	**XXX**	**XXX**	**XXX**
Rank	**XXX**	**XXX**	**XXX**

3. Use the following format for allocation of resources:

Product	No. of units	Units of limiting factor per unit	Limiting factor consumed	Total contribution

1. Basics of Marginal Costing:

Fixed cost	Rs.1,20,000
Variable costs	Rs.3 per unit
Selling price	Rs.7 per unit
Output	50,000 units

Determine the profit for each of the following situation with the above data:

i. With the data above
ii. With a 10% increase in output and sales
iii. With a 10% increase in fixed costs
iv. With a 10% increase in variable costs
v. With a 10% increase in selling price
vi. Taking all the above situations

Answer:

WN 1: Marginal costing statement for original scenario

Particulars	Per unit	Total (50,000 units)
Sales	7	3,50,000
Less: Variable cost	(3)	(1,50,000)
Contribution	**4**	**2,00,000**
Less: Fixed cost		(1,20,000)
Profit		**80,000**

WN 2: Marginal costing statement for scenario (ii), (iii) and (iv):

Particulars	Per unit	Total (55,000 units) Scenario (ii)	Per unit	Total (50,000 units) Scenario (iii)	Per Unit	Total (50,000 units) Scenario (iv)
Sales	7	3,85,000	7	3,50,000	7	3,50,000
Less: Variable cost	(3)	(1,65,000)	(3)	(1,50,000)	(3.3)	(1,65,000)
Contribution	**4**	**2,20,000**	**4**	**2,00,000**	**3.7**	**1,85,000**
Less: Fixed cost		(1,20,000)		(1,32,000)		(1,20,000)
Profit		**1,00,000**		**68,000**		**65,000**

WN 3: Marginal costing statement for scenario (v) and (vi):

Particulars	Per unit	Total (50,000 units) Scenario (v)	Per unit	Total (55,000 units) Scenario (vi)
Sales	7.7	3,85,000	7.7	4,23,500
Less: Variable cost	(3)	(1,50,000)	(3.3)	(1,81,500)
Contribution	**4.7**	**2,35,000**	**4.4**	**2,42,000**
Less: Fixed cost		(1,20,000)		(1,32,000)
Profit		**1,15,000**		**1,10,000**

2. Computation of contribution:

Variable costs	50,000
Fixed costs	20,000
Sales	80,000
Contribution	?

Answer:

Particulars	Per unit	Total
Sales	NA	80,000
Less: Variable cost	NA	(50,000)
Contribution	**NA**	**30,000**
Less: Fixed cost		(20,000)
Profit		**10,000**

3. Computation of contribution per unit:

Sales	20,000

Units produced	2,000 units
Units sold	1,000 units
Variable cost per unit	Rs.14
Contribution per unit	?

Answer:

Particulars	Per unit	Total (1,000 units)
Sales	20	20,000
Less: Variable cost	(14)	(14,000)
Contribution	**6**	**6,000**
Less: Fixed cost		NA
Profit		**NA**

4. Computation of contribution per unit:

Profit earned	Rs.2,000
Fixed cost	Rs.20,000
Sales	Rs.50,000
Units sold	1,000 units
Contribution per unit	?

Answer:

Particulars	Per unit	Total (1,000 units)
Sales	50	50,000
Less: Variable cost	(28)	(28,000)
Contribution	**22**	**22,000**
Less: Fixed cost		(20,000)
Profit		**2,000**

5. Profit Volume Ratio:

The trading results for two period:

Particulars	Sales (Rs.)	Profit (Rs.)
I period	20,000	1,000
II period	10,000	400

Calculate PV Ratio.

Answer:

$$PVR = \frac{\text{Change in Profit}}{\text{Change in sales}} \times 100 = \frac{1,000 - 400}{20,000 - 10,000} \times 100 = \textbf{6}\%$$

6. Computation of PV Ratio:

Sales	1,00,000
Fixed costs	20,000
Variable costs	60,000
PV Ratio	?

Answer:

Particulars	Per unit	Total
Sales	NA	1,00,000
Less: Variable cost	NA	(60,000)
Contribution	NA	**40,000**
Less: Fixed cost		(20,000)
Profit		**20,000**

$$PVR = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{40,000}{1,00,000} \times 100 = \textbf{40}\%$$

7. PV ratio and fixed cost:

Sales (in units)	1,000
Selling price	Rs.25/unit
Variable cost	Rs.10/unit

Profit	Rs.5,000
PV Ratio	?
Fixed cost	?

Answer:

Particulars	Per unit	Total (1,000 units)
Sales	25	25,000
Less: Variable cost	(10)	(10,000)
Contribution	**15**	**15,000**
Less: Fixed cost		(10,000)
Profit		**5,000**

$$PVR = \frac{Contribution}{Sales} \times 100 = \frac{15,000}{25,000} \times 100 = \mathbf{60\%}$$

8. Data for multiple years:

The sales turnover and profit during two years were as follows:

Particulars	1999	2000
Sales (Rs.)	1,50,000	1,70,000
Profit	20,000	25,000

You are required to calculate:
   a) P/V ratio
   b) Break-even point
   c) Sales required to earn a profit of Rs.40,000
   d) Profit made when sales are Rs.2,50,000
   e) Variable costs of the two periods.

Answer:

Particulars	1999	2000
Sales	1,50,000	1,70,000
Less: Variable cost (75% of sales)	(1,12,500)	(1,27,500)
Contribution	37,500	42,500
Less: Fixed cost (b/f)	**(17,500)**	**(17,500)**
Profit	20,000	25,000

Solution:

PVR	$\dfrac{Change\ in\ Profit}{Change\ in\ sales} \times 100 = \dfrac{25,000 - 20,000}{1,70,000 - 1,50,000} \times 100$	25%
BEP	$\dfrac{Fixed\ cost}{PVR} = \dfrac{17,500}{25\%}$	Rs.70,000
Sales to earn profit of 40,000	$\dfrac{Desired\ Profit + Fixed\ cost}{PVR} = \dfrac{40,000 + 17,500}{25\%}$	Rs.2,30,000
Profit when sales is 2,50,000	$(Sales \times PVR) - Fixed\ Cost = (2,50,000 \times 25\%) - 17,500$	Rs.45,000
Variable cost of two periods	Variable cost of 1999 = 1,50,000 x 75% Variable cost of 2000 = 1,70,000 x 75%	Rs.1,12,500 Rs.1,27,500

9. Break-even Point:

Financial information of a company is as under:

Particulars	Amount
Materials	200
Labour	100
Variable expenses	50
Fixed expenses	7,50,000
Total cost	42,50,000
Profit	100
Selling price	Rs.525

Compute the following:
   a) Break-even point
   b) If sale price is reduced by Rs.25 how many more units must be produced and sold to realize the same profit as at present?

Answer:
WN 1: Marginal costing statement

Particulars	Per unit	Total (10,000 units)	Per unit	Total (X units)
Sales	525	52,50,000	500	500X
Less: Variable cost	(350)	(35,00,000)	(350)	(350X)
Contribution	**175**	**17,50,000**	**150**	**150X**
Less: Fixed cost		(7,50,000)		(7,50,000)
Profit		**10,00,000**		**150X – 7,50,000**

WN 2: Computation of BEP:

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{7,50,000}{175}$	4,286 units
PVR	$\dfrac{\text{Contribution}}{\text{sales}} \times 100 = \dfrac{17,50,000}{52,50,000} \times 100$	33.33%
BEP in Rs.	$\dfrac{\text{Fixed cost}}{\text{PVR}} = \dfrac{7,50,000}{33.333333\%}$	Rs.22,50,000
BEP in Rs.	BEP in units x SP = 4,286 units x 525	Rs.22,50,150

WN 3: Computation of number of units to realize the same profit:
- Let us assume the number of units to be X
- Profit as per statement = 150X – 7,50,000
- Target profit = 10,00,000
- 150X – 7,50,000 = 10,00,000
- X = 11,667 units
- The company should sell additional 1,667 units to make the same amount of profit as at present

10. BEP and Profit computation:

I.M.Chappell factory manufacturing Sewing Machine has the capacity to produce 500 machines per annum. The Marginal (variable) cost of each machine is Rs.200 and each machine are sold for Rs.250. Fixed overheads are Rs.12,000 per annum. Calculate the break-even points for output and sales and show what profit will result if output is 90% of capacity?

Answer:
WN 1: Marginal costing statement at full capacity:

Particulars	Per unit	Total (500 units)
Sales	250	1,25,000
Less: Variable cost	(200)	(1,00,000)
Contribution	**50**	**25,000**
Less: Fixed cost		(12,000)
Profit		**13,000**

WN 2: Computation of BEP and profit at 90% capacity

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{12,000}{50}$	240 units
BEP in Rs.	BEP in units x SP = 240 units x 250	Rs.60,000
Profit at 90% capacity	(Units sold x Contribution per unit) − Fixed Cost (450 x 50) − 12,000	Rs.10,500

11. Computation of BEP:

From the following data, calculate breakeven point express in terms of units and also the new B.E.P. if selling price is reduced by 10%:
- Fixed expenses: Depreciation Rs.1,00,000   Salaries Rs.1,00,000
- Variable Expenses: MaterialsRs.3 per unit Labour Rs.2 per unit
- Selling Price Rs.10 per unit

Answer:

Original BEP (in units)	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} =$	$\dfrac{1,00,000 + 1,00,000}{10 - 3 - 2}$	40,000 units
Revised BEP (in units)	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} =$	$\dfrac{1,00,000 + 1,00,000}{9 - 3 - 2}$	50,000 units

12. BEP for multiple products:

Dennis Lillee engineering limited manufacture and sells four products – A, B, C and D. The sales mix in value comprises 33.33%, 41.67%, 16.67% and 8.33% of A, B, C and D respectively.

- The total budgeted sales are Rs.60,000 per month.
- The VC for A is 60% of the selling price, B – 68% of the selling price, C -80% of the selling price and D-40% of the selling price.
- Fixed costs are Rs.14,700 per month.

Calculate the BEP for the enterprise as a whole.

Answer:

Marginal costing statement:

Particulars	A	B	C	D	Total
Sales	20,000	25,000	10,000	5,000	60,000
Less: Variable cost	(12,000)	(17,000)	(8,000)	(2,000)	(39,000)
Contribution	**8,000**	**8,000**	**2,000**	**3,000**	**21,000**
Less: Fixed cost					(14,700)
Profit					**6,300**

Composite PVR	$\dfrac{\text{Total Contribution}}{\text{Total sales}}$ x 100 $= \dfrac{21,000}{60,000}$ x 100	**35%**
Break-even point (Month)	$\dfrac{\text{Fixed cost}}{\text{PVR}} = \dfrac{14,700}{35\%}$	**42,000**

13. Computation of Break-even Point:

Gilmour Ltd. has an installed capacity of 5,000 tractors per annum. They are presently operating at about 35% of installed capacity. For the coming year, they have budgeted as follows:

Particulars	Amount
Production/sales	4,000 units
Direct material	Rs.8 crores
Direct wages	Rs.0.60 crores
Factory expenses	Rs.0.80 crores
Administrative expenses	Rs.0.20 crores
Selling expenses	Rs.0.20 crores
Profit	Rs.1 crore

Factory expenses as well as selling expenses are variable to the extent of 20%. Calculate BEP?

Answer:

WN 1: Computation of variable cost per unit and total fixed cost:

Particulars	Variable cost	Fixed cost
Direct material	8,00,00,000	
Direct wages	60,00,000	
Factory expenses	16,00,000	64,00,000
Admin expenses	-	20,00,000
Selling expenses	4,00,000	16,00,000
Total cost	**8,80,00,000**	**1,00,00,000**
No of units	4,000	
Cost per unit	**22,000**	

WN 2: Marginal costing statement:

Particulars	Per unit	Total (4,000 units)
Sales	27,000	10,80,00,000
Less: Variable cost	(22,000)	(8,80,00,000)

Contribution	5,000	2,00,00,000
Less: Fixed cost		(1,00,00,000)
Profit		**1,00,00,000**

WN 3: Computation of BEP

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}}=$	$\dfrac{1,00,00,000}{5,000}$	2,000 units
BEP in Rs.	BEP in units x SP = 2,000 units x 27,000		Rs.5,40,00,000

14. **Margin of Safety:**

Selling price per unit Rs.5; Variable cost per unit Rs.3; Units sold 2000 and FC is 3000. Find (a) Margin of safety and (b) Number of units to be sold for a profit of Rs.2,000

Answer:

WN 1: Marginal costing statement:

Particulars	Per unit	Total (2,000 units)
Sales	5	10,000
Less: Variable cost	(3)	(6,000)
Contribution	**2**	**4,000**
Less: Fixed cost		(3,000)
Profit		**1,000**

WN 2: Computation of MOS and sales to earn profit of Rs.2,000:

MOS in units	$\dfrac{\text{Profit}}{\text{Contribution per unit}}=$	$\dfrac{1,000}{2}$	500 units
MOS in rupees	MOS in units x SP = 500 units x 5		Rs.2,500
Sales to earn profit of Rs.2,000	$\dfrac{\text{Desired Profit + Fixed cost}}{\text{Contribution per unit}}=$	$\dfrac{2,000+3,000}{2}$	2,500 units (or) Rs.12,500

15. **Calculation of capacity sales:**

The ratio of variable cost to sales is 70%. The break-even point occurs at 60% of the capacity sales. Find the capacity sales when fixed costs are Rs. 90,000. Also compute profit at 75% of the capacity sales.

Answer:

PVR	100% − 70%	30%
BEP (in Rs)	$\dfrac{\text{Fixed cost}}{\text{PVR}}=\dfrac{90,000}{30\%}$	Rs.3,00,000
Capacity sales (in Rs.)	BEP = 60% of capacity sales 3,00,000 = 60% of CS $CS=\dfrac{3,00,000}{60\%}$	Rs.5,00,000
Profit at 75% CS	(Sales x PVR) − Fixed Cost = (3,75,000 x 30%) − 90,000	Rs.22,500

16. **BEP analysis:**

A Chinese soft drink company is planning to establish a subsidiary company in India to produce mineral water. Based on the estimated annual sales of 40,000 bottles of the mineral water, cost studies produced the following estimates for the Indian subsidiary:

Particulars	Total annual costs	Percent of total annual cost which is variable
Material	2,10,000	100%
Labour	1,50,000	80%
Factory overheads	92,000	60%
Administration expenses	40,000	35%

The Indian production will be sold by manufacturer's representatives who will receive a commission of 8% of the sale price. No portion of the Chinese office expenses is to be allocated to the Indian subsidiary. You are required to

(i)   Compute the sale price per bottle to enable the management to realize an estimated 10% profit on sale proceeds in India.

(ii)   Calculate the break-even point in Rupee sales as also in number of bottles for the Indian subsidiary on the assumption that the sale price is Rs. 14 per bottle.

Answer:

WN 1: Computation of variable cost per unit and total fixed cost:

Particulars	Variable cost	Fixed cost
Direct material	2,10,000	0
Direct Labour	1,20,000	30,000
Factory overheads	55,200	36,800
Admin overheads	14,000	26,000
Total cost excluding commission	**3,99,200**	**92,800**
No of units	40,000	
Cost per unit	**9.98**	

WN 2: Computation of selling price to earn profit of 10% on sale proceeds:

Let us assume selling price to be X

Particulars	Per unit	Total (40,000 units)
Sales	X	40,000X
Less: Variable cost	(9.98)	(3,99,200)
Less: Commission	(0.08X)	(3,200X)
Contribution	**0.92X – 9.98**	**36,800X – 3,99,200**
Fixed cost		(92,800)
Profit		**36,800X – 4,92,000**

- Profit as per marginal cost statement = 36,800X – 4,92,000
- Target profit = 10% of sales = 10% x 40,000X = 4,000X
- 36,800X – 4,92,000 = 4,000X
- 32,800X = 4,92,000
- **X = Rs.15 per unit**

WN 3: Computation of BEP in units as well as in rupees:

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{92,800}{14 - 9.98 - 1.12}$	**32,000 units**
BEP in Rs.	BEP in units x SP = 32,000 units x 14	**Rs.4,48,000**

17. Sales to achieve desired profit before and after tax:

Unit selling price –Rs.10. Marginal cost –Rs.6. Fixed cost Rs.10,000. What should be the sales for a desired profit of Rs.60,000 a. before tax and b. after 40% tax.

Answer:

Sales to achieve desired PBT of Rs.60,000

$$\text{Sales} = \frac{\text{Desired Profit} + \text{Fixed cost}}{\text{Contribution per unit}} = \frac{60,000 + 10,000}{10 - 6} = \textbf{17,500 units (or)Rs. 1,75,000}$$

Sales to achieve desired PAT of Rs.60,000

$$\text{Desired PBT} = \frac{\text{Desired PAT}}{1 - \text{Tax}} = \frac{60,000}{1 - 0.4} = \textbf{Rs. 1,00,000}$$

$$\text{Sales} = \frac{\text{Desired Profit} + \text{Fixed cost}}{\text{Contribution per unit}} = \frac{1,00,000 + 10,000}{10 - 6} = \textbf{27,500 units (or)Rs. 2,75,000}$$

18. Impact of change on PVR

By noting "P/V will increase or P/V will decrease or P/V will not change", as the case may be, state how the following independent situations will affect the P/V ratio:

(i)   An increase in the physical sales volume;

(ii)   An increase in the fixed cost;

(iii)   A decrease in the variable cost per unit;

(iv)   A decrease in the contribution margin;

(v)   An increase in selling price per unit;

(vi)   A decrease in the fixed cost;
(vii)   A 10% increase in both selling price and variable cost per unit;
(viii) A 10% increase in the selling price per unit and 10% decrease in the physical sales volume;
(ix)   A 50% increase in the variable cost per unit and 50% decrease in the fixed cost.
(x)   An increase in the angle of incidence.

Answer:

Base scenario:

- Let us assume a base scenario to identify the impact on PVR for multiple categories
- SP = Rs.20 per unit; VC per unit = Rs.12 per unit; Total fixed cost = Rs.80,000; No of units sold = 25,000

Particulars	Per unit	Total (25,000 units)
Sales	20	5,00,000
Less: Variable cost	(12)	(3,00,000)
Contribution	**8**	**2,00,000**
Less: Fixed cost		(80,000)
Profit		**1,20,000**
PVR		**40%**

Scenario 1 – Increase in physical sales volume

Let us assume the units sold to increase to 30,000 units

Particulars	Per unit	Total (30,000 units)
Sales	20	6,00,000
Less: Variable cost	(12)	(3,60,000)
Contribution	**8**	**2,40,0000**
Less: Fixed cost		(80,000)
Profit		**1,60,000**
PVR		**40%**

PVR will not be impacted because of increase in physical sales volume

Scenario 2 – Increase in fixed cost:

Let us assume fixed cost increases to Rs.90,000

Particulars	Per unit	Total (25,000 units)
Sales	20	5,00,000
Less: Variable cost	(12)	(3,00,000)
Contribution	**8**	**2,00,000**
Less: Fixed cost		(90,000)
Profit		**1,10,000**
PVR		**40%**

PVR will not be impacted because of increase in fixed cost

Scenario 3 – Decrease in variable cost per unit

Let us assume variable cost per unit reduced to Rs.10 per unit

Particulars	Per unit	Total (25,000 units)
Sales	20	5,00,000
Less: Variable cost	(10)	(2,50,000)
Contribution	**10**	**2,50,000**
Less: Fixed cost		(80,000)
Profit		**1,70,000**
PVR		**50%**

PVR will increase because of decrease in variable cost per unit

Scenario 4 – Decrease in contribution margin:

Let us assume contribution margin has reduced to Rs.6 per unit due to fall in selling price

Particulars	Per unit	Total (25,000 units)
Sales	18	4,50,000
Less: Variable cost	(12)	(3,00,000)
Contribution	**6**	**1,50,000**
Less: Fixed cost		(80,000)
Profit		**70,000**
PVR		**33.33%**

PVR will decrease due to decrease in contribution margin

Scenario 5 – Increase in selling price per unit:
Let us assume selling price has been increased to Rs.22 per unit

Particulars	Per unit	Total (25,000 units)
Sales	22	5,50,000
Less: Variable cost	(12)	(3,00,000)
Contribution	**10**	**2,50,000**
Less: Fixed cost		(80,000)
Profit		**1,70,000**
PVR		**45.45%**

PVR will increase due to increase in selling price per unit

Scenario 6 – Decrease in fixed cost:
Let us assume fixed cost has decreased to Rs.70,000

Particulars	Per unit	Total (25,000 units)
Sales	20	5,00,000
Less: Variable cost	(12)	(3,00,000)
Contribution	**6**	**2,00,000**
Less: Fixed cost		(70,000)
Profit		**1,30,000**
PVR		**40%**

PVR will not be impacted due to decrease in fixed cost

Scenario 7 – 10% increase in both selling price and variable cost per unit:

Particulars	Per unit	Total (25,000 units)
Sales	22	5,50,000
Less: Variable cost	(13.2)	(3,30,000)
Contribution	**8.8**	**2,20,000**
Less: Fixed cost		(80,000)
Profit		**1,40,000**
PVR		**40%**

PVR will not be impacted due to same percentage increase in selling price and variable cost per unit

Scenario 8 – 10% increase in selling price and 10% decrease in physical sales volume:

Particulars	Per unit	Total (22,500 units)
Sales	22	4,95,000
Less: Variable cost	(12)	(2,70,000)
Contribution	**10**	**2,25,000**
Less: Fixed cost		(80,000)
Profit		**1,45,000**
PVR		**45.45%**

PVR will increase due to increase in selling price with decrease in physical sales volume

Scenario 9 – 50% increase in variable cost per unit and 50% decrease in fixed cost:

Particulars	Per unit	Total (25,000 units)
Sales	20	5,00,000
Less: Variable cost	(18)	(4,50,000)
Contribution	**2**	**50,000**
Less: Fixed cost		(40,000)
Profit		**10,000**
PVR		**10%**

PVR will decrease due to 50% increase in variable cost per unit

Scenario 10 – Increase in the angle of incidence:
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. Increase in angle of incidence will lead to higher PVR.

19. Cost reduction
PQR Ltd. has furnished the following data for the two years:

Particulars	2011	2012
Sales	Rs.8,00,000	?
PVR	50%	37.5%
MOS as % of total sales	40%	21.875%

There has been substantial savings in the fixed cost in the year 2012 due to the restructuring process. The company could maintain its sales quantity level of 2011 in 2012 by reducing selling price.
You are required to calculate the following:
    (i)   Sales for 2012 in Rs.
    (ii)   Fixed cost for 2012
    (iii)   Break-even sales for 2012 in Rupees
Answer:
Marginal costing statement:

Particulars	2011	2012
Sales	8,00,000	6,40,000
Less: Variable cost	(4,00,000)	(4,00,000)
Contribution	**4,00,000**	**2,40,000**
Less: Fixed cost	(2,40,000)	(1,87,500)
Profit	**1,60,000**	**52,500**

Notes:
- Contribution of 2011 = 8,00,000 x 50% = 4,00,000
- MOS (in rupees) of 2011 = 8,00,000 x 40% = 3,20,000
- Profit of 2011 = MOS x PVR = 3,20,000 x 50% = 1,60,000
- Variable cost of 2012 would be equal to variable cost of 2011 as the company has maintained the same sales quantity
- **PVR of 2012 is 37.5%. This would mean that variable cost is 62.5% of sales. Sales of 2012 = (4,00,000/62.5%) = Rs.6,40,000**
- MOS (in rupees) of 2012 = 6,40,000 x 21.875% = 1,40,000
- Profit of 2012 = MOS x PVR = 1,40,000 x 37.5% = 52,500

Final solution:
- Sale for 2012 = Rs.6,40,000
- Fixed cost for 2012 = Rs.1,87,500
- Break-even sales for 2012 = 6,40,000 – 1,40,000 = Rs.5,00,000

20. Units to maintain same profit
A single product company sells its product at Rs. 60 per unit. In 2010, the company operated at a margin of safety of 40%. The fixed costs amounted to Rs. 3,60,000 and the variable cost ratio to sales

was 80%. In 2011, it is estimated that the variable cost will go up by 10% and the fixed cost will increase by 5%.

- Find the selling price required to be fixed in 2011 to earn the same P/V ratio as in 2010.
- Assuming the same selling price of Rs. 60 per unit in 2011, find the number of units required to be produced and sold to earn the same profit as in 2010.

Answer:
WN 1: Marginal costing statement for 2010:

Particulars	Per unit	Total
Sales	60	30,00,000
Less: Variable cost	-48	(24,00,000)
Contribution	**12**	**6,00,000**
Less: Fixed cost		(3,60,000)
Profit		**2,40,000**

Note:

- Break-even point = (Fixed cost/PVR) = (3,60,000/20%) = Rs.18,00,000
- MOS is 40% and hence BEP will be 60%
- **Sales = 18,00,000/60% = Rs.30,00,000**

WN 2: Computation of selling price in 2011 to earn same PVR:

- Variable cost increases by 10% and hence variable cost per unit will increase from Rs.48 to Rs.52.8 per unit
- Company wants to maintain same PVR and hence variable cost should continue to be 80% of sales
- **New selling price = (52.8/80%) = Rs.66 per unit**

WN 3: Computation of units to be sold to earn same amount of profit:

Sales to achieve desired profit	$\frac{\text{Desired Profit + Fixed cost}}{\text{Contribution per unit}} = \frac{2,40,000 + 3,78,000}{60 - 52.8}$	85,833 units

21. BEP for multiple products:

A company sells two products, J and K. The sales mix is 4 units of J and 3 units of K. The contribution margins per unit are Rs.40 per J and Rs.20 for K. Fixed costs are Rs.6,16,000 per month. Compute the break-even point?

Answer:

- This is a problem on multiple products and the sales mix is given in terms of units
- Let us assume one set contains 4 units of J and 3 units of K
- **Contribution per set of JK = (4 x 40) + (3 x 20) = Rs.220 per set**

BEP in units (Month)	$\frac{\text{Fixed cost}}{\text{Contribution per set}} = \frac{6,16,000}{220}$	**2,800 sets**
BEP of J	2,800 sets x 4	**11,200 units**
BEP of K	2,800 sets x 3	**8,400 units**

22. Sales to maintain desired profit and MOS:

Maxim Limited 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:

Particulars	Amount
Sales revenues	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 manager of Maxim Limited. As per the forecast, price of direct material and variable overhead will be increased by 10% and 5% respectively.

Required to calculate:

- Number of units to be sold to maintain the same quantum of profit that made in August 2014

- Margin of safety in the month of August 2014 and September 2014

Answer:
WN 1: Marginal costing statement of August 2014

Particulars	Per unit	Total (14,000 units)
Sales	18	2,52,000
Less: Variable cost	(14)	(1,96,000)
Contribution	**4**	**56,000**
Less: Fixed cost		(28,000)
Profit		**28,000**

Note:
- Material cost per unit = (1,12,000/14,000) = Rs.8 per unit
- Labour cost per unit = (49,000/14,000) = Rs.3.50 per unit
- Variable overheads per unit = (35,000/14,000) = Rs.2.50 per unit
- **Cost per unit = 8 + 3.50 + 2.50 = Rs.14 per unit**

WN 2: Computation of number of units to be sold to maintain the same quantum of profit:

Sales to achieve desired profit	$\dfrac{\text{Desired Profit + Fixed cost}}{\text{Contribution per unit}} = \dfrac{28{,}000 + 28{,}000}{18 - (8 \times 1.10) - 3.50 - (2.50 \times 1.05)}$	18,212 units

WN 3: Computation of margin of safety:

Particulars	August 2014	September 2014
Fixed cost	28,000	28,000
Contribution per unit	4	3.075
Break-even point	7,000	9,106
Units sold	14,000	18,212
Margin of safety (in units)	7,000	9,106
Selling Price	18	18
Margin of safety (in rupees)	**1,26,000**	**1,63,908**

23. BEP of multiple products

XY Ltd. makes two products X and Y, whose respective fixed costs are F1 and F2. You are given that the unit contribution of Y is one-fifth less than the unit contribution of X, that the total of F1 and F2 is Rs. 1,50,000, that the BEP of X is 1,800 units (for BEP of X F2 is not considered) and that 3,000 units is the indifference point between X and Y (i.e. X and Y make equal profits at 3,000 unit volume, considering their respective fixed costs). There is no inventory buildup as whatever is produced is sold.

- Find out the values F1 and F2 and unit contributions of X and Y.
- Calculate the break-even point of the company if the proposed sales mix is 2:3 and the products operate at 40% and 25% PVR.

Answer:
WN 1: Computation of F1 and F2 and contribution of products:
- Let us assume C1 and C2 to be the unit contribution of X and Y
- Unit contribution of Y is 1/5th less than unit contribution of X and hence **C2 = 0.8C1**
- **F1 + F2 = 1,50,000**
- BEP of X= (Fixed cost (F1)/Contribution per unit(C1))
- 1,800 = (F1/C1); **F1 = 1,800C1**

Indifference Point $= \dfrac{\text{Change in fixed cost}}{\text{Change in contribution per unit}}$
$3{,}000 = \dfrac{F1 - F2}{C1 - C2}; 3{,}000 = \dfrac{F1 - F2}{C1 - 0.8C1}; \mathbf{600C1 = F1 - F2}$

Solving equations:

F1 + F2 = 1,50,000 …………Equation 1
F1 – F2 = 600C1 ……………Equation 2
Adding both equations:
2F1 = 1,50,000 + 600C1

$2(1,800C_1) = 1,50,000 + 600C_1$ $3,000C_1 = 1,50,000$
C_1 = Rs.50 per unit
C_2 = 0.8 (50) = Rs.40 per unit
F_1 = 1,800 x 50 = Rs.90,000
F_2 = 1,50,000 – 90,000 = Rs.60,000

WN 2: Computation of Break-even point:
- Total Fixed Cost = Rs.1,50,000
- Contribution of X = Rs.50 per unit
- Contribution of Y = Rs.40 per unit

Alternative 1 – It is assumed that 2:3 is mix for units sold:
- Let us assume one set contains 2 units of X and 3 units of Y
- **Contribution per set of XY = (2 x 50) + (3 x 40) = Rs.220 per set**

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per set}} = \dfrac{1,50,000}{220}$	**681.82 sets**
BEP of X	681.82 x 2	**1,364 units**
BEP of Y	681.82 x 3	**2,045 units**

Alternative 2 – It is assumed that 2:3 mix is for value of units sold:

$$\text{Composite PVR} = \frac{(40\% \times 2) + (25\% \times 3)}{(2 + 3)} = 31\%$$

BEP in rupees	$\dfrac{\text{Fixed cost}}{\text{PVR}} = \dfrac{1,50,000}{31\%}$	**Rs.4,83,871**
BEP of X	4,83,871 x (2/5)	**Rs.1,93,548**
BEP of Y	4,83,871 x (3/5)	**Rs.2,90,323**

24. Computation of break-even point:

The following information was obtained from the records of a manufacture unit:

Particulars	Amount	Amount
Sales 80,000 units @ Rs.25		20,00,000
Material consumed	8,00,000	
Variable overheads	2,00,000	
Labour charges	4,00,000	
Fixed overheads	3,60,000	17,60,000
Net Profit		2,40,000

Calculate:
- The number of units by selling which the company will neither lose nor gain anything
- The sales needed to earn a profit of 20% on sales
- The extra units which should be sold to obtain the present profit if it is proposed to reduce the selling price by 20% and 25%
- The selling price to be fixed to bring down its Break-even Point to 10,000 units under present conditions

Answer:
WN 1: Marginal costing statement:

Particulars	Per unit	Total (80,000 units)
Sales	25.00	20,00,000
Less: Variable cost	(17.50)	(14,00,000)
Contribution	**7.50**	**6,00,000**
Less: Fixed cost		(3,60,000)
Profit		**2,40,000**

WN 2: Computation of BEP:

BEP (in units)	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{3,60,000}{7.50}$	48,000 units

WN 3: Computation of sales needed to earn profit of 20% on sales:

Let us assume that no of units to be assumed as X

Particulars	Per unit	Total
Sales	25.00	25X
Less: Variable cost	(17.50)	(17.50X)
Contribution	**7.50**	**7.50X**
Less: Fixed cost		(3,60,000)
Profit		**7.50X – 3,60,000**

- Profit as per marginal costing statement = 7.5X – 3,60,000
- Target profit = 20% of 25X = 5X
- 7.5X – 3,60,000 = 5X
- 2.5X = 3,60,000; X = 3,60,000/2.50 = 1,44,000 units
- **Sales needed to earn profit of 20% = 1,44,000 x 25 = Rs.36,00,000**

WN 4: Computation of extra units to be sold to earn same profit if company proposes to reduce selling price by 20% and 25%:

Selling price reduced by 20%:

Particulars	Per unit	Total
Sales	20.00	20X
Less: Variable cost	(17.50)	(17.50X)
Contribution	**2.50**	**2.50X**
Less: Fixed cost		(3,60,000)
Profit		**2.50X – 3,60,000**

- Profit as per marginal costing statement = 2.5X – 3,60,000
- Target profit = 2,40,000
- 2.5X – 3,60,000 = 2,40,000
- 2.5X = 6,00,000; X = 6,00,000/2.50 = 2,40,000 units
- Units presently sold = 80,000 units
- Extra units to be sold to earn same profit = 2,40,000 – 80,000 = 1,60,000 units

Selling price reduced by 25%:

Particulars	Per unit	Total
Sales	18.75	18.75X
Less: Variable cost	(17.50)	(17.50X)
Contribution	**1.25**	**1.25X**
Less: Fixed cost		(3,60,000)
Profit		**1.25X – 3,60,000**

- Profit as per marginal costing statement = 1.25X – 3,60,000
- Target profit = 2,40,000
- 1.25X – 3,60,000 = 2,40,000
- 1.25X = 6,00,000; X = 6,00,000/1.25; X = 4,80,000 units
- Units presently sold = 80,000 units
- Extra units to be sold to earn same profit = 4,80,000 – 80,000 = 4,00,000 units

WN 5: Computation of selling price to bring the BEP down to 10,000 units:

BEP in units $= \dfrac{\text{Fixed cost}}{\text{Contribution per unit}}$
$10,000 = \dfrac{3,60,000}{\text{Contribution per unit}}$
Contribution per unit $= \dfrac{3,60,000}{10,000}$
Contribution per unit = Rs.36
Selling price = VC per unit + Contribution per unit
Selling price = 17.50 + 36 = Rs.53.50 per unit

25. Computation of revised PVR/BEP/MOS:

Maryanne Petrochemicals Limited is operating at 80% capacity and presents the following information:

Particulars	Amount
Break-even sales	Rs.400 Crores
PVR	30%
Margin of Safety	Rs.120 Crores

Maryanne's management has decided to increase production to 95% capacity level with the following modifications:

    i. The selling price will be reduced by 10%
    ii. The variable cost will be increased by 2% on sales
    iii. The fixed costs will increase by Rs.50 crores, including depreciation on additions, but excluding interest on additional capital

Additional capital of Rs.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 Rs.20 crores over and above the present profit and also meet 15% interest on the additional capital

    ii. What will be the revised?
        o Break-even sales
        o PV Ratio
        o Margin of Safety

Answer:

WN 1: Marginal costing income statement:

Particulars	Calculation	Amount (in crores)
Sales	400 + 120	520
Less: Variable cost	520 x 70%	(364)
Contribution		156
Less: Fixed cost	Bal figure	(120)
Profit	120 x 30%	36

WN 2: Computation of sales to achieve desired profit:

- Variable cost will be increased by 2 percent on sales. This would mean that variable cost ratio will increase from 70% to 72%
- PVR of the company will decline from 30% to 28%
- Fall in selling price is already considered in increase in variable cost ratio and hence the same will not have any additional impact
- Revised fixed cost = 120 Crores + 50 Crores + (100 crores x 15%) = 185 Crores
- Target profit = 36 Crores + 20 Crores = 56 Crores

Sales to achieve desired profit	$\dfrac{\text{Desired Profit + Fixed cost}}{\text{PVR}} = \dfrac{56 \text{ Cr} + 185 \text{ Cr}}{28\%}$	Rs.860.71 Crores

WN 3: Computation of revised Break-even sales, PVR and MOS:

Break-even sales	$\dfrac{\text{Fixed cost}}{\text{PVR}} = \dfrac{185 \text{ Cr}}{28\%}$	Rs.660.71 Crores
PVR	WN 2	28%
MOS	860.71 – 660.71	Rs.200 Crores

26. Computation of Break-even Point:

From the following data of K.J.Hughes Ltd. Calculate the break-even point :

Selling price per unit	Rs.20
Direct material cost per unit	Rs.8
Direct Labour cost per unit	Rs.2
Direct expenses per unit	Rs.2
Overheads per unit	Rs.3
Fixed overheads (total)	20,000

If Sales are 20% above Breakeven point, find Net Profit.

Answer:
Computation of BEP and net profit:

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{20,000}{20 - 8 - 2 - 2 - 3}$	**4,000 units**
BEP in Rs.	BEP in units x SP = 4,000 units x 20	**Rs.80,000**
Profit if sales is 20% above BEP	(Units sold x Contribution per unit) − Fixed Cost (4,800 x 5) − 20,000	**Rs.4,000**

27. **Computation of BEP and Cash BEP:**

A company is producing an identical product in two factories. The following are the details in respect of both factories:

Particulars	Factory X	Factory Y
Selling price per unit	50	50
Variable cost per unit	40	35
Fixed cost	2,00,000	3,00,000
Depreciation included in above fixed cost	40,000	30,000
Sales in units	30,000	20,000
Production capacity (units)	40,000	30,000

You are required to determine:
   i.   Break even point (BEP) for each factory individually
   ii. Cash break even point for each factory individually
   iii. BEP for company as a whole, assuming the present product mix is in sales ratio
   iv. Consequence on profit and BEP if product mix is changed to 2:3 and total demand remain same

Answer:
WN 1: Computation of Break-even point and Cash break-even point:

Particulars	Factory X	Factory Y
Fixed cost	2,00,000	3,00,000
Contribution per unit	10	15
Break-even point (FC/CPU)	**20,000**	**20,000**
Cash Fixed cost	1,60,000	2,70,000
Contribution per unit	10	15
Cash Break-even point (CFC/CPU)	**16,000**	**18,000**

WN 2: Computation of BEP if the sales mix is in sales ratio (3:2):
   • Let us assume one set contains 3 units from factory X and 2 units from Factory Y
   • Contribution per set = (3 x 10) + (2 x 15) = Rs.60 per set

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per set}} = \dfrac{5,00,000}{60}$	**8,333.33 sets**
BEP of Factory X	8,333.33 x 3	**25,000 units**
BEP of factory Y	8,333.33 x 2	**16,667 units**
Total BEP		**41,667 units**

WN 3: Computation of revised BEP if sale mix is altered to 2:3:
   • Let us assume one set contains 2 units from factory X and 3 units from Factory Y
   • Contribution per set = (2x 10) + (3 x 15) = Rs.65 per set

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per set}} = \dfrac{5,00,000}{65}$	**7,692.31 sets**
BEP of Factory X	7,692.31 x 2	**15,385 units**
BEP of factory Y	7,692.31 x 3	**23,077 units**
Total BEP		**38,462 units**
Decrease in BEP	41,667 – 38,462	**3,205 units**

WN 4: Impact on profit with change in mix:

Particulars	Existing	Revised
Units from factory X sold	30,000	20,000
Units from factory Y sold	20,000	30,000
Total contribution		

[30,000 x10 + 20,000 x 15]	6,00,000	
[20,000 x10 + 30,000 x 15]		6,50,000
Less: Fixed cost	(5,00,000)	(5,00,000)
Profit	1,00,000	1,50,000

28. MOS and sales to achieve desired profit

A company produces single product which sells for Rs. 20 per unit. Variable cost is Rs. 15 per unit and Fixed overhead for the year is Rs. 6,30,000.

Required:

(a) Calculate sales value needed to earn a profit of 10% on sales.

(b) Calculate sales price per unit to bring BEP down to 1,20,000 units.

(c) Calculate margin of safety sales if profit is Rs.6,000

Answer:

WN 1: Computation of sales value to earn a profit of 10% on sales:

Let us assume units sold to be X

Particulars	Per unit	Total
Sales	20	20X
Less: Variable cost	-15	-15X
Contribution	**5**	**5X**
Less: Fixed cost		(6,30,000
Profit		**5X – 6,30,000**

- Profit as per marginal costing statement = 5X – 6,30,000
- Target profit = 10% of sales = 10% of 20X = 2X
- 5X – 6,30,000 = 2X; 3X = 6,30,000; X = 2,10,000 units
- **Units to be sold = 2,10,000 units**
- **Value of sales = 2,10,000 x 20 = Rs.42,00,000**

WN 2: Computation of selling price to bring BEP down to 1,20,000 units:

$\text{BEP in units} = \dfrac{\text{Fixed cost}}{\text{Contribution per unit}}$
$1,20,000 = \dfrac{6,30,000}{\text{Contribution per unit}}$
$\text{Contribution per unit} = \dfrac{6,30,000}{1,20,000}$
Contribution per unit = Rs.5.25
Selling price = VC per unit + Contribution per unit
Selling price = 15 + 5.25 = Rs.20.25 per unit

WN 3: Computation of Margin of Safety:

MOS (in units)	$\dfrac{\text{Profit}}{\text{Contribution per unit}} = \dfrac{6,000}{5}$	**1,200 units**
MOS (in rupees)	1,200 units x 20	**Rs.24,000**

29. Calculation of PVR and BEP

The following information is given by Z Limited:

Margin of Safety	Rs.1,87,500
Total cost	Rs.1,93,750
Margin of safety	75%

Compute profit, PVR, BEP sales in rupees and fixed cost

Answer:

- MOS (in rupees) is equal to Rs.1,87,500. MOS (in %) is equal to 75%. This would mean that total sales are equal to (1,87,500/75%) = Rs.2,50,000
- **Profit = Total sales – Total cost = 2,50,000 – 1,93,750 = Rs.56,250**
- **PVR = (Profit/MOS) = (56,250/1,87,500) x 100 = 30%**
- **BEP in rupees = Total sales – MOS = 2,50,000 – 1,87,500 = Rs.62,500**
- **Fixed cost = BEP x PVR = 62,500 x 30% = Rs.18,750**

30. **Sales to achieve desired profit and BEP:**

SK Limited is engaged in the manufacture of tyres. Analysis of income statement indicated a profit of Rs.150 lacs on a sales volume of 50,000 units. The fixed costs are Rs.850 lacs which appears to be high. Existing selling price is Rs.3,400 per unit. The company is considering to revise the profit target to Rs.350 lacs. 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 (iii) above, if a reduction of 8% in the variable costs and Rs.85 lacs in the fixed cost is envisaged.

Answer:
Marginal costing statement:

(in lacs)

Particulars	Original		Scenario (iii)	
	Per unit	Total (50,000 units)	Per unit	Total (45,000 units)
Sales	3,400	1,700	3,910	1,759.50
Less: Variable cost	(1,400)	(700)	(1,400)	(630.00)
Contribution	**2,000**	**1000**	**2,510**	**1,129.50**
Less: Fixed cost		(850)		(850)
Profit		**150**		**279.50**

Note:

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{850 \text{ lacs}}{2,000}$	42,500 units
BEP in Rupees	BEP in units x SP = 42,500 units x 3,400	Rs.1,445 lacs
Units to get target profit	$\dfrac{\text{Desired profit + Fixed cost}}{\text{Contribution per unit}} = \dfrac{350 + 850}{2,000}$	60,000 units
Units to achieve target profit (at revised SP)	$\dfrac{\text{Desired profit + Fixed cost}}{\text{Contribution per unit}} = \dfrac{350 + 765}{3,910 - 1,288}$	42,525 units

31. **Break-even point and sales to achieve desired profit:**

Dean Jones sells a popular brand of men's sports shirts at an average price of Rs.28 each. He purchases the shirts from a supplier at a unit cost of Rs.18. The costs of operating his shop are all fixed costs and amount to Rs.54,000 a year. He pays commission to his salesmen at the rate of Re.1 for every shirt sold through the particular salesman.

Required:
(i) How many shirts must be sold in a year to break-even?
(ii) Compute the sales revenue at the break-even.
(iii) Compute the monthly sales revenue required to earn a net profit before tax of Rs.45,000 in a year.

Answer:

BEP (in units)	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{54,000}{28 - 18 - 1}$	**6,000 shirts**
BEP (in rupees)	6,000 shirts x 28	**Rs.1,68,000**
Sales to achieve profit of Rs.45,000	$\dfrac{\text{Desired Profit + Fixed cost}}{\text{Contribution per unit}} = \dfrac{(54,000 + 45,000)}{28 - 18 - 1}$	**11,000 shirts**
Annual sales in rupees	11,000 shirts x 28	**Rs.3,08,000**
Monthly revenues	3,08,000/12	**25,667**

32. **Decision on change in selling price:**

PH Gems Limited is manufacturing readymade suits. It has annual production capacity of 2,000 pieces. The cost accountant has presented the following information for the year to the management:

Particulars	Amount	Amount
Sales 1,500 pieces @ Rs.1,800 per piece		27,00,000
Direct material	5,94,200	
Direct labour	4,42,600	
Overheads (40% fixed)	11,97,000	22,33,800

Net Profit		4,66,200

Evaluate the following options:

- If selling price is increased by Rs.200, the sales will come down to 60% of the total annual capacity. Should the company increase its selling price?
- The company can earn a profit of 20% on sales if the company provides TIEPIN with ready-made suit. The cost of each TIEPIN is Rs.18. Calculate the sales to earn a profit of 20% on sales.

Answer:

WN 1: Computation of variable cost per unit and total fixed cost:

Particulars	Variable cost	Fixed cost
Direct material	5,94,200	
Direct Labour	4,42,600	
Factory overheads	7,18,200	4,78,800
Total cost	**17,55,000**	**4,78,800**
No of units	1,500	
Cost per unit	**1,170**	

WN 2: Decision on price increase:

Particulars	Per unit	Total (1,200 units)
Sales	2,000	24,00,000
Less: Variable cost	(1,170)	(14,04,000)
Contribution	**830**	**9,96,000**
Less: Fixed cost		(4,78,800)
Profit		**5,17,200**

- The company should go ahead with price increase as the same leads to higher profit

WN 3: Computation of sales to earn a profit of 20% on sales:

Let us assume the no of units sold as X

Particulars	Per unit	Total
Sales	1,800	1,800X
Less: Variable cost	(1,188)	(1,188X)
Contribution	**612**	**612X**
Less: Fixed cost		(4,78,800)
Profit		**612X – 4,78,800**

- Profit as per marginal costing statement = 612X – 4,78,800
- Target profit = 20% of sales = 20% of 1,800X = 360X
- 612X – 4,78,800 = 360X; 252X = 4,78,800; X = 1,900 units
- **Units to be sold = 1,900 units**
- **Value of sales = 1,900 x 1,800 = Rs.34,20,000**

33. Decision making:

A manufacturing company is producing a product 'A' which is sold in the market at Rs.45 per unit. The company has the capacity to produce 40,000 units per year. The budget for the year 2018-19 projects a sale of 30,000 units. The costs of each unit are expected as under:

Particulars	Amount
Materials	12
Wages	9
Overheads	6

Margin of safety is Rs.4,12,500.

You are required to:

i. Calculate fixed cost and break-even point
ii. Calculate the volume of sales to earn profit of 20% on sales
iii. If management is willing to invest Rs.10,00,000 with an expected return of 20%, calculate units to be sold to earn this profit
iv. Management expects additional sales if the selling price is reduced to Rs.44. Calculate units to be sold to achieve the same profit as desired in above (iii)

Answer:

BEP (in Rs.)	Total sales − MOS = (30,000 x 45) − 4,12,500	Rs.9,37,500
BEP (in units)	$\dfrac{\text{BEP in rupees}}{\text{SP}} = \dfrac{9,37,500}{45}$	20,833.33
Fixed cost	BEP (in units) x Contribution per unit 20,833.33 x (45 – 27)	Rs.3,75,000
Part (iii)		
Target profit	10,00,000 x 20%	2,00,000
Sales to achieve target profit	$\dfrac{\text{Desired profit + Fixed cost}}{\text{Contribution per unit}} = \dfrac{2,00,000 + 3,75,000}{18}$	31,945 units
Part iv		
Sales to achieve target profit	$\dfrac{\text{Desired profit + Fixed cost}}{\text{Contribution per unit}} = \dfrac{2,00,000 + 3,75,000}{17}$	33,824 units

Part (ii)

Let us assume the no of units sold as X

Particulars	Per unit	Total
Sales	45	45X
Less: Variable cost	(27)	(27X)
Contribution	**18**	**18X**
Less: Fixed cost		(3,75,000)
Profit		**18X – 3,75,000**

- Profit as per marginal costing statement = 18X – 3,75,000
- Target profit = 20% of sales = 20% of 45X = 9X
- 18X – 3,75,000 = 9X; 9X = 3,75,000
- **Units to be sold = 41,666.66 units**
- **Value of sales = 41,666.66 x 45 = Rs.18,75,000**

34. Preparation of income statement:

A laboratory carrying out various tests on products produced by various drug companies to ascertain whether drugs are fit for medical use or not. At present, the laboratory carries out 10,000 tests each year and a survey carried out by the laboratory shows a rise in number of tests to 15,000 tests a year, to carrying out all these tests would require an additional shift to be worked.

The current cost of carrying out a full test is:

Particulars	Rs. per test
Materials	1,500
Technicians' fees	130
Variable expenses	25
Fixed cost	100

Working the additional shift would

i. require a shift premium of 50 per cent to be paid to the technicians on the additional shift;
ii. enable a quantity discount of 10 per cent to be obtained for all materials if an order was placed to cover 15,000 tests;
iii. increase fixed costs by Rs. 5,00,000 per year.

The current fee per test is Rs. 2,000.

Required

(a) Calculate the profit for the period at the current capacity of 10,000 tests.

(b) A profit statement if the additional shift was worked and 15,000 tests were carried out.

Answer:

Profitability statement for 10,000 tests and 15,000 tests

Particulars	10,000 tests		15,000 tests	
	Per unit	Total	Per Unit	Total
Sales	2,000	2,00,00,000	2,000	3,00,00,000
Less: Variable cost				
Materials	(1,500)	(1,50,00,000)	(1,350)	(2,02,50,000)

Technician fees	(130)	(13,00,000)	(151.67)	(22,75,000)
Variable expenses	(25)	(2,50,000)	(25)	(3,75,000)
Contribution	**345**	**34,50,000**	**473.33**	**71,00,000**
Less: Fixed cost		(10,00,000)		(15,00,000)
Profit		**24,50,000**		**56,00,000**

Note:
- Technician fees for first 10,000 units will continue to be 130 per unit and for the extra 5,000 units it would be 195 per unit.
- Total technician cost for 15,000 units = (10,000 x 130) + (5,000 x 195) = 22,75,000
- **Cost per unit = 22,75,000/15,000 = Rs.151.67 per unit**

35. Break-even point:

An executive manager spends Rs.10.00 per kilometer on taxi fares for his office work. He is considering two other alternatives, the purchase of a new nano car or a second hand innova car. The estimated cost figures are as follows:

Items	New Nano Car	Old Innova Car
Purchase Price	1,35,000	1,60,000
Sale price, after 5 years	25,000	40,000
Repairs and servicing per annum	12,000	18,000
Taxes and insurance per annum	3,200	2,400
Petrol consumption per liter	20 km	15 km
Petrol/diesel price per liter	68.00	42.00

He estimates that he has to travel 10,800 km annually. Which of the three alternatives will be economical? If the official visit increase and he has to do 18,000 km per annum what would be his decision? At how many km per annum will the cost of the two cars break-even and why? Ignore interest and income-tax.

Answer:

WN 1: Computation of variable cost per KM and total fixed cost for New Nano and Old Innova:

Particulars	New Nano		Old Innova	
	Variable cost	Fixed cost	Variable cost	Fixed cost
Depreciation		22,000		24,000
Repairs and servicing		12,000		18,000
Taxes and insurance		3,200		2,400
Total Fixed cost		**37,200**		**44,400**
Variable cost per KM	**3.40**		**2.80**	

WN 2: Selection of alternative for different volumes:

Travel of 10,800 KM:

Particulars	Taxi	New Nano	Old Innova
Variable cost	1,08,000	36,720	30,240
Fixed cost	0	37,200	44,400
Total Cost	**1,08,000**	**73,920**	**74,640**

Executive manager should opt for New Nano if the plan is to travel 10,800 kms

Travel of 18,800 KM:

Particulars	Taxi	New Nano	Old Innova
Variable cost	1,80,000	61,200	50,400
Fixed cost	0	37,200	44,400
Total Cost	**1,80,000**	**98,400**	**94,800**

Executive manager should opt for Old Innova if the plan is to travel 18,000 kms

WN 3: Computation of break-even point:

Particulars	New Nano	Old Innova
Fixed cost	37,200	44,400
Contribution per KM (Saving per KM)	6.60	7.20
	[10 – 3.40]	[10 – 2.80]

Break-even point (FC/Contribution per KM)	5,637	6,167

36. Plant Merger:

Two manufacturing companies which have the following operating details decide to merge.

Particulars	Company Taylor	Company Warne
Capacity utilization	90%	60%
Sales in lacs	540	300
Variable cost in lacs	396	225
Fixed cost in lacs	80	50

Assuming the proposal is implemented, calculate
- (i) Break-Even sales of the merged plant and the capacity utilisation at that stage.
- (ii) Profitability of the merged plant at 80% capacity utilisation.
- (iii) Sales turnover of the merged plant to earn a profit of Rs.75 lakhs.
- (iv) When the merged plant is working at a capacity to earn a profit of Rs.75 lakhs what % increase in selling price is required to sustain an increase of 5% in fixed overheads.

Answer:

WN 1: Marginal cost statement of merged plant:

                                                                      (In lacs)

Particulars	Company Taylor		Company Warne		Merged
Capacity utilization	90%	100%	60%	100%	100%
Sales	540	600	300	500	1,100
Less: Variable cost	(396)	(440)	(225)	(375)	(815)
Contribution	**144**	**160**	**75**	**125**	**285**
Less: Fixed cost	(80)	(80)	(50)	(50)	(130)
Profit	**64**	**80**	**25**	**75**	**155**

WN 2: Solution:

PVR	$\dfrac{\text{Contribution}}{\text{Sales}} \times 100 = \dfrac{285}{1,100} \times 100$	**25.91%**
Break-even sales (in Rs)	$\dfrac{\text{Fixed Cost}}{\text{PVR}} = \dfrac{130}{25.91\%}$	**Rs.501.74 lacs**
Break-even sales (capacity utilization)	100% = 1,100 lacs ? = 501.74 lacs	**45.61%**
Profit at 80% utilization	(Sales x PVR) − Fixed cost (1,100 x 80% x 25.91%) – 130	**Rs.98 lacs**
Sales to achieve profit of 75 lacs	$\dfrac{\text{Desired Profit} + \text{Fixed Cost}}{\text{PVR}} = \dfrac{75 + 130}{25.91\%}$	**Rs.791.20 lacs**

Computation of % increase in SP to sustain 5% increase in fixed overheads:
- Fixed overheads of the company will increase from Rs.130 lacs to Rs.136.50 lacs. This would mean that profits of the company will decline by Rs.6.50 lacs
- The company wants to sustain the current profit by increasing selling price. Overall sales of Rs.791.20 lacs should increase by Rs.6.50 lacs to sustain same profit

% increase in selling price $= \dfrac{6.50}{791.20} \times 100 = 0.82\%$

37. Break-even point:

ABC Limited is planning a concert village in India. The following costs have been estimated:

Particulars	Amount
Rent of premises	Rs.1,300
Advertising	Rs.1,000
Printing of tickets	Rs.250
Ticket sellers security	Rs.400
Wages of ABC Limited personnel employed	Rs.600
Fee to artist	Rs.1000

There are no variable costs of staging the concert. The company is considering a selling price of Rs.4 or Rs.5 per ticket.

Required:

a) Calculate the number of tickets that must be sold at each price to break even

b) Recalculate, the number to tickets that must be sold at each price in order to breakeven, if the artist agrees to change from a fixed fee of Rs.1000 to a fee equal to 25% of the gross sale proceeds

c) Calculate the level of ticket sales, for each price, at which the company would be indifferent as between the fixed and percentage of fee alternatives

Answer:

WN 1: Computation of break-even point with no variable costs:

Particulars	Price of Rs.4	Price of Rs.5
Selling Price	4	5
Less: Variable cost	0	0
ontribution per unit	4	5
Total Fixed cost	4,550	4,550
BEP (TFC/CPU)	1,138	910

WN 2: Computation of break-even point if artist charges 25% of sale proceeds:

Particulars	Price of Rs.4	Price of Rs.5
Selling Price	4	5
Less: Variable cost	(1)	(1.25)
Contribution per unit	3	3.75
Total Fixed cost	3,550	3,550
BEP (TFC/CPU)	1,183	947

WN 3: Computation of indifference point:

Indifference Point	Change in fixed cost / Change in Variable cost per unit	
Price of Rs.4	$\dfrac{4,550 - 3,550}{1 - 0}$	**1,000 tickets**
Price of Rs.5	$\dfrac{4,550 - 3,550}{1.25 - 0}$	**800 tickets**

38. **Indifference Point:**

A company has a project to install a new machine exclusively for the manufacture of a new product which is expected to have goods demand and reasonably high margin. Maximum possible annual sales may not exceed Rs. 50 lakhs and if there is competition it may fall considerably. The company has obtained quotations and short listed two offer for the new machine. Details in respect of the two models are given below:

Particulars	Model X	Model Y
Maximum possible sales per year	Rs.50 lacs	Rs.50 lacs
Fixed costs per year	Rs.5 lacs	Rs.8 lacs
Estimated profit for maximum sales	Rs.15 lacs	Rs.17 lacs

You are required to calculate:

(i) Break even sales of each machine;

(ii) Sales at which both models will give the same profit;

(iii) Range of sales over which one model is better than the other.

Answer:

WN 1: Marginal cost statement of Machine X and Machine Y:

Particulars	Machine X	Machine Y
Sales	50,00,000	50,00,000
Less: Variable cost	(30,00,000)	(25,00,000)
Contribution	**20,00,000**	**25,00,000**
Less: Fixed cost	(5,00,000)	(8,00,000)
Profit	**15,00,000**	**17,00,000**
PVR (Contribution/sales)	40%	50%
Break-even sales (Fixed cost/PVR)	**12,50,000**	**16,00,000**

WN 2: Computation of level at which both models will give same profit (Indifference Point):

Indifference Point	$\dfrac{\text{Change in fixed cost}}{\text{Change in PVR}} = \dfrac{8,00,000 - 5,00,000}{50\% - 40\%}$	**Rs.30,00,000**

WN 3: Range of sales over which one model is better than other:

Level of sales	Model to be preferred
0 to 12,49,999	Neither X nor Y
12,50,000 to 29,99,999	Model X (Low FC)
At 30,00,000	Model X or Y (indifferent)
30,00,001 to 50,00,000	Model Y (High FC)

39. Indifference Point:

Aditya Limited and Arnav Limited are engaged in producing identical products in the domestic market. Budgeted income statement for the year 2016-17 of the both companies is as follows:

Particulars	Aditya Limited	Arnav Limited
Sales	8,00,000	10,00,000
Less: Variable cost	6,00,000	5,00,000
Contribution	2,00,000	5,00,000
Less: Fixed cost	1,00,000	4,00,000
Budgeted Profit	1,00,000	1,00,000

You are required to calculate:
- BEP for each company
- Sales at which each company will earn profit of Rs.1,20,000
- Sales at which both companies will have same profits
- Which company will be in advantageous position when there will be heavy demand for the products?

Answer:

WN 1: Computation of BEP and sales to achieve profit of 1,20,000

Particulars	Aditya Limited	Arnav Limited
Contribution	2,00,000	5,00,000
Sales	8,00,000	10,00,000
PVR	**25%**	**50%**
Fixed cost	1,00,000	4,00,000
BEP (Fixed cost/PVR)	**4,00,000**	**8,00,000**
Target Profit	1,20,000	1,20,000
Target contribution (FC + 1,20,000)	2,20,000	5,20,000
Sales to achieve profit (Target contribution/PVR)	**8,80,000**	**10,40,000**

WN 2: Computation of level at which both companies will give same profit (Indifference Point):

Indifference Point	$\dfrac{\text{Change in fixed cost}}{\text{Change in PVR}} = \dfrac{4,00,000 - 1,00,000}{50\% - 25\%}$	**Rs.12,00,000**

Company in advantageous position:
Arnav Limited will be in advantageous position in case of heavy demand. This is because it has higher PVR and any additional unit sold will contribute more towards fixed cost and profit.

40. Indifference point

The following are the cost data for three different alternative ways of processing work

Particulars	Manual	Semi-automatic	Fully-automatic
Monthly fixed costs			
Occupancy	15,000	15,000	15,000
Maintenance contract	-	5,000	10,000
Equipment lease	-	25,000	1,00,000
Variable costs			
Supplies	40	80	20
Labour	200	60	20

❖ Calculate the cost indifference points and interpret your results

❖ If the present case load is 600 cases and it is expected to go up to 850 cases in near future, which method is most appropriate on cost considerations?

Answer:

Computation of indifference point:

Indifference Point	$\dfrac{\text{Change in fixed cost}}{\text{Change in Variable cost per unit}}$	
Manual and semi-automatic	$\dfrac{45,000 - 15,000}{240 - 140}$	**300 cases**
Manual and fully-automatic	$\dfrac{1,25,000 - 15,000}{240 - 40}$	**550 cases**
Semi-automatic and fully automatic	$\dfrac{1,25,000 - 45,000}{140 - 40}$	**800 cases**

Interpretation:

Volume	Method to be selected
0 to 299	Manual (Low Fixed cost)
At 300	Manual or semi-automatic (indifferent)
301 to 799	Semi-automatic (High Fixed cost)
At 800	Semi-automatic or fully automatic (indifferent)
> 800	Fully automatic (High fixed cost)

Selection of alternative:

- For the present case load of 600, we should opt for semi-automatic method. However, if the case load is expected to increase to 850 then the company should directly opt for fully automatic method

41. Analysis of alternatives:

A company manufactures two types of herbal product, A and B. Its budget shows profit figures after apportioning the fixed joint cost of Rs.15 lacs in the proportion of the numbers of units sold. The budget for 2018, indicates:

Particulars	A	B
Profit	1,50,000	30,000
Selling price per unit	200	120
PV Ratio (%)	40	50

Required:

Compute the best option among the following, if the company expects that the number of units to be sold would be equal.

  i.   Due to exchange in manufacturing process, the joint fixed cost would be reduced by 15% and the variables would be increased by 7.5%
 ii.   Price of A could be increased by 20% as it is expected that the price elasticity of demand would be unity over the range of price
iii.   Simultaneous introduction of both the option (i) and (ii) above

Answer:

WN 1: Computation of existing units sold:

- Contribution per unit of A is Rs.80 (200 x 40%)
- Contribution per unit of B is Rs.60 (120 x 50%)
- Equal number of units have been sold for both A and B. Let us assume no of units sold as X
- Contribution = Fixed cost + Profit
- 80X + 60X = 15,00,000 + 1,80,000
- 140X = 16,80,000; **X = 12,000 units**

WN 2: Profitability statement for scenario (i)

Particulars	A	B	Total
Selling price	200	120	
Less: Variable cost	129	64.5	
	(120 + 7.5%)	(60 + 7.5%)	
Contribution per unit	71	55.5	

No of units sold	12,000	12,000	
Total contribution	**8,52,000**	**6,66,000**	**15,18,000**
Less: Fixed cost			(12,75,000)
Profit			**2,43,000**

- There is net increase of Rs.63,000 as the profit has increased to Rs.2,43,000 from Rs.1,80,000

WN 3: Profitability statement for scenario (ii):
- Price elasticity of demand is 1. This would mean that overall sales of the company would remain same and nay increase in price will be offset by fall in volume
- Existing sales of A is Rs.24,00,000 (200 x 12,000)
- Revised price of A is 240 (200 + 20%) and hence units sold would reduce to 10,000 units (24,00,000/240)

Particulars	A	B	Total
Selling price	240	120	
Less: Variable cost	120	60	
Contribution per unit	120	60	
No of units sold	10,000	12,000	
Total contribution	**12,00,000**	**7,20,000**	**19,20,000**
Less: Fixed cost			(15,00,000)
Profit			**4,20,000**

- There is net increase of Rs.2,40,000 as the profit has increased to Rs.4,20,000 from Rs.1,80,000

WN 4: Profitability statement for scenario (iii):

Particulars	A	B	Total
Selling price	240	120	
Less: Variable cost	129 (120 + 7.5%)	64.5 (60 + 7.5%)	
Contribution per unit	111	55.5	
No of units sold	10,000	12,000	
Total contribution	**11,10,000**	**6,66,000**	**17,76,000**
Less: Fixed cost			(12,75,000)
Profit			**5,01,000**

- There is net increase of Rs.3,21,000 as the profit has increased to Rs.5,01,000 from Rs.1,80,000

42. BEP analysis

A company has three factories situated in north, east and south with its Head Office in Mumbai. The management has received the following summary report on the operations of each factory for a period:

	Sales (in '000s)		Profit (in '000s)	
	Actual	Over/(Under) Budget	Actual	Over/(Under) Budget
North	1,100	(400)	135	(180)
East	1,450	150	210	90
South	1,200	(200)	330	(110)

Calculate for each factory and for the company as a whole for the period:

(i) the fixed costs.

(ii) break-even sales.

Answer:

WN 1: Computation of PVR:

                                                     (in '000s)

Particulars	North	East	South
Actual sales	1,100	1,450	1,200
Budgeted sales	1,500	1,300	1,400
Actual Profit	135	210	330
Budgeted Profit	315	120	440
Change in profit (A)	180	90	110
Change in sales (B)	400	150	200
PVR (A/B)	**45%**	**60%**	**55%**

Note:
- North has performed under-budget by 400 in sales. Therefore, budgeted sales would be higher and the same would amount to 1,500. Other items are computed in same manner

WN 2: Computation of fixed cost and break-even sales:

Particulars	North	East	South	Total
Sales	1,100	1,450	1,200	3,750
Less: Variable cost (b/f)	(605)	(580)	(540)	(1,725)
Contribution (sales x PVR)	495	870	660	2,025
Less: Fixed cost (b/f)	(360)	(660)	(330)	(1,350)
Profit	135	210	330	675
Break-even point (Fixed cost/PVR)	**800**	**1,100**	**600**	**2,500**

43. Computation of revised BEP:

The Dabour Co. Ltd. Is developing the annual profit plan. They have just reviewed the "first cut" at the annual income statement and are concerned with the Rs. 1,10,000 indicated profit on a sales volume of 20,000 units. The fixed cost structure of Rs. 9,90,000 appears to be high and they have some doubts about departing from the unit sales price of Rs. 100. There is a general agreement that the "profit target should be Rs. 2,20,000".

You are required to compute:

(a) The budgeted break-even point in rupees and in units and the number of units required to be sold to earn the target profit;

(b) What will be the new Break-even-point in the following cases:

(i) – If sales price is increased by 20%, and sales will be dropped by 15% then what would be the new break-even point in rupees and in units. What would be the new profit figures? How many units would have to be sold to earn the target profit?

(ii) – A decrease in fixed costs of Rs. 55,000 and a decrease in variable costs of 6% are contemplated. What would be new B.E.P. in rupees? How many units must be sold to earn a target profit

Answer:

WN 1: Existing profitability statement:

Particulars	Per unit	Total (20,000 units)
Sales	100	20,00,000
Less: Variable cost	(45)	(9,00,000)
Contribution	**55**	**11,00,000**
Less: Fixed cost		(9,90,000)
Profit		**1,10,000**

WN 2: Computation of BEP and units to achieve desired profit:

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{9,90,000}{55}$	**18,000 units**
BEP in rupees	18,000 units x 100	**Rs.18,00,000**
Units to achieve profit of Rs.2,20,000	$\dfrac{\text{Desired Profit} + \text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{2,20,000 + 9,90,000}{55}$	**22,000 units**

WN 3: Marginal cost statement for scenario (b(i)):

Particulars	Per unit	Total (17,000 units)
Sales	120	20,40,000
Less: Variable cost	(45)	(7,65,000)
Contribution	**75**	**12,75,000**
Less: Fixed cost		(9,90,000)
Profit		**2,85,000**

Note:

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{9,90,000}{75}$	**13,200 units**
BEP in rupees	13,200 units x 120	**Rs.15,84,000**

Units to achieve profit of Rs.2,20,000	$\dfrac{\text{Desired Profit + Fixed cost}}{\text{Contribution per unit}} = \dfrac{2,20,000 + 9,90,000}{75}$	**16,133 units**

WN 4: Marginal cost statement for scenario b(ii):

Particulars	Per unit	Total (20,000 units)
Sales	100.00	20,00,000
Less: Variable cost	(42.30)	(8,46,000)
Contribution	**57.70**	**11,54,000**
Less: Fixed cost		(9,35,000)
Profit		**2,19,000**

Note:

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{9,35,000}{57.70}$	**16,205 units**
BEP in rupees	16,205 units x 100	**16,20,500**
Units to achieve profit of Rs.2,20,000	$\dfrac{\text{Desired Profit + Fixed cost}}{\text{Contribution per unit}} = \dfrac{2,20,000 + 9,35,000}{57.70}$	**20,017 units**

44. Shut-down point

Mr. X has Rs. 2,00,000 investments in his business firm. He wants a 15 per cent return on his money. From an analysis of recent cost figures, he finds that his variable cost of operating is 60 per cent of sales, his fixed costs are Rs. 80,000 per year. Show computations to answer the following questions:

(i) What sales volume must be obtained to break even?

(ii) What sales volume must be obtained to get 15 per cent return on investment?

(iii) Mr. X estimates that even if he closed the doors of his business, he would incur Rs. 25,000 as expenses per year. At what sales would he be better off by locking his business up?

Answer:

BEP	$\dfrac{\text{Fixed cost}}{\text{PVR}} = \dfrac{80,000}{40\%}$	Rs.2,00,000
Target profit	2,00,000 x 15%	Rs.30,000
Sales to achieve profit of 30,000	$\dfrac{\text{Desired Profit + Fixed Cost}}{\text{PVR}} = \dfrac{30,000 + 80,000}{40\%}$	Rs.2,75,000
Shut-down point	$\dfrac{\text{FC during operation} - \text{FC during shutdown}}{\text{PVR}}$ $\dfrac{80,000 - 25,000}{40\%}$	Rs.1,37,500

If the expected sales of the company is below Rs.1,37,500, then Mr.X can temporarily shut-down the operations

45. Shut-down point:

Zed Limited sells its product at Rs.30 per unit. During the quarter ending on 31st March, 2014, it produced and sold 16,000 units and suffered a loss of Rs.10 per unit. If the volume of sales is raised to 40,000 units, it can earn a profit of Rs.8 per unit.

You are required to calculate:

- BEP in rupees
- Profit if the sale volume is 50,000 units
- Minimum level of production where the company needs not to close the production if unavoidable fixed cost is Rs.1,50,000

Answer:

Particulars	Scenario 1	Scenario 2
Sales	4,80,000	12,00,000
Less: Variable cost	(1,60,000)	(4,00,000)
Contribution (2/3 of sales)	3,20,000	8,00,000
Less: Fixed cost (bal figure)	**4,80,000**	**4,80,000**
Profit	(1,60,000)	3,20,000

Notes:

PVR	$\dfrac{\text{Change in Profit}}{\text{Change in sales}} \times 100 = \dfrac{3,20,000 + 1,60,000}{12,00,000 - 4,80,000} \times 100$	66.6667%
BEP in Rupees	$\dfrac{\text{Fixed cost}}{\text{PVR}} = \dfrac{4,80,000}{66.6667\%}$	7,20,000
Profit if sales is 50,000 units	(Sales x PVR) − Fixed cost (50,000 x 30 x 66.6667%) – 4,80,000	5,20,000
Shut-down point	$\dfrac{\text{FC during operation} - \text{FC during shutdown}}{\text{PVR}}$ $\dfrac{4,80,000 - 1,50,000}{66.6667\%}$	Rs.4,95,000 (or) 16,500 units

- The company need not shut-down operations if the production is above 16,500 units

46. Profit with increase in selling price and volume:

An automobile manufacturing company produces different models of Cars. The budget in respect of model 007 for the month of March, 2013 is as under:

Particulars	Amount	Amount in lacs 40,000 units
Net realization		700
Variable costs:		
Materials	264	
Labour	52	
Direct expenses	124	440
Fixed costs:		
Specific fixed costs	90	
Allocated fixed costs	112.50	202.50
Total costs		642.50
Profit		57.50

Calculate:

(i) Profit with 10 percent increase in spelling price with a 10 percent reduction in sales volume.

(ii) Volume to be achieved to maintain the original profit after a 10 percent rise in material costs, at the originally budgeted selling price per unit.

Answer:

WN 1: Marginal costing statement:

(in lacs)

Particulars	Original		Scenario (i)	
	Per unit	Total (40,000 units)	Per unit	Total (36,000 units)
Sales	1,750	700.00	1,925	693.00
Less: Variable cost	(1,100)	(440.00)	(1,100)	(396.00)
Contribution	**650**	**260.00**	**825**	**297.00**
Less: Fixed cost		(202.50)		(202.50)
Profit		**57.50**		**94.50**

WN 2: Computation of volume to achieve originally budgeted profit:

Sales to achieve desired profit	$\dfrac{\text{Desired Profit} + \text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{57.50 + 202.50}{584}$	**44,521 units**

Contribution per unit:

Particulars	Calculation	Amount
Selling Price		1,750
Less: Material cost	(264 lacs/0.40) x 1.10	(726)
Less: Other costs	(176 lacs/0.40)	(440)
Contribution per unit		**584**

47. Comprehensive problem:

Arnav Limited manufactures and sells 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	Nil
Direct labour	15% of cost of goods sold	Nil
Factory overhead	10% of cost of goods sold	Rs.2,30,000
General and administration overhead	2% of cost of goods sold	Rs.71,000
Selling and distribution overhead	4% of cost of sales	Rs.68,000

Last year 5,000 units were sold at Rs.195 per unit. From the given data find the following:
- Break-even sales (in rupees)
- Profit earned during last year
- Margin of safety (in %)
- Profit if the sales were 10% less than the actual sales

Answer:

WN 1: Computation of COGS and COS:

Particulars	Amount
Direct material	0.30COGS
Direct Labour	0.15COGS
Factory OH	0.10COGS +2,30,000
Admin OH relating to production	0.02COGS + 71,000
COGS	**0.57COGS + 3,01,000**
Selling and distribution Overhead	0.04COS + 68,000
Cost of sales	**COGS + 0.04COS + 68,000**

Note:
- COGS = 0.57COGS + 3,01,000; **COGS = Rs.7,00,000**
- COS = COGS + 0.04COS + 68,000; COS = 7,00,000 + 0.04COS + 68,000; **COS = Rs.8,00,000**

WN 2: Computation of variable cost per unit and total fixed cost:
- Total fixed cost = 2,30,000 + 71,000 + 68,000 = Rs.3,69,000
- Total variable cost = 8,00,000 – 3,69,000 = Rs.4,31,000
- Variable cost per unit = (4,31,000/5,000) = Rs.86.20 per unit

WN 3: Solution:

PVR	$\dfrac{\text{Contribution per unit}}{\text{Selling Price}} \times 100 = \dfrac{195 - 86.20}{195} \times 100$	55.7949%
BEP in Rupees	$\dfrac{\text{Fixed cost}}{\text{PVR}} = \dfrac{3,69,000}{55.7949\%}$	Rs.6,61,351
Profit	Total sales – total cost = (5,000 x 195) – 8,00,000	Rs.1,75,000
MOS (in Rs.)	Total sales – Break-even sales 9,75,000 – 6,61,351	Rs.3,13,649
MOS (in %)	$\dfrac{\text{MOS}}{\text{Total sales}} \times 100 = \dfrac{3,13,649}{9,75,000} \times 100$	32.17%
Profit with 10% less sales	(Sales x PVR) – Fixed cost (9,75,000 x 90% x 55.7949%) – 3,69,000	1,20,600

48. Preparation of income statement:

ABC Baggage Limited sells different styles of laptop bags with identical purchase costs and selling prices. The company is trying to find out the profitability of opening another store which will have the following expenses and revenues:

Particulars	Amount per piece
Selling price	600
Variable costs:	
Material cost	410
Salesmen's commission	60
Total variable cost	470
Annual fixed expenses are	
• Rent	6,00,000
• Office expenses	20,00,000

• Advertising	8,00,000
• Other fixed expenses	2,00,000

For each of the following independent situation, you are required to:

- Calculate the annual break-even point in units and in value. Also determine the profit of loss if 35,000 units of bags are sold
- The sales commissions are proposed to be discontinued, but instead a fixed amount of Rs.9,00,000 is to be incurred in fixed salaries. A reduction in selling price of 5% is also proposed. What will be the break-even point in units?
- It is proposed to pay the store manager Rs.5 per piece as further commission. The selling price is also proposed to be increased by 5%. What would be the break-even point in units?

Answer:

WN 1: Computation of Break-even point and profits when 35,000 bags are sold:

Contribution per unit	$600 - 470$	130
BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{36,00,000}{130}$	27,693 units
BEP in rupees	27,693 units x 600	Rs.1,66,15,800
Profit at 35,000 bags	(Units sold x Contribution per unit) – Fixed cost (35,000 x 130) – 36,00,000	Rs.9,50,000

WN 2: Computation of revised BEP for scenario (ii)

New SP	$600 - 5\%$	570 per unit
Contribution per unit	570 – 410	160 per unit
Fixed cost	36,00,000 + 9,00,000	Rs.45,00,000
BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{45,00,000}{160}$	28,125 units

WN 3: Computation of revised BEP for scenario (iii):

New SP	$600 + 5\%$	630 per unit
Variable cost per unit	470 + 5	475 per unit
Contribution per unit	630 – 475	155 per unit
BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{36,00,000}{155}$	23,226 units

49. Computation of BEP and sales to achieve desired profit:

Yamuna Limited manufactures a product, currently utilizing 80% capacity with a turnover of Rs.8,00,000 at Rs.25 per unit. The cost data are as under:

- Material cost = Rs.7.50 per unit
- Labour cost = Rs.6.25 per unit
- Semi-variable cost (including variable cost of Rs.3.75) per unit is Rs.1,80,000
- Fixed cost Rs.90,000 upto 80% level of output, beyond this an additional Rs.20,000 will be incurred.

Calculate:

- Activity level at break-even point
- Number of units to be sold to earn a net income of 8% on sales
- Activity level needed to earn a profit of Rs.95,000

Answer:

WN 1: Computation of variable cost per unit and total fixed cost:

- Variable cost per unit = 7.50 + 6.25 + 3.75 = Rs.17.50 per unit
- Fixed cost upto 80% capacity = 90,000 + 1,80,000 – (32,000 x 3.75) = Rs.1,50,000
- Fixed cost for higher capacity = 1,50,000 + 20,000 = Rs.1,70,000

WN 2: Computation of BEP:

Particulars	Upto 80% capacity 0 to 32,000 units	Higher capacity >32,000 units
Total Fixed cost	1,50,000	1,70,000
Contribution per unit	7.50	7.50
Tentative BEP	**20,000**	**22,667**

Final BEP	20,000	Invalid

- 20,000 units is valid BEP as the same falls in class interval of 0 to 32,000 units
- 22,667 units is invalid as the same does not fall in class interval of >32,000 units

WN 3: Computation of units to be sold to earn profit of 8% on sales:

Let us assume units sold as X

Particulars	Upto 80% capacity 0 to 32,000 units	Higher capacity >32,000 units
Sales	25X	25X
Less: Variable cost	(17.5X)	(17.5X)
Contribution	**7.5X**	**7.5X**
Less: Fixed cost	(1,50,000)	(1,70,000)
Profit	**7.5X – 1,50,000**	**7.5X – 1,70,000**
Target profit (8% of sales)	**2X**	**2X**
Equating two profits and solving X	27,273	30,909
Final answer	**27,273**	**Invalid**

- 27,273 units is valid answer as the same falls in class interval of 0 to 32,000 units
- 30,909 units is invalid as the same does not fall in class interval of >32,000 units

WN 4: Computation of units to be sold to earn profit of 95,000:

Particulars	Upto 80% capacity 0 to 32,000 units	Higher capacity >32,000 units
Desired Profit	95,000	95,000
Fixed cost	1,50,000	1,70,000
Desired contribution	**2,45,000**	**2,65,000**
Contribution per unit	7.50	7.50
Units to be sold (tentative)	**32,667**	**35,333**
Final answer	**Invalid**	**35,333**

- 32,667 units is invalid answer as the same does not falls in class interval of 0 to 32,000 units
- 35,333 units is valid as the same fall in class interval of >32,000 units

50. Computation of break-even point:

A diary product company manufacturing baby food with a shelf life of one year furnishes the following information:

- On 1st January, 2016 the company has an opening stock of 20,000 packets whose variable cost is Rs.180 per packet
- In 2015, production was 1,20,000 packets and the expected production in 2016 is 1,50,000 packets. Expected sales for 2016 is 1,60,000 packets
- In 2015, fixed cost per unit was Rs.60 and it is expected to increase by 10% in 2016. The variable cost is expected to increase by 25%. Selling price for 2016 has been fixed at Rs.300 per packet

You are required to calculate the break-even volume in units for 2016

Answer:

WN 1: Computation of total fixed cost and variable cost per unit of 2016:

- Variable cost per unit of 2016 = 180 + 25% = Rs.225 per unit
- Total fixed cost of 2016 = (Fixed cost of 2015) + 10% = (1,20,000 x 60) + 10%= Rs.79,20,000

WN 2: Computation of Break-even point:

Particulars	Calculation	Amount
Total fixed cost		79,20,000
Contribution to be earned		79,20,000
Contribution earned from opening stock units	20,000 x (300 – 180)	24,00,000
Balance contribution to be earned from CYP		55,20,000
Contribution per unit	300 – 225	75
Units to be sold from CYP		73,600
Overall units to be sold (BEP)	**20,000 + 73,600**	**93,600**

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51. Comprehensive problem:

SK Limited is engaged in the manufacture of tyres. Analysis of income statement indicated a profit of Rs.150 lacs on a sales volume of 50,000 units. The fixed costs are Rs.850 lacs which appears to be high. Existing selling price is Rs.3,400 per unit. The company is considering to revise the profit target to Rs.350 lacs. 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 Rs.85 lacs in the fixed cost is envisaged.

Answer:

Marginal costing statement:

(in lacs)

Particulars	Original		Scenario (iii)	
	Per unit	Total (50,000 units)	Per unit	Total (45,000 units)
Sales	3,400	1,700	3,910	1,759.50
Less: Variable cost	(1,400)	(700)	(1,400)	(630.00)
Contribution	**2,000**	**1000**	**2,510**	**1,129.50**
Less: Fixed cost		(850)		(850)
Profit		**150**		**279.50**

Note:

BEP in units	$\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{850 \text{ lacs}}{2,000}$	42,500 units
BEP in Rupees	BEP in units x SP = 42,500 units x 3,400	Rs.1,445 lacs
Units to get target profit	$\dfrac{\text{Desired profit + Fixed cost}}{\text{Contribution per unit}} = \dfrac{350 + 850}{2,000}$	60,000 units
Units to achieve target profit (at revised SP)	$\dfrac{\text{Desired profit + Fixed cost}}{\text{Contribution per unit}} = \dfrac{350 + 765}{3,910 - 1,288}$	42,525 units

52. Break-even point and cost reduction:

M/s Gaurav Private Limited is manufacturing and selling two products: Black and White at the selling price of Rs.20 and Rs.30 respectively.

The following sales strategy has been outlined for the financial year 2019-20:

i. Sales planned for the year will be Rs.81,00,000 in the case of Black and Rs.54,00,000 in the case of White
ii. The selling price of Black will be reduced by 10% and that of White by 20%
iii. Breakeven is planned at 70% of the total sales of each product
iv. Profit for the year to be maintained at Rs.8,26,200 in the case of black and Rs.7,45,200 in the case of white. This would be possible by reducing the present annual fixed cost of Rs.42,00,000 allocated as Rs.22,00,000 to Black and Rs.20,00,000 to white.

You are required to calculate:

• Number of units to be sold to Black and White to Break even during the financial year 2019-20
• Amount of reduction in fixed cost product-wise to achieve desired profit mentioned at (iv) above.

Answer:

Computation of units to be sold and target reduction in fixed cost:

Particulars	Black	White
Target sales (A)	81,00,000	54,00,000
New SP (B)	18	24
Units to be sold (A/B)	4,50,000	2,25,000
BEP in units (70% of sales)	3,15,000	1,57,500
MOS in units (30% of sales)	1,35,000	67,500
Target Profit	8,26,200	7,45,200
Contribution per unit (Profit/MOS)	**6.12**	**11.04**
BEP in units	3,15,000	1,57,500
Target fixed cost (BEP x Contribution per unit)	19,27,800	17,38,800

Existing fixed cost	22,00,000	20,00,000
Desired reduction in fixed cost	**2,72,200**	**2,61,200**

53. <u>Comprehensive problem:</u>

M Limited has an annual fixed cost of Rs.98,50,000. In the year 2018-19, sales amounted to Rs.7,80,60,000 as compared to Rs.5,93,10,000 in the preceding year 2017-18. Profit in the year 2018-19 is Rs.37,50,000 more than that in 2017-18.

<u>Required:</u>
- Calculate break-even sales of the company
- Determine Profit/Loss on a forecasted sales value of Rs.8,20,00,000
- If there is a reduction in selling price by 10% in the financial year 2018-19 and company desired to earn the same amount of profit as in 2017-18, compute the required sales amount?

<u>Answer:</u>

PVR	$\dfrac{\text{Change in profit}}{\text{Change in sales}} \times 100 = \dfrac{37,50,000}{7,80,60,000 - 5,93,10,0000} \times 100$	20%
Break-even sales	$\dfrac{\text{Fixed cost}}{\text{PVR}} = \dfrac{98,50,000}{20\%}$	4,92,50,000
Profit at sales of 8.2 crores	(8,20,00,000 x 20%) – 98,50,000	65,50,000
Sales to earn profit of 20,12,000 (Year 2018-19)	$\dfrac{\text{Desired Profit} + \text{Fixed cost}}{\text{PVR}} = \dfrac{20,12,000 + 98,50,000}{11.11111\%}$	10,67,58,000

<u>Note:</u>
- Profit of 2017-18 = (5,93,10,000 x 20%) – 98,50,000 = Rs.20,12,000
- Existing PVR is 20%. Let us assume SP to be 100; VC will be 80 and contribution will be 20 per unit
- SP will be revised to 90, VC will continue to be 80 and contribution will become 10 per unit. Hence revised PVR is 11.11111% (10/90)

54. <u>Selection of alternative:</u>

The M-Tech Manufacturing company is presently evaluating two possible processes for the manufacture of a toy. The following information is available:

Particulars	Process A (Rs.)	Process B (Rs.)
Variable cost per unit	12	14
Sales price per unit	20	20
Total fixed costs per year	30,00,000	21,00,000
Capacity (in units)	4,30,000	5,00,000
Anticipated sales (next year in units)	4,00,000	4,00,000

Suggest:
- Which process should be chosen?
- Would you change your answer as given above, if you were informed that the capacities of the two processes are as follows:
  - A = 6,00,000 units
  - B = 5,00,000 units
- State the reason for answer to the earlier part?

<u>Answer:</u>
<u>WN 1: Selection of Process to be chosen:</u>

Particulars	Process A	Process B
Selling Price	20	20
Less: Variable cost	(12)	(14)
Contribution per unit	8	6
Feasible sales (lower of capacity and demand)	4,00,000	4,00,000
Total contribution	**32,00,000**	**24,00,000**
Less: Fixed cost	(30,00,000)	(21,00,000)
Profit	**2,00,000**	**3,00,000**

- The company should go ahead with Process B as the same results in higher profit

Rework scenario:

- Answer would remain same even if the capacity is increased. This is because units sold would be constrained by the demand and hence any increase in capacity without increase in demand will not change the decision

55. Marginal versus absorption costing

Mega company has just completed its first year of operations. The unit cost on a normal costing basis are as under:

Direct material 4kg @ Rs.4	= Rs.16
Direct labour 3 hrs @ Rs.18	= Rs.54
Variable overhead 3 hrs @ Rs.4	= Rs.12
Fixed overhead 3 hrs @ Rs.6	= Rs.18

Selling and administrative costs: Variable Rs.20 per unit and fixed Rs.7,60,000
During the year the company had the following activity:

Units produced	= 24,000
Units sold	= 21,500
Unit selling price	= Rs.168
Direct labour hours worked	= 72,000

Actual fixed overhead was Rs.48,000 less than the budgeted fixed overhead. Budgeted variable overheads was Rs.20,000 less than the actual variable overhead. The company used an expected activity recovery level of 72,000 direct labour hours to compute pre-determined 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
Reconcile the difference between the total income under absorption and marginal costing

Answer:
WN 1: Income statement under Absorption Costing Method:

Particulars	Calculation	Amount	Per unit
Variable Production costs:			
Direct Material	24,000 x 16	3,84,000	16.00
Direct Labour	24,000 x 54	12,96,000	54.00
Variable Overheads	24,000 x 12	2,88,000	12.00
Total Variable Production Costs		**19,68,000**	**82.00**
Fixed Production Costs	24,000 x 18	4,32,000	18.00
Cost of Production (24,000 units)		**24,00,000**	**100.00**
Add: Opening FG (0 units)		-	
Less: Closing FG (2,500 units)	$2,500 \times \left(\dfrac{24,00,000}{24,000}\right)$	(2,50,000)	
Cost of Goods Sold (21,500 units)		**21,50,000**	
Variable selling and admin costs	21,500 x 20	4,30,000	
Fixed selling and admin costs	Given	7,60,000	
Cost of Sales		**33,40,000**	
Under-absorption of VOH		20,000	
Over-absorption of FOH		(48,000)	
Revised Cost of sales		**33,12,000**	
Profit		3,00,000	
Sales	**21,500 x 168**	**36,12,000**	

Note 1: Computation of under/over absorption of fixed and variable overheads:
Variable Overheads:

- Budgeted variable overheads = 72,000 x 4 = Rs.2,88,000
- Actual variable overheads = 2,88,000 + 20,000 = Rs.3,08,000
- Variable overheads absorbed (Part of COP) = Rs.2,88,000
- **Under-absorbed variable overheads = Rs.20,000**

Fixed Overheads:
- Budgeted fixed overheads = 72,000 x 6 = Rs.4,32,000
- Actual fixed overheads = 4,32,000 – 48,000 = Rs.3,84,000
- Fixed overheads absorbed (Part of COP) = Rs.4,32,000
- **Over-absorbed fixed overheads = Rs.48,000**

Note: It is assumed that increase in variable overheads is abnormal in nature and hence not considered for inventory valuation.

WN 2: Income statement under Marginal Costing Method:

Particulars	Calculation	Amount
Sales	21,500 x 168	36,12,000
Less: Variable costs	Note 1	(22,13,000)
Contribution		**13,99,000**
Less: Fixed costs	3,84,000 + 7,60,000	(11,44,000)
Profit		**2,55,000**

Note 1: Computation of variable costs:

Particulars	Calculation	Amount
Variable production cost		19,68,000
Add: Opening FG		-
Less: Closing FG	$2,500 \times \left(\dfrac{19,68,000}{24,000}\right)$	(2,05,000)
Variable cost of goods sold		**17,63,000**
Other variable costs	21,500 x 20	4,30,000
Under-absorbed variable OH		20,000
Total variable costs		**22,13,000**

WN 3: Reconciliation of Profits

Particulars	Calculation	Amount
Profit as per Marginal Costing		2,55,000
Add: Difference in valuation of closing stock	(2,50,000 – 2,05,000)	45,000
Less: Difference in valuation of opening stock		-
Profit as per Absorption Costing		**3,00,000**

56. **Marginal versus absorption costing:**

T Limited produces a single product 'T-10' and sells it at a fixed price of Rs.2,050 per unit. The production and sales data for first quarter of the year 2014-15 are as follows:

Particulars	April	May	June
Sales in units	4,200	4,500	5,200
Production in units	4,600	4,400	5,500

Actual/budget information for each month was as follows:

Direct materials	4 Kg at Rs.120 per kg
Direct labour	6 hours at Rs.60 per hour
Variable production overheads	150% of direct labour
Sales commission	15% of sales value
Fixed production overheads	5,00,000
Fixed selling overheads	95,000

There was no opening inventory at the start of the quarter. Fixed production overheads are budgeted at Rs.60,00,000 per annum and are absorbed into products based on a budgeted normal output of 60,000 units per annum

Required:
- Prepare a profit statement for each of the three months using absorption costing method
- Prepare a profit statement for each of the three months using marginal costing method
- Prepare a reconciliation of the profit or loss figures given in your answer to (a) and (b)

Answer:

WN 1: Profit statement for each of the three months under absorption costing:

Particulars	April	May	June
Direct material (production x 480)	22,08,000	21,12,000	26,40,000
Direct labour (production x 360)	16,56,000	15,84,000	19,80,000
Variable Prod OH (production x 540)	24,84,000	23,76,000	29,70,000
Fixed Prod OH (production x 100 per unit)	4,60,000	4,40,000	5,50,000
Cost of Production	**68,08,000**	**65,12,000**	**81,40,000**
Add: Opening stock	-	5,92,000	4,44,000
Less: Closing stock	(5,92,000)	(4,44,000)	(8,88,000)
Cost of goods sold (units sold x 1,480)	**62,16,000**	**66,60,000**	**76,96,000**
Fixed selling cost	95,000	95,000	95,000
Sales commission (15% of sales)	12,91,500	13,83,750	15,99,000
Cost of sales	**76,02,500**	**81,38,750**	**93,90,000**
Under/over absorption of fixed prod OH	40,000	60,000	(50,000)
Revised cost of sales	**76,42,500**	**81,98,750**	**93,40,000**
Profit	9,67,500	10,26,250	13,20,000
Sales	**86,10,000**	**92,25,000**	**1,06,60,000**

Note: Valuation of stock:

Particulars	April	May	June
Production cost per unit (480+360+540+100)	1,480	1,480	1,480
Opening stock	-	400	300
Production	4,600	4,400	5,500
Less: Sales	4,200	4,500	5,200
Closing stock	**400**	**300**	**600**
Cost per unit	1,480	1,480	1,480
Value of closing stock	**5,92,000**	**4,44,000**	**8,88,000**

WN 2: Profitability statement under Marginal Costing:

Particulars	April	May	June
Sales	86,10,000	92,25,000	1,06,60,000
Less: Variable costs	(70,87,500)	(75,93,750)	(87,75,000)
Contribution	**15,22,500**	**16,31,250**	**18,85,000**
Less: Fixed costs	(5,95,000)	(5,95,000)	(5,95,000)
Profit	**9,27,500**	**10,36,250**	**12,90,000**

Note 1: Computation of variable costs:

Particulars	April	May	June
Direct material (production x 480)	22,08,000	21,12,000	26,40,000
Direct labour (production x 360)	16,56,000	15,84,000	19,80,000
Variable Prod OH (production x 540)	24,84,000	23,76,000	29,70,000
Cost of Production (1,380 per unit)	**63,48,000**	**60,72,000**	**75,90,000**
Add: Opening stock (units x 1,380)	-	5,52,000	4,14,000
Less: Closing stock (units x 1,380)	(5,52,000)	(4,14,000)	(8,28,000)
Cost of Goods sold (units x 1,380)	57,96,000	62,10,000	71,76,000
Sales commission	12,91,500	13,83,750	15,99,000
Variable costs	**70,87,500**	**75,93,750**	**87,75,000**

WN 3: Reconciliation of profit under absorption and marginal costing:

Particulars	April	May	June
Profit under marginal costing	9,27,500	10,36,250	12,90,000
Add: Difference in valuation of closing stock	40,000	30,000	60,000
Less: Difference in valuation of opening stock	-	(40,000)	(30,000)
Profit under absorption costing	**9,67,500**	**10,26,250**	**13,20,000**

57. **Marginal versus absorption costing**

XYZ Limited has a production capacity of 2,00,000 units per year. Normal capacity utilization is reckoned as 90 percent. Standard variable production costs are Rs.11 per unit. The fixed costs are reckoned at Rs.3,60,000 per year. Variable selling costs are Rs.3 per unit and fixed selling costs are Rs.2,70,000 per year. The unit selling price is Rs.20.

In the year just ended on 30th June 2006, the production was 1,60,000 units and sales were 1,50,000 units. The closing inventory on 30th June was 20,000 units. The actual variable production costs for the year were Rs.35,000 higher than standard.
Calculate the profit for the year
- By absorption costing method and
- By marginal costing method
- Explain the difference in profits

Answer:
WN 1: Income statement under Absorption Costing Method:

Particulars	Calculation	Amount
Variable Production costs	(1,60,000 x 11) + 35,000	17,95,000
Fixed Production Costs	Note 2	3,20,000
Cost of Production (1,60,000 units)		**21,15,000**
Add: Opening FG (10,000 units)	10,000 x (11 + 2)	1,30,000
Less: Closing FG (20,000 units)	$20,000 \times \left(\dfrac{21,15,000}{1,60,000}\right)$	(2,64,375)
Cost of Goods Sold (1,50,000 units)		**19,80,625**
Variable selling costs	1,50,000 x 3	4,50,000
Fixed selling costs	Given	2,70,000
Cost of Sales		**27,00,625**
Under-absorption of FOH	Note 2	40,000
Revised Cost of sales		**27,40,625**
Profit		2,59,375
Sales	**1,50,000 x 20**	**30,00,000**

Note 1: Computation of OAR for Fixed Production Cost:

$$\text{OAR} = \frac{\text{Budgeted Fixed Production Cost}}{\text{Budgeted Production}} = \frac{3,60,000}{1,80,000} = \text{Rs. 2 per unit}$$

Note 2: Computation of Overheads Absorbed and under/over absorption:
- Overheads absorbed = (SR x AO) = (2 x 1,60,000) = Rs.3,20,000
- Under-absorption/over-absorption = OH Absorbed – Actual Fixed Overheads
- Under-absorption/over-absorption = (3,20,000 – 3,60,000) = Rs.40,000 (under-absorption)

Note 3: Assumptions:
- It is assumed that extra Rs.35,000 of variable production cost is normal in nature and considered for inventory valuation
- It is assumed company follows FIFO Method for inventory valuation

WN 2: Income statement under Marginal Costing Method:

Particulars	Calculation	Amount
Sales	1,50,000 x 20	30,00,000
Less: Variable costs	Note 1	(21,30,625)
Contribution		**8,69,375**
Less: Fixed costs	3,60,000 + 2,70,000	(6,30,000)
Profit		**2,39,375**

Note 1: Computation of variable costs:

Particulars	Calculation	Amount
Variable production cost		17,95,000
Add: Opening FG	10,000 x 11	1,10,000

Less: Closing FG	$20,000 \times \left(\dfrac{17,95,000}{1,60,000}\right)$	(2,24,375)
Variable cost of goods sold		**16,80,625**
Other variable costs	1,50,000 x 3	4,50,000
Total variable costs		**21,30,625**

WN 3: Reconciliation of Profits

Particulars	Calculation	Amount
Profit as per Marginal Costing		2,39,375
Add: Difference in valuation of closing stock	(2,64,375 – 2,24,375)	40,000
Less: Difference in valuation of opening stock	(1,30,000 – 1,10,000)	(20,000)
Profit as per Absorption Costing		**2,59,375**

58. Limiting Factor – Basic

Division Z is a profit center which produces four products A, B, C and D. Each product is sold in the external market also. Data for the period is:

	A	B	C	D
Market price per unit (Rs.)	150	146	140	130
Variable cost per unit (Rs.)	130	100	90	85
Labour hours required per unit	3	4	2	3
Maximum demand	2800	2500	2300	1600

❖ Identify the production pattern if the available labour hours are a) 20000 hours and b) 30,000 hours

Answer:

WN 1: Computation of labour hours required to meet demand:

Product	Maximum Demand	Hours per unit	Total Hours required
A	2,800	3	8,400
B	2,500	4	10,000
C	2,300	2	4,600
D	1,600	3	4,800
Total Hours Required			**27,800**

WN 2: Production pattern if labour hours availability is 30,000 hours:

- Labour is not a limiting factor as the requirement of labour (27,800 hours) is lower than its supply (30,000 hours)
- The company will be able to meet the entire demand of customer and production pattern will be as under:
    - o Product A = 2,800 units
    - o Product B = 2,500 units
    - o Product C = 2,300 units
    - o Product D = 1,600 units

WN 3: Production pattern if labour hours availability is 20,000 hours:

Statement of Ranking:

Particulars	A	B	C	D
Selling Price	150	146	140	130
Less: Variable cost	(130)	(100)	(90)	(85)
Contribution per unit	**20**	**46**	**50**	**45**
No of labour hours per unit	3	4	2	3
Contribution per labour hour	**6.67**	**11.50**	**25.00**	**15.00**
Rank	**IV**	**III**	**I**	**II**

Statement of Allocation:

Particulars	Units	Hours Per unit	Hours consumed
C	2,300	2	4,600

D	1,600	3	4,800	
B	2,500	4	10,000	
A	200 [600/3]	3	600 [20,000 – 19,400]	
Total			20,000	

59. Computation of opportunity costs:

A company can make any one of the 3 products X, Y or Z in a year. It can exercise its option only at the beginning of each year. Relevant information about the products for the next year is given below:

Particulars	X	Y	Z
Selling price per unit	10	12	12
Variable cost per unit	6	9	7
Market demand	3,000	2,000	1,000
Production capacity	2,000	3,000	900
Fixed costs	Rs.30,000		

Answer:
Computation of Opportunity Cost:

Particulars	X	Y	Z
Selling Price	10	12	12
Less: Variable cost	(6)	(9)	(7)
Contribution per unit	**4**	**3**	**5**
Maximum possible sales [Lower of demand and capacity]	2,000	2,000	900
Total Contribution	**8,000**	**6,000**	**4,500**
Opportunity Cost (contribution of next best product)	**6,000**	**8,000**	**8,000**

60. Limiting factor:

X Limited supplies spare parts to an air craft company Y Limited. The production capacity of X Limited facilitates production of any one spare part for a particular period of time. The following are the cost and other information for the production of two different spare parts A and B:

Per Unit	Part A	Part B
Alloy usage	1.6 kgs	1.6 kgs
Machine Time: Machine A	0.6 hours	0.25 hours
Machine Time: Machine B	0.5 hours	0.55 hours
Target Price	145	115
Total hours available	Machine A = 4,000 hours; Machine B = 4,500 hours	
Alloy available	13,000 kgs @ 12.50 per Kg	
Variable OH per Machine hour	Machine A: Rs.80; Machine B: Rs.100	

❖ Identify the spare part which will optimize contribution at the offered price
❖ If Y Limited reduces target price by 10% and offers Rs.60 per hour of unutilized machine hour, what will be the total contribution from the spare part identified above?

Answer:
WN 1: Computation of Contribution per unit:

Particulars	Part A	Part B
Selling Price	145	115
Less: Variable costs:		
Alloy cost	(20)	(20)
Machine A	(48)	(20)
Machine B	(50)	(55)
Contribution per unit	**27**	**20**

WN 2: Identification of Spare part to be produced:

Particulars	Part A	Part B
Material constraint:		
Available material	13,000	13,000
RM per unit	1.60	1.60
Maximum possible production (A)	**8,125**	**8,125**

Machine A constraint:		
Available hours	4,000	4,000
Hours per unit	0.6	0.25
Maximum possible production (B)	**6,666**	**16,000**
Machine B constraint:		
Available hours	4,500	4,500
Hours per unit	0.50	0.55
Maximum possible production (C)	**9,000**	**8,181**
Final Feasible Production (Minimum of A, B and C)	**6,666**	**8,125**
Contribution per unit	27	20
Total Contribution	**1,79,982**	**1,62,500**

- The company should go ahead with production of 6,666 units of Part A to maximize its contribution

WN 3: Computation of contribution from identified spare part with reduction in price:
Note 1: Computation of Contribution per unit:

Particulars	Part A
Selling Price (145 x 90%)	130.50
Less: Variable costs:	
Alloy cost	(20)
Machine A	(48)
Machine B	(50)
Contribution per unit	**12.50**

Note 2: Computation of total contribution:

Particulars	Calculation	Amount
Contribution from Part A	6,666 x 12.50	83,325
Contribution from unutilized time:		
Machine A	(4,000 – (6,666 x 0.6)) x 60	0
Machine B	(4,500 – (6,666 x 0.5)) x 60	70,020
Total Contribution		**1,53,345**

Additional Homework Problems:
1. BEP:
A company sells its product at Rs. 15 per unit. In a period, if it produces and sells 8,000 units, it incurs a loss of Rs. 5 per unit. If the volume is raised to 20,000 units, it earns a profit of Rs. 4 per unit. Calculate break-even point both in terms of rupees as well as in units.
Answer:

Particulars	Scenario 1	Scenario 2
Sales	1,20,000	3,00,000
Less: Variable cost	(40,000)	(1,00,000)
Contribution (2/3 of sales)	80,000	2,00,000
Less: Fixed cost (bal figure)	**(1,20,000)**	**(1,20,000)**
Profit	(40,000)	80,000

Notes:

PVR	$\dfrac{\text{Change in Profit}}{\text{Change in sales}} \times 100 = \dfrac{80,000 + 40,000}{3,00,000 - 1,20,000} \times 100$	66.6667%
BEP in Rupees	$\dfrac{\text{Fixed cost}}{\text{PVR}} = \dfrac{1,20,000}{66.6667\%}$	Rs.1,80,000
BEP in units	1,80,000/15	12,000 units

2. Data for multiple years:
You are given the following data:

Particulars	2010	2011
Sales	1,20,000	1,40,000
Profit	8,000	13,000

Find out –
- (i)   P/V ratio,
- (ii)   B.E. Point,
- (iii) Profit when sales are Rs. 1,80,000,
- (iv)   Sales required earn a profit of Rs. 12,000,
- (v)   Margin of safety in year 2011.

Answer:

Particulars	2010	2011
Sales	1,20,000	1,40,000
Less: Variable cost (75%)	(90,000)	(1,05,000)
Contribution (25%)	30,000	35,000
Less: Fixed cost (bal figure)	**(22,000)**	**(22,000)**
Profit	8,000	13,000

Notes

PVR	$\dfrac{\text{Change in Profit}}{\text{Change in sales}} \times 100 = \dfrac{13,000 - 8,000}{1,40,000 - 1,20,000} \times 100$	25%
BEP in Rupees	$\dfrac{\text{Fixed cost}}{\text{PVR}} = \dfrac{22,000}{25\%}$	Rs.88,000
Profit when sales is Rs.1,80,000	(Sales x PVR) – Fixed cost (1,80,000 x 25%) – 22,000	Rs.23,000
Sales to earn profit of 12,000	$\dfrac{\text{Desired Profit + Fixed cost}}{\text{PVR}} = \dfrac{12,000 + 22,000}{25\%}$	Rs.1,36,000
MOS of 2011	1,40,000 – 88,000	Rs.52,000

3. MOS:

A company earned a profit of Rs. 30,000 during the year 2011. If the marginal cost and selling price of the product are Rs. 8 and Rs. 10 per unit respectively, find out the amount of margin of safety

Answer:

MOS in units	$\dfrac{\text{Profit}}{\text{Contribution per unit}} = \dfrac{30,000}{10 - 8}$	15,000 units
MOS in Rs.	MOS in units x SP = 15,000 units x 10	Rs.1,50,000

4. BEP and MOS:

A Ltd. Maintains margin of safety of 37.5% with an overall contribution to sales ratio of 40%. Its fixed costs amount to Rs. 5 lakhs.
Calculate the following:
- i.   Break-even sales
- ii.   Total sales
- iii.   Total variable cost
- iv.   Current profit
- v.   New 'margin of safety' if the sales volume is increased by 7 ½ %.

Answer:

Break-even sales	$\dfrac{\text{Fixed Cost}}{\text{PVR}} = \dfrac{5,00,000}{40\%}$	Rs.12,50,000
Total Sales	MOS is 37.5% of sales Hence BEP is 62.5% of sales (12,50,000/62.50%)	Rs.20,00,000
Total Variable cost	Total sales x 60% = 20,00,000 x 60%	Rs.12,00,000
Current profit	MOS x PVR 7,50,000 x 40%	Rs.3,00,000
New MOS if sales increase by 7.5%	Revised sales = 21,50,000 MOS = 21,50,000 – 12,50,000	Rs.9,00,000

5. BEP and MOS

A company had incurred fixed expenses of Rs. 4,50,000, with sales of Rs. 15,00,000 and earned a profit of Rs. 3,00,000 during the first half year. In the second half, it suffered a loss of Rs. 1,50,000.

Calculate:
- (i)   The profit-volume ratio, break-even point and margin of safety for the first half year.

    (ii)   Expected sales volume for the second half year assuming that selling price and fixed expenses remained unchanged during the second half year.

    (iii)   The break-even point and margin of safety for the whole year.

Answer:

PVR	$\dfrac{\text{Contribution}}{\text{Sales}} \times 100 = \dfrac{3,00,000 + 4,50,000}{15,00,000} \times 100$	50%
BEP in Rupees	$\dfrac{\text{Fixed cost}}{\text{PVR}} = \dfrac{4,50,000}{50\%}$	Rs.9,00,000
Margin of safety	Sales – Break-even sales 15,00,000 – 9,00,000	Rs.6,00,000
Sales for second half When loss is Rs.1,50,000	$\dfrac{\text{Profit} + \text{Fixed cost}}{\text{PVR}} = \dfrac{-1,50,000 + 4,50,000}{50\%}$	Rs.6,00,000
BEP of full year	9,00,000 x 2	Rs.18,00,000
MOS of full year	15,00,000 + 6,00,000 – 18,00,000	Rs.3,00,000

6. Fixed vs variable costs:

PQ Ltd. reports the following cost structure at two capacity levels:

Particulars	100% capacity (2,000 units)	75% capacity (1,500 units)
Production overhead I	Rs.3 per unit	Rs.4 per unit
Production overhead II	Rs.2 per unit	Rs.2 per unit

If the selling price, reduced by direct material and labour is Rs. 8 per unit, what would be its break-even point?

Answer:

- Production overhead I is Rs.3 per unit at 2,000 units. Total production overhead would be Rs.6,000. Similarly, it is Rs.4 per unit at 1,500 units. Total overheads would be Rs.6,000. Hence Production overhead I would be fixed cost
- Production overhead II is variable cost as the per unit remain same at both capacity utilization

$$\textbf{BEP} = \frac{\textbf{Fixed cost}}{\textbf{Contribution per unit}} = \frac{\textbf{6,000}}{\textbf{8} - \textbf{2}} = \textbf{1,000 units}$$

7. BEP for multiple products

The product-mix of Gama Limited is as under:

	Products	
	M	N
Units	54,000	18,000
Selling price	Rs.7.5	Rs.15
Variable cost	Rs.6	Rs.4.5

Find the break-even point in units if the company discontinues product 'M' and replace with product 'O'. The quantity of product 'O' is 9,000 units and its selling price and variable costs are Rs.18 and Rs.9. Fixed cost is Rs.15,000.

Answer:

- The company plans to sell 18,000 units of N and 9,000 units of O. Sales mix is in the ratio of 2:1
- Let us assume one set contains 2 units of N and 1 unit of O
- Contribution per set = (2 x 10.50) + (1 x 9) = Rs.30 per set

$$\textbf{BEP} = \frac{\textbf{Fixed cost}}{\textbf{Contribution per set}} = \frac{\textbf{15,000}}{\textbf{30}} = \textbf{500 sets}$$

- BEP of Product N = 500 x 2 =1 ,000 units
- BEP of Product O = 500 x 1 = 500 units

8. Sales to achieve desired profit

MNP Ltd sold 2,75,000 units of its product at Rs. 37.50 per unit. Variable costs are Rs. 17.50 per unit (manufacturing costs of Rs. 14 and selling cost Rs. 3.50 per unit). Fixed costs are incurred uniformly throughout the year and amount to Rs. 35,00,000 (including depreciation of Rs. 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 Rs. 2,50,000.

    (iv)   Estimate the sales level achieve an after-tax income (PAT) of Rs. 2,50,000. Assume 40% corporate Income Tax rate.

Answer:

Contribution per unit	37.50 – 17.50	Rs.20.00 per unit
Break-even point	$\dfrac{\text{Fixed Cost}}{\text{Contribution per unit}} = \dfrac{35,00,000}{20}$	1,75,000 units
Cash break-even point	$\dfrac{\text{Cash Fixed Cost}}{\text{Contribution per unit}} = \dfrac{20,00,000}{20}$	1,00,000 units
PV Ratio	$\dfrac{\text{Contribution per unit}}{\text{Selling Price}} = \dfrac{20}{37.50} \times 100$	53.33%
Units to earn EBIT of Rs.2,50,000	$\dfrac{\text{Desired Profit} + \text{Fixed Cost}}{\text{Contribution per unit}}$ $= \dfrac{2,50,000 + 35,00,000}{20}$	1,87,500 units
Sales to earn PAT of Rs.2,50,000	Target PAT = 2,50,000 Target PBT = 2,50,000/60% = 4,16,667 $\dfrac{\text{Desired Profit} + \text{Fixed Cost}}{\text{PVR}}$ $= \dfrac{4,16,667 + 35,00,000}{53.33\%}$	Rs.73,43,750

9. Profit under marginal and absorption costing:

WONDER LTD. manufactures a single product, ZEST. The following figures relate to ZEST for a one-year period:

Activity Level	50%	100%
Sales and production (units)	400	800
Sales (in lacs)	8.00	16.00
Variable production costs (in lacs)	3.20	6.40
Fixed production costs (in lacs)	1.60	1.60
Variable selling and administration costs (in lacs)	1.60	3.20
Fixed selling and administration costs (in lacs)	2.40	2.40

The normal level of activity for the year is 800 units. Fixed costs are incurred evenly throughout the year, and actual fixed costs are the same as budgeted. There were no stocks of ZEST at the beginning of the year. In the first quarter, 220 units were produced and 160 units were sold.

Required:

(a) What would be the fixed production costs absorbed by ZEST if absorption costing is used?

(b) What would be the under/over-recovery of overheads during the period?

(c) What would be the profit using absorption costing?

(d) What would be the profit using marginal costing?

Answer:

WN 1: Income statement under Absorption Costing Method:

Particulars	Calculation	Amount
Variable Production costs	$220 \times \left(\dfrac{3,20,000}{400}\right)$	1,76,000
Fixed Production Costs	$220 \times \left(\dfrac{1,60,000}{800}\right)$	44,000
Cost of Production (220 units)		**2,20,000**
Add: Opening FG (0 units)		0
Less: Closing FG (60 units)	$60 \times \left(\dfrac{2,20,000}{220}\right)$	(60,000)
Cost of Goods Sold (160 units)		**1,60,000**
Variable selling costs	$160 \times \left(\dfrac{1,60,000}{400}\right)$	64,000
Fixed selling costs	2,40,000/4	60,000

Cost of Sales		**2,84,000**
Over-absorption of FOH	Note 2	(4,000)
Revised Cost of sales		**2,80,000**
Profit		40,000
Sales	**160 units x 2,000**	**3,20,000**

Note 1: Computation of OAR for Fixed Production Cost:

$$OAR = \frac{\text{Budgeted Fixed Production Cost}}{\text{Budgeted Production}} = \frac{1,60,000}{800} = \text{Rs. 200 per unit}$$

Note 2: Computation of Overheads Absorbed and under/over absorption:

- Overheads absorbed = (SR x AO) = (200 x 220) = Rs.44,000
- Under-absorption/over-absorption = OH Absorbed – Actual Fixed Overheads
- Under-absorption/over-absorption = (44,000 –40,000) = Rs.4,000 (over-absorption)

WN 2: Income statement under Marginal Costing Method:

Particulars	Calculation	Amount
Sales	160 units x 2,000	3,20,000
Less: Variable costs	Note 1	(1,92,000)
Contribution		**1,28,000**
Less: Fixed costs	40,000 + 60,000	(1,00,000)
Profit		**28,000**

Note 1: Computation of variable costs:

Particulars	Calculation	Amount
Variable production cost		1,76,000
Add: Opening FG		0
Less: Closing FG	$60 \times \left(\frac{1,76,000}{220}\right)$	(48,000)
Variable cost of goods sold		**1,28,000**
Other variable costs	160 x 400	64,000
Total variable costs		**1,92,000**

CHAPTER 15: BUDGET & BUDGETARY CONTROL

1. What is budget and budgeting? **[Category A]**
 ❖ Budget is a quantitative expression of a plan for a defined period of time. It may include planned sales volumes, resource requirements, costs and expenses, assets, liabilities and cash flows
 ❖ Budgeting refers to the process of preparing the budget by coordinating with the various departments within the company

2. What are the essential elements of a budget? **[Category B]**
 ❖ Organisational structure should be clearly defined and responsibilities are assigned to identifiable units within the organization
 ❖ Setting of clear objectives with reasonable targets
 ❖ Objectives and degree of responsibility should be clearly stated and communicated
 ❖ Budget may be prepared for future periods based on expected course of action
 ❖ Budgets should be revised for events that were not kept while preparing the budgets. Hence budget should be flexible for mid-term revision
 ❖ Budgets should be quantifiable and master budget should be broken down into various functional budgets
 ❖ Periodical monitoring of budgets and budgetary performance must be linked effectively to the reward system

3. What are the characteristics of a budget? **[Category B]**
 ❖ Budget is concerned for a definite time period
 ❖ Budget is a written document
 ❖ Budget is a detailed plan of all economic activities of a business
 ❖ Budget is a mean to achieve business and it is not an end in itself
 ❖ Budget helps in planning, coordination and control
 ❖ Budget needs to be updated, corrected and controlled every time when circumstances change
 ❖ Budget acts as a business barometer
 ❖ Budget is usually prepared in the light of past experiences

4. What are the objectives of budgeting? **[Category C]**
 ❖ **Planning:** Budgeting is dependent on effective planning within an organization. Budget plans are made in line with the overall objectives of the organization. Individual plans at unit level must be in line with organization plan. Budgets reflect plans and that planning should have taken place before budgets are prepared.
 ❖ **Directing and coordinating:** Budget plans can be used to direct and coordinate operations in order to achieve the stated targets. Business is much more complex and requires more formal direction and coordination. Budgetary units of an organization are called responsibility centers. Objectives and degree of a performance expected from responsibility centres are communicated periodically and hence the same can help in proper direction and coordination
 ❖ **Controlling:** Actual performance of the company is compared against the planned targets and this enables the company in effective control. Deviations in the performance are analyzed and the same helps prevent unplanned expenditures. Budget encourages employees to establish their spending priorities

5. What is Budgetary Control? **[Category B]**
 ❖ Budgetary control is the establishment of budgets relating to the responsibilities of executives of a company and the continuous comparison of the actual with the budgeted results.
 ❖ Budgetary control involves:
    o Establishment of budgets
    o Continuous comparison of actual with budgets for achievement of targets
    o Revision of budgets after considering changed circumstances
    o Placing the responsibility for failure to achieve the budget targets

6. What are objectives of budgetary control? **[Category B]**
 ❖ Determining targets of performance for each section or department of the business

- ❖ Laying down the responsibilities of each of the executives
- ❖ Providing a basis for the comparison of actual performance with the predetermined targets and investigation of the deviation
- ❖ Ensuring best use of available resources to maximize profit
- ❖ Coordinating the various activities of the business
- ❖ Drawing up long range plans with fair measure of accuracy
- ❖ Providing a yardstick against which actual results can be compared

7. Explain the role of a budget officer? **[Category C]**
- ❖ The responsibility for successful implementation of a budgetary control system rests with the budget committee acting through the budget officer
- ❖ The main responsibilities of the budget officer are:
   - o Assisting in preparation of the various budgets
   - o Forwarding the budget to the responsible individuals
   - o Preparing periodical reports to compare actuals against budget to the concerned
   - o Follow-up for action on the budget reports
   - o Providing periodical reports for the board meeting

8. What are the advantages of budgetary control system? **[Category C]**
- ❖ **Efficiency:** Helps the company to reduce unplanned expenditures and hence improves efficiency
- ❖ **Control on expenditure:** Powerful instrument to cut down the expenditure as this is used as a yardstick for evaluating the performance of individuals and departments
- ❖ **Finding deviations:** Reveals deviations in performance as compared to the budget
- ❖ **Effective utilization of resources:** Enables effective utilization of resources as the production is planned after taking the resources into account
- ❖ **Revision of plans:** Review of current trends and based on the plans can be changed
- ❖ **Implementation of standard costing system:** Standard costing system can be implemented only when a plan exist in the organization
- ❖ **Cost consciousness:** Budgets are analyzed by outside fund providers and hence the same encourages management to be cost conscious and target maximum utilization of available resources

9. What are the limitations of budgetary control system? **[Category C]**
- ❖ **Based on estimates:** Budgets are based on estimates prevailing at the time of preparation of budget and the same may require revision if conditions change
- ❖ **Time factor:** Preparation and execution of budgets involves investment of time and cost
- ❖ **Cooperation required:** Staff cooperation is required for successful implementation of the budgetary control system. In a decentralized organization each unit has its own objective and hence may not provide the desired level of cooperation
- ❖ **Expensive:** Implementation of the budgetary control system is expensive. For successful implementation of the system a proper organization structure with responsibility is prerequisite
- ❖ **Not a substitute for management:** Budget is only a managerial tool and must be applied correctly for management to get benefitted. It cannot replace budget
- ❖ **Rigid document:** Budgets are considered to be rigid document and hence it lacks the desired flexibility to absorb various internal and external factors

10. What are the components of budgetary control system? **[Category C]**
- ❖ **Physical budgets:** Physical budgets contain information in terms of physical units like quantity of sales, quantity of production, inventory etc
- ❖ **Cost budgets:** Budgets which provide information in respect of manufacturing, selling and administration cost
- ❖ **Profit budgets:** A budget which enables in the ascertainment of profit, for example sales budget, profit budget
- ❖ **Financial budgets:** A budget which facilitates in ascertaining the financial position of a concern. Example: Capital expenditure budget, cash budget, budgeted balance sheet

11. How a budget is prepared? **[Category C]**

❖ **Definition of objectives:** A budget being a plan for the achievement of certain operational objectives and that the same are defined precisely

❖ **Location of the key (or budget) factor:** There is usually one factor which sets a limit to the total activity. Lack of demand may limit production and hence the same can be a key factor

❖ **Appointment of controller:** Controller is responsible for coordinating and development of budget programmes and preparing the manual of instruction, known as budget manual

❖ **Budget manual:** Effective budgetary planning relies on the provision of adequate information to the individuals involved in the planning process. A budget manual is a collection of documents that contain key information for those involved in the planning process

❖ **Budget period:** The period covered by a budget is known as budget period. There is no general rule governing the selection of the budget period.

❖ **Standard of activity or output:** For preparing budgets for the future, the company must rely on combination of past information and the expectations of the future operating conditions.

12. What is the budget classification on the basis of capacity or flexibility? **[Category A]**

Fixed budget:

❖ A fixed budget is one which remain unchanged irrespective of the level of activity actually attained

❖ Fixed budgeting is used by many service companies and for some administration function of manufacturing companies

❖ Fixed budget is used when the following conditions are satisfied:
   o When the nature of business is not seasonal
   o No impact of external factors on the business activities
   o Demand of the product is certain and stable
   o There is a trend of price stability and supply of production inputs is regular

❖ **Merits:**
   o Very simple to understand
   o Less time consuming

❖ **Demerits:**
   o Misleading as poor performance remain undetected and a good performance may go unrealized
   o Not suitable for long period
   o Accurate estimates are not possible

Flexible budget:

❖ A flexible budget is defined as a budget which recognizes the difference between fixed, variable and semi-variable costs and hence shows the expected costs at different activity levels

❖ Flexible budget is suitable for the following situations:
   o Seasonal fluctuations in sales and/or production
   o Company which keeps introducing new products
   o Industries engaged in make-to-order business
   o Industry which is influenced by changes in fashion and
   o General changes in sales

❖ **Merits:**
   o Cost and profits may be calculated easily at various levels of production capacity
   o Adjustment is very simple according to change in business conditions
   o Determination of production level which can lead to maximum profits
   o Shows the quantity of product to be produced to earn determined profit

❖ **Demerits:**
   o Formulation of flexible budget is possible only when proper accounting system is maintained
   o Flexible budget also requires system of standard costing
   o Very expensive and labour oriented

13. Difference between fixed and flexible budget? **[Category A]**

Fixed Budget	Flexible Budget

Does not change with actual volume of activity	Can be re-cased on the basis of activity level to be achieved
Operates at one level of activity under one set of conditions	Consists of various budgets for different levels of activity
All costs are related to only one level of activity and hence variance analysis does not give useful information	Analysis of variance provides useful information as cost is analysed according to its behaviour
If the budgeted and actual activity differ significantly then the aspect like cost ascertainment and price fixation do not give a correct picture	Flexible budgeting at different levels of activity facilitates the ascertainment of cost, fixation of selling price and tendering of quotations

14. How budgets are classified on the basis of function? **[Category B]**
❖ A functional budget is one which is related to function of the business.
❖ Functional budgets are prepared for each function and they are subsidiary to the master budget of the business
❖ Commonly used functional budgets are:
   o Sales budget
   o Production budget
   o Plant utilization budget
   o Direct material usage budget
   o Direct material purchase budget
   o Direct labour budget
   o Factory overhead budget
   o Production cost budget
   o Ending inventory budget
   o Cost of goods sold budget
   o Selling and distribution cost budget
   o Administration expenses budget
   o Research and development cost budget
   o Capital expenditure budget
   o Cash budget

15. What is a master budget? **[Category B]**
❖ Post preparation of all functional budgets, the budget officer will prepare the master budget which will consist of budgeted profit and loss account and budgeted balance sheet
❖ Master budget represents a standard for the achievement of which all the departments will work

16. How are budgets classified on the basis of period? **[Category B]**
❖ **Long term budget:** The budgets are prepared to depict the long term planning of the business. The period of long term budgets varies between three to ten years
❖ **Short term budget:** These budgets are generally for one or two years
❖ **Current budgets:** The period of current budgets is generally of months and weeks

17. What is zero-based budgeting? **[Category B]**
❖ Zero based budgeting is defined as a method of budgeting which requires each cost element to be specifically justified, although the activities to which the budgets relates are being undertaken for the first time.
❖ It involves the following states:
   o Identification and description of decision packages
   o Evaluation of decision packages
   o Ranking of decision packages
   o Allocation of resources
❖ **Advantages:**
   o Provide a systematic approach for evaluation of different activities
   o Various functions are being performed in the best possible way
   o Allocation of resources only after a detailed cost-benefit analysis

  o Areas of wasteful expenditure can be easily identified and eliminated
  o Departmental budgets can be closely linked with company objectives
❖ **Limitations:**
  o Process is very tedious as new data is to be collected
  o ZBB is difficult to implement

18. Differentiate traditional budgeting and zero-based budgeting? **[Category A]**
❖ Traditional budgeting is primarily based on previous level of expenditure whereas zero-based budgeting makes decision oriented approach with justification for every item
❖ Traditional budgeting makes first reference to the past and then adjusts the same for inflation and new programmes. Zero-based budgeting focuses attention to only on decision packages, which enjoy priority to others
❖ In traditional budgeting, some managers can deliberately inflate the budget request. However the same cannot be done under ZBB as the rationale for every item is to be provided
❖ Traditional budgeting is not as clear and as responsive as ZBB
❖ Traditional budgeting makes a routine approach whereas ZBB makes a very straight forward approach and immediately focuses on the decision packages which enjoy priority over others

19. What is performance budgeting? **[Category B]**
❖ Performance budget (PB) is one which presents the purposes and objectives for which funds are required, the costs of the programmes proposed for achieving those objectives, and quantities data measuring the accomplishments and work performed under each programme
❖ PB is a technique of presenting budgets for costs and revenues in terms of functions
❖ PB aims at establishing a relationship between the inputs and the outputs
❖ PB involve the following steps:
  o Establishing a meaningful functional programme and activity classification
  o Bring system of accounting and financial management in accordance with the classification
  o Develop suitable norms, yardsticks, work units of performance and unit costs for various programmes and activities

20. What are budget ratios? **[Category B]**
❖ Budget ratio provides information about the performance level. If the ratio is more than 100%, then the performance is considered as favourable. If the ratio is less than 100%, then the performance is considered as adverse
❖ Following are the various ratios:

Efficiency ratio = Standard Hours / Actual hours
Activity ratio = Standard hours / Budgeted hours
Calendar ratio = Actual working days / Budgeted working days
Standard capacity usage ratio = Budgeted hours / Maximum possible hours
Actual capacity usage ratio = Actual hours / Maximum possible hours
Actual usage of budgeted capacity ratio = Actual hours worked / budgeted hours

 1. **Flexible Budget – Validity of the foreman's claim**
Action Plan Manufacturers normally produce 8,000 units of their product in a month, in their Machine Shop. For the month of January, they had planned for a production of 10,000 units. Owing to a sudden cancellation of a contract in the middle of January, they could only produce 6,000 units in January. Indirect manufacturing costs are carefully planned and monitored in the Machine Shop and the Foreman of the shop is paid a 10% of the savings as bonus when in any month the indirect manufacturing cost incurred is less than the budgeted provision. The Foreman has put in a claim that he should be paid a bonus of Rs. 88.50 for the month of January. The Works Manager wonders how anyone can claim a bonus when the Company has lost a sizeable contract. The relevant figures are as under:

Indirect manufacturing	Expenses for a normal month	Planned for January	Actual costs in January
Salary of foreman	1,000	1,000	1,000
Indirect labour	720	900	600

Indirect material	800	1,000	700
Repairs and maintenance	600	650	600
Power	800	875	740
Tools consumed	320	400	300
Rates and taxes	150	150	150
Depreciation	800	800	800
Insurance	100	100	100
Total	5,290	5,875	4,900

Do you agree with the Works Manager? Is the Foreman entitled to any bonus for the performance in January? Substantiate your answer with facts and figures.

Answer:

WN 1: Analysis of foreman's claim:

- Foreman is paid a bonus of 10% of the savings in indirect manufacturing costs. The planned cost for January is Rs.5,875 whereas the actual cost is Rs.4,990
- Foreman has requested for bonus of Rs.88.50 as the same is based on 10% of savings of Rs.885
- Works manager does not see a need for bonus as the company has lost a sizable order
- In order to decide on bonus payout, we should prepare flexible budget for 6,000 units

WN 2: Flexible budget for 6,000 units:

Particulars	Calculation	Amount
Variable costs:		
Indirect labour	$\frac{720}{8,000} \times 6,000$	540
Indirect material	$\frac{800}{8,000} \times 6,000$	600
Tools consumed	$\frac{320}{8,000} \times 6,000$	240
Total Variable cost		**1,380**
Semi-variable costs:		
Repairs and maintenance	Note 1	550
Power	Note 2	725
Total Semi-variable cost		**1,275**
Fixed costs:		
Salary of foreman		1,000
Rates and taxes		150
Depreciation		800
Insurance		100
Total Fixed cost		**2,050**
Total Cost		**4,705**

Conclusion:

The revised budgeted cost is Rs.4,705 and the actual cost is Rs.4,990. Bonus is not payable as there is no savings in cost

Note 1: Analysis of repairs and maintenance cost:

Particulars	Calculation	Amount
Cost for 8,000 units		600
Cost for 10,000 units		650
Variable cost per unit	$\frac{650 - 600}{10,000 - 8,000}$	0.025
Total Fixed cost	Total cost – Total Variable cost 600 – (8,000 x 0.025)	400
Total cost for 6,000 units	**400 + (6,000 x 0.025)**	**550**

Note 2: Analysis of power cost:

Particulars	Calculation	Amount

Cost for 8,000 units		800
Cost for 10,000 units		875
Variable cost per unit	$\dfrac{875 - 800}{10,000 - 8,000}$	0.0375
Total Fixed cost	Total cost – Total Variable cost 800 – (8,000 x 0.0375)	500
Total cost for 6,000 units	**500 + (6,000 x 0.0375)**	**725**

2. Flexible Budget with cost escalation:

ABC Ltd. is currently operating at 75% of its capacity. In the past two years, the level of operations was 55% and 65% respectively. Presently, the production is 75,000 units. The company is planning for 85% capacity level during 2006-2007. The cost details are as follows:

Particulars	55%	65%	75%
Direct materials	11,00,000	13,00,000	15,00,000
Direct labour	5,50,000	6,50,000	7,50,000
Factory overheads	3,10,000	3,30,000	3,50,000
Selling overheads	3,20,000	3,60,000	4,00,000
Administrative overheads	1,60,000	1,60,000	1,60,000
Total	**24,40,000**	**28,00,000**	**31,60,000**

Profit is estimated @ 20% on sales.

The following increases in costs are expected during the year:

Particulars	%
Direct materials	8
Direct labour	5
Variable factory overheads	5
Variable selling overheads	8
Fixed factory overheads	10
Fixed selling overheads	15
Administrative overheads	10

Prepare flexible budget for the period 2006-2007 at 85% level of capacity. Also ascertain profit and contribution.

Answer:

Flexible budget for 85% level of capacity (85,000 units):

Particulars	Calculation	Amount
Variable costs:		
Direct material	$\left(\dfrac{11,00,000}{55,000} + 8\%\right)$ x 85,000	18,36,000
Direct Labour	$\left(\dfrac{5,50,000}{55,000} + 5\%\right)$ x 85,000	8,92,500
Variable factory overheads	Note 1	1,78,500
Variable selling overheads	Note 2	3,67,200
Total variable costs		**32,74,200**
Fixed costs:		
Fixed factory overheads	Note 1	2,20,000
Fixed selling overheads	Note 2	1,15,000
Administrative overheads	(1,60,000 + 10%)	1,76,000
Total Fixed Cost		**5,11,000**
Total cost		**37,85,200**
Profit	**1/5 on sales = 1/4 on cost**	**9,46,300**
Total sales		**47,31,500**
Contribution	**Profit + Fixed cost**	**14,57,300**

Note 1: Analysis of factory overheads:

Particulars	Calculation	Amount
Cost for 55,000 units		3,10,000
Cost for 65,000 units		3,30,000

Variable cost per unit	$\dfrac{3,30,000 - 3,10,000}{65,000 - 55,000}$	2
Total Fixed cost	Total cost – Total Variable cost 3,10,000 – (55,000 x 2)	2,00,000
Variable factory OH for 85,000 units	**(2 + 5%) x 85,000**	**1,78,500**
Fixed factory OH for 85,000 units	**(2,00,000 + 10%)**	**2,20,000**

Note 2: Analysis of selling overheads:

Particulars	Calculation	Amount
Cost for 55,000 units		3,20,000
Cost for 65,000 units		3,60,000
Variable cost per unit	$\dfrac{3,60,000 - 3,20,000}{65,000 - 55,000}$	4
Total Fixed cost	Total cost – Total Variable cost 3,20,000 – (55,000 x 4)	1,00,000
Variable selling OH for 85,000 units	**(4 + 8%) x 85,000**	**3,67,200**
Fixed selling OH for 85,000 units	**(1,00,000 + 15%)**	**1,15,000**

3. **Flexible budget:**

RST Limited is presently operating at 50% capacity and producing 30,000 units. The entire output is sold at a price of Rs.200 per unit. The cost structure at the 50% level of activity is as under:

Particulars	Amount
Direct materials	75 per unit
Direct labour	25 per unit
Variable overheads	25 per unit
Direct expenses	15 per unit
Factory expenses (25% fixed)	20 per unit
Selling and distribution expenses (80% variable)	10 per unit
Office and administrative expenses (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.

Answer:

Flexible budget for 50% and 60% capacity:

Particulars	30,000 units		36,000 units	
	Calculation	Amount	Calculation	Amount
Variable costs:				
Direct material	(75+10%) x 30,000	24,75,000	(75+10%) x 36,000	29,70,000
Direct labour	(25+10%) x 30,000	8,25,000	(25+10%) x 36,000	9,90,000
Variable OH	(25+10%) x 30,000	8,25,000	(25+10%) x 36,000	9,90,000
Direct expenses	(15+10%) x 30,000	4,95,000	(15+10%) x 36,000	5,94,000
Factory expenses	(15+10%) x 30,000	4,95,000	(15+10%) x 36,000	5,94,000
S&D expenses	(8+10%) x 30,000	2,64,000	(8+10%) x 36,000	3,16,800
Total Variable costs		**53,79,000**		**64,54,800**
Fixed costs:				
Admin expenses	(5 x 30,000) + 15%	1,72,500	(5 x 30,000) + 15%	1,72,500
Factory expenses	(5 x 30,000) + 15%	1,72,500	(5 x 30,000) + 15%	1,72,500
S&D Expenses	(2 x 30,000) + 15%	69,000	(2 x 30,000) + 15%	69,000
Total fixed cost		**4,14,000**		**4,14,000**
Total cost		**57,93,000**		**68,68,800**
Profit		2,07,000		3,31,200
Sales	**200 x 30,000**	**60,00,000**	**200 x 36,000**	**72,00,000**
Contribution	**2,07,000 + 4,14,000**	**6,21,000**	**3,31,200 + 4,14,000**	**7,45,200**

4. **Flexible budget:**

Little Angel School has a total of 150 students consisting of 5 sections with 30 students per section. The school plans for a picnic around the city during the weekend to places such as the zoo, the amusement

park, the planetarium etc. A private transport operator has come forward to lease out the buses for taking the students. Each bus will have a maximum capacity of 50 (excluding 2 seats reserves for the teachers accompanying students. The school will employ two teachers for each bus, paying them an allowance of Rs.50 per teacher. It will also lease out the required number of buses. The following are the other cost estimates:

Particulars	Amount
Cost per student:	
Breakfast	Rs.5
Lunch	Rs.10
Tea	3
Entrance fee at zoo	2
Other costs	
Rent	Rs.650 per bus
Special permit fee	Rs.50 per bus
Block entrance fee at the planetarium	Rs.250
Prizes to students for games	Rs.250

No costs are incurred in respect of the accompanying teachers (except the allowance of Rs.50 per teacher).

You are required to prepare:
- A flexible budget estimating the total cost for the levels of 30, 60, 90, 120 and 150 students. Each item of cost is to be indicated separately
- Compare the average cost per student at these levels
- What will be your conclusion regarding the break-even level of student if the school proposes to collect Rs.45 per student?

Answer:

WN 1: Flexible budget for 30, 60, 90, 120 and 150 students:

Particulars	30 students	60 students	90 students	120 students	150 students
Variable costs:					
Breakfast	150	300	450	600	750
Lunch	300	600	900	1,200	1,500
Tea	90	180	270	360	450
Entrance fees	60	120	180	240	300
Total variable cost	**600**	**1,200**	**1,800**	**2,400**	**3,000**
Semi-variable costs:					
Teacher allowance	100	200	200	300	300
Rent	650	1,300	1,300	1,950	1,950
Special permit fee	50	100	100	150	150
Total semi-variable cost	**800**	**1,600**	**1,600**	**2,400**	**2,400**
Fixed Cost:					
Block entrance fees	250	250	250	250	250
Prizes to students	250	250	250	250	250
Total Fixed Cost	**500**	**500**	**500**	**500**	**500**
Total cost	**1,900**	**3,300**	**3,900**	**5,300**	**5,900**
No of students	**30**	**60**	**90**	**120**	**150**
Cost per student	**63.33**	**55.00**	**43.33**	**44.17**	**39.33**

WN 2: Computation of Break-even Point:

Particulars	50 students	100 students	150 students
Semi-variable cost	800	1,600	2,400
Fixed cost	500	500	500
Total Fixed cost	**1,300**	**2,100**	**2,900**
Contribution per student (45 – 20)	25	25	25
Tentative BEP	**52**	**84**	**116**
Final BEP	**Invalid**	**84**	**116**

- 52 is invalid BEP as the same does not fall in class interval of 1 to 50
- 84 and 116 are valid BEP as they fall in respective class intervals

5. Flexible budget:

Maximum production capacity of KM (P) Limited is 28,000 units per month. Output at different levels along with cost data is furnished below:

Particulars	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 calculate the selling price per unit at an activity level of 24,000 units by considering a profit at the rate of 25% on sales.

Answer:

Flexible budget for 24,000 units:

Particulars	Calculation	Amount
Variable costs:		
Direct material	$\left(\dfrac{12,80,000}{16,000}\right)$ x 24,000	19,20,000
Direct Labour	$\left(\dfrac{17,60,000}{16,000}\right)$ x 24,000	26,40,000
Factory Overheads	Note 1	28,80,000
Total cost		**74,40,000**
Add: Profit	1/4 on sales = 1/3 on cost	24,80,000
Total sales		**99,20,000**
No of units		24,000
Selling price	**99,20,000/24,000**	**413.33**

Note 1: Analysis of factory overheads:

Particulars	Calculation	Amount
Cost for 16,000 units		22,00,000
Cost for 18,000 units		23,70,000
Variable cost per unit	$\dfrac{23,70,000 - 22,00,000}{18,000 - 16,000}$	85
Total Fixed cost	Total cost – Total Variable cost 22,00,000 – (16,000 x 85)	8,40,000
Variable factory OH for 24,000 units	**24,000 x 85**	**20,40,000**
Fixed factory OH for 24,000 units		**8,40,000**
Total factory overheads		**28,80,000**

6. Flexible budgets:

Pentax Limited has prepared its expense budget for 20,000 units in its factory for the year 2013 as detailed below:

Particulars	Rs. 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.

Answer:

Flexible budget for 15,000 units and 18,000 units:

Particulars	15,000 units		18,000 units	
	Calculation	**Amount**	**Calculation**	**Amount**
Variable costs:				

Direct material	50 x 15,000	7,50,000	50 x 18,000	9,00,000
Direct labour	20 x 15,000	3,00,000	20 x 18,000	3,60,000
Variable OH	15 x 15,000	2,25,000	15 x 18,000	2,70,000
Direct expenses	6 x 15,000	90,000	6 x 18,000	1,08,000
Selling expenses	12 x 15,000	1,80,000	12 x 18,000	2,16,000
Distribution expenses	10.20 x 15,000	1,53,000	10.20 x 18,000	1,83,600
Total Variable costs		**16,98,000**		**20,37,600**
Fixed costs:				
Selling expenses	3 x 20,000	60,000	3 x 20,000	60,000
Factory expenses	7 x 20,000	1,40,000	7 x 20,000	1,40,000
Admin expenses	4 x 20,000	80,000	4 x 20,000	80,000
Distribution expenses	1.80 x 20,000	36,000	1.80 x 20,000	36,000
Total fixed cost		**3,16,000**		**3,16,000**
Total cost		**20,14,000**		**23,53,600**
No of units		15,000		18,000
Cost per unit		**134.27**		**130.76**

7. Functional Budgets

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

Quarter	Sales in units
I	30,000
II	37,500
III	41,250
IV	45,000

The opening stock of finished goods is 10,000 units and the company expect to maintain the closing stock of finished goods at 16,250 units at the end of the year. The production pattern in each quarter is based on 80% of the sales of the current quarter and 20% of the sales of the next quarter. The opening stock of raw materials in the beginning of the year is 10,000 kg. and the closing stock at the end of the year is required to be maintained at 5,000 kg. Each unit of finished output requires 2 kg. of raw materials.

The company proposes to purchase the entire annual requirement of raw materials in the first three quarters in the proportion and at the prices given below:

Quarter	Purchase of raw material as % of total annual requirement	Price per KG
I	30%	2
II	50%	3
III	20%	4

The value of the opening stock of raw materials in the beginning of the year is Rs. 20,000. You are required to present the following for the next year, quarter-wise:
- Production budget (in units).
- Raw material consumption budget (in quantity).
- Raw material purchase budget (in quantity and value).
- Priced stores ledger card of the raw material using First in First out method.

Answer:

WN 1: Quarterly Production Budget

Particulars	Q1	Q2	Q3	Q4	Total
80% of current quarter sales	24,000	30,000	33,000	36,000	1,23,000
20% of next quarter sales	7,500	8,250	9,000	12,250	37,000
Total	**31,500**	**38,250**	**42,000**	**48,250**	**1,60,000**

Note:
- Annual production for the year as per WN 2 is 1,60,000 units. Production for three quarters is known and hence Q4 production is balancing figure
- Q4 production = 1,60,000 – 31,500 – 38,250 – 42,000 = 48,250 units

WN 2: Annual Production Budget:

Particulars	Units

Sales	1,53,750
Add: Closing stock	16,250
Less: Opening stock	(10,000)
Production	**1,60,000**

WN 3: Raw material consumption budget:

Particulars	Q1	Q2	Q3	Q4	Total
Production	31,500	38,250	42,000	48,250	1,60,000
Input: Output ratio	2:1	2:1	2:1	2:1	
Raw material consumed	**63,000**	**76,500**	**84,000**	**96,500**	**3,20,000**

WN 4: Annual RM Purchase budget:

Particulars	Units
RM consumption	3,20,000
Add: Closing stock	5,000
Less: Opening stock	(10,000)
RM purchased	**3,15,000**

WN 5: Quarterly RM Purchase budget:

Particulars	Q1	Q2	Q3	Total
Proportion of purchases made	30%	50%	20%	100%
RM purchased quantity	94,500	1,57,500	63,000	3,15,000
Purchase price	2	3	4	
Value of purchases	**1,89,000**	**4,72,500**	**2,52,000**	**9,13,500**

WN 6: Priced stores ledger using FIFO Method:

Date	Particulars	Receipts			Issues			Balance		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Q1	Op balance							10,000	2	20,000
Q1	Purchase	94,500	2	1,89,000				1,04,500	2	2,09,000
Q1	Consumption				63,000	2	1,26,000	41,500	2	83,000
Q2	Purchase	1,57,500	3	4,72,500				41,500	2	83,000
								1,57,500	3	4,72,500
Q2	Consumption				41,500	2	83,000	1,22,500	3	3,67,500
					35,000	3	1,05,000			
Q3	Purchase	63,000	4	2,52,000				1,22,500	3	3,67,500
								63,000	4	2,52,000
Q3	Consumption				84,000	3	2,52,000	38,500	3	1,15,500
								63,000	4	2,52,000
Q4	Consumption				38,500	3	1,15,500	5,000	4	20,000
					58,000	4	2,32,000			

8. **Functional budgets**

Following is the budget for the first six months of the year 2009 in respect of PQR Limited:

Month	January	February	March	April	May	June
Sales (units)	10,000	12,000	14,000	15,000	15,000	16,000

FG inventory at the end of each month is expected to be 20 percent of budgeted sales quantity for the following month. FG inventory was 2,700 units as on Jan 1, 2009. There would be no work in progress at the end of the month. Each unit of finished product requires two types of materials as detailed below:

- Material X = 4 kgs @ Rs.10/kg
- Material Y = 6 kgs @ Rs.15/kg

Material on hand on January 1, 2009 was 19,000 kgs of material X and 29,000 kgs of material Y. Monthly closing stock of material is budgeted to be equal to half of the requirements of the next month's production. Budgeted direct labour hour per unit of production is ¾ hour. Budgeted direct labour cost for the first quarter of the year was Rs.10,89,000.

Actual data for the quarter ended March 2009 was as follows:

Particulars	Amount
Actual production quantity	40,000 units

Direct material cost (purchase cost based on material actually issued)	
Material X	1,65,000 kgs @ Rs.10.20 per kg
Material Y	2,38,000 kgs @ Rs.15.10 per kg
Actual direct labour hours worked	32,000 hours
Actual direct labour cost	Rs.13,12,000

Required:
- Prepare the following budgets:
  - Monthly production quantity for the quarter one
  - Monthly raw material consumption budget from January 2009 to April 2009
  - Materials purchase quantity budget for the quarter one
- Compute the following variances:
  - Material cost variance
  - Material price variance
  - Material usage variance
  - Direct labour cost variance
  - Direct labour rate variance
  - Direct labour efficiency variance

Answer:
WN 1: Production budget for the month of January to April 2009:

Particulars	January	February	March	April
Sales	10,000	12,000	14,000	15,000
Add: Closing stock (20% of next month sales)	2,400	2,800	3,000	3,000
Less: Opening stock	(2,700)	(2,400)	(2,800)	(3,000)
Production	**9,700**	**12,400**	**14,200**	**15,000**

WN 2: Raw material consumption budget for January to April 2009:

Particulars	January		February		March		April	
	X	Y	X	Y	X	Y	X	Y
Production	9,700	9,700	12,400	12,400	14,200	14,200	15,000	15,000
Input: Output ratio	4:1	6:1	4:1	6:1	4:1	6:1	4:1	6:1
RM Consumed	**38,800**	**58,200**	**49,600**	**74,400**	**56,800**	**85,200**	**60,000**	**90,000**
Cost per KG	10	15	10	15	10	15	10	15
Value of RM consumed	**3,88,000**	**8,73,000**	**4,96,000**	**11,16,000**	**5,68,000**	**12,78,000**	**6,00,000**	**13,50,000**

WN 3: Raw material purchase budget for January to March 2009:

Particulars	January		February		March	
	X	Y	X	Y	X	Y
RM Consumption	38,800	58,200	49,600	74,400	56,800	85,200
Add: Closing stock (50% of next month consumption)	24,800	37,200	28,400	42,600	30,000	45,000
Less: Opening stock	(19,000)	(29,000)	(24,800)	(37,200)	(28,400)	(42,600)
RM Purchased	**44,600**	**66,400**	**53,200**	**79,800**	**58,400**	**87,600**

9. **Functional Budgets**

A company is engaged in the manufacture of specialized sub-assemblies required for certain electronic equipment. The company envisages that in the forthcoming month, December, 2006, the sales will take a pattern in the ratio of 3: 4: 2 respectively of subassemblies, ACB, MCB and DP.
The following is the schedule of components required for manufacture:

Sub-assembly	Selling Price	Base Board	Component requirements		
			IC08	IC12	IC26
ACB	520	1	8	4	2
MCB	500	1	2	10	6

DP	350	1	2	4	8
Purchase price		60	20	12	8

The direct labour time and variable overheads required for each of the sub-assemblies are:

Sub-assembly	Variable OH per sub-assembly	Labour hours per sub-assembly	
		Grade A	Grade B
ACB	36	8	16
MCB	24	6	12
DP	24	4	8
Direct wage rate per hour		5	4

The labourers work 8 hours a day for 25 days a month. The opening stocks of sub-assemblies and components for December, 2006 are as under:

Sub-assemblies		Components	
ACB	800	Baseboard	1,600
MCB	1,200	IC08	1,200
DP	2,800	IC12	6,000
		IC26	4,000

Fixed overheads amount to Rs. 7,57,200 for the month and a monthly profit target of Rs. 12 lacs has been set. The company is eager for a reduction of closing inventories for December, 2006 of subassemblies and components by 10% of quantity as compared to the opening stock.

Prepare the following budgets for December 2006:

(i) Sales budget in quantity and value.

(ii) Production budget in quantity

(iii) Component usage budget in quantity.

(iv) Component purchase budget in quantity and value.

(v) Manpower budget showing the number of workers and the amount of wages payable.

Answer:

WN 1: Computation of contribution per unit of ACB, MCB and DP:

Particulars	ACB	MCB	DP
Selling Price	520	500	350
Less: Variable costs:			
Baseboard	(60)	(60)	(60)
IC08	(160)	(40)	(40)
IC12	(48)	(120)	(48)
IC26	(16)	(48)	(64)
Grade A Labour	(40)	(30)	(20)
Grade B Labour	(64)	(48)	(32)
Variable overheads	(36)	(24)	(24)
Contribution per unit	**96**	**130**	**62**

WN 2: Computation of units to be sold to achieve target profit:

- Let us assume one set contains 3 units of ACB, 4 units of MCB and 2 units of DP
- Contribution per set = (3 x 96) + (4 x 130) + (2 x 62) = 932

Sets to be sold	$\dfrac{\text{Desired Profit + Fixed cost}}{\text{Contribution per set}} = \dfrac{12,00,000 + 7,57,200}{932}$	**2,100 sets**
Units of ACB to be sold	2,100 x 3	**6,300 units**
Units of MCB to be sold	2,100 x 4	**8,400 units**
Units of DP to be sold	2,100 x 2	**4,200 units**

WN 3: Sales budget:

Particulars	ACB	MCB	DP	Total
Units to be sold	6,300	8,400	4,200	
Selling price	520	500	350	
Value of sales	**32,76,000**	**42,00,000**	**14,70,000**	**89,46,000**

WN 4: Production budget:

Particulars	ACB	MCB	DP

Sales	6,300	8,400	4,200
Add: Closing stock	720	1,080	2,520
Less: Opening stock	(800)	(1,200)	(2,800)
Production	**6,220**	**8,280**	**3,920**

WN 5: Component usage budget:

Particulars	Baseboard	IC08	IC12	IC26
ACB				
Production	6,220	6,220	6,220	6,220
Input: Output ratio	1:1	8:1	4:1	2:1
RM required	6,220	49,760	24,880	12,440
MCB				
Production	8,280	8,280	8,280	8,280
Input: Output ratio	1:1	2:1	10:1	6:1
RM required	8,280	16,560	82,800	49,680
DP				
Production	3,920	3,920	3,920	3,920
Input: Output ratio	1:1	2:1	4:1	8:1
RM required	3,920	7,840	15,680	31,360
Total RM required	**18,420**	**74,160**	**1,23,360**	**93,480**

WN 5: Component purchase budget:

Particulars	Baseboard	IC08	IC12	IC26	Total
RM consumed	18,420	74,160	1,23,360	93,480	
Add: Closing stock	1,440	1,080	5,400	3,600	
Less: Opening stock	(1,600)	(1,200)	(6,000)	(4,000)	
RM purchase quantity	**18,260**	**74,040**	**1,22,760**	**93,080**	
Purchase price	60	20	12	8	
Value of purchases	**10,95,600**	**14,80,800**	**14,73,120**	**7,44,640**	**47,94,160**

WN 6: Manpower budget:

Particulars	Grade A	Grade B
ACB		
Production	6,220	6,220
Hours required per unit	8	16
Overall hours required	49,760	99,520
MCB		
Production	8,280	8,280
Hours required per unit	6	12
Overall hours required	49,680	99,360
DP		
Production	3,920	3,920
Hours required per unit	4	8
Overall hours required	15,680	31,360
Total hours required (A)	**1,15,120**	**2,30,240**
Working hours per employee per month (B)	200	200
Number of workers required (A/B)	**576**	**1,152**
Wages per month per worker	**1,000**	**800**
Total wage cost	**5,76,000**	**9,21,600**

10. Functional budgets

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:

Particulars	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 Rs. 4 and Rs. 6 per kg and labours are paid Rs. 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 downtime 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 and end of the period will be:

Particulars	Beginning of period	End of period
Product A	400 units	4 days of sales
Product B	200 units	5 days of sales
Material X	1,000 kg	10 days of consumption
Material Y	500 kg	6 days of consumption

Required:

Calculate the Material Purchase Budget and the Wages Budget for the direct workers, showing the quantities and values, for the next month.

Answer:

WN 1: Production budget of Product A and Product B:

Particulars	A	B
Sales	2,400	3,600
Add: Closing stock	480	900
	(2,400 x 4/20)	(3,600 x 5/20)
Less: Opening stock	(400)	(200)
Production	**2,480**	**4,300**

WN 2: Raw material consumption budget:

Particulars	Material X	Material Y
Product A		
Production	2,480	2,480
Input: Output ratio	5:1	4:1
RM required	12,400	9,920
Product B		
Production	4,300	4,300
Input: Output ratio	3:1	6:1
RM required	12,900	25,800
Total RM required	**25,300**	**35,720**

WN 3: Raw material purchase budget:

Particulars	Material X	Material Y
RM consumption	25,300	35,720
Add: Closing stock	12,650	10,716
	(25,300 x 10/20)	(35,720 x 6/20)
Less: Opening stock	(1,000)	(500)
RM purchase quantity	**36,950**	**45,936**
Purchase Price	4	6
Value of purchases	**1,47,800**	**2,75,616**

WN 4: Manpower budget:

Particulars	Amount
Product A	
Production	2,480
Hours per unit	3

Overall hours required	7,440
Product B	
Production	4,300
Hours per unit	5
Overall hours required	21,500
Total hours required (standard time)	**28,940**
Efficiency	80%
Revised hours worked (28,940/80%)	**36,175**
Add: Additional non-productive downtime (36,175 x 20%)	7,235
Revised hours required	**43,410**
Normal time (180 x 160 hours)	28,800
Overtime working (43,410 – 28,800)	14,610
Total wages cost (28,800 x 25 + 14,610 x 37.50)	**12,67,875**

Note:

- It is assumed that non-productive downtime is on total hours worked by employees (36,175) and not on standard hours to be worked (28,940)

11. Functional budgets:

V Limited produces and markets a very popular product called 'X'. The company is interested in presenting its budget for the second quarter of 2019:

The following information are made available for this purpose:

- It expects to sell 50,000 bags of 'X' during the second quarter of 2019 at the selling price of Rs.900 per bag
- Each bag of 'X' requires 2.5 kgs of a raw material called 'Y' and 7.5 kgs of raw material called 'Z'
- Stock levels are planned as follows:

Particulars	Beginning of quarter	End of quarter
Finished bags of X	15,000	11,000
Raw material Y	32,000	26,000
Raw material Z	57,000	47,000
Empty bags	37,000	28,000

- Y cost Rs.120 per kg, Z costs Rs.20 per kg and empty bag costs Rs.80 each
- It requires 9 minutes of direct labour to produce and fill one bag of X. Labour cost is Rs.50 per hour
- Variable manufacturing costs are Rs.45 per bag. Fixed manufacturing costs Rs.30,00,000 per quarter.
- Variable selling and administration expenses are 5% of sales and fixed administration and selling expenses are Rs.20,50,000 per quarter.

Required:

    (i)   Prepare a production budget for the said quarter
    (ii)   Prepare a raw material purchase budget for Y, Z and Empty Bags for the said quarter in quantity as well as in rupees
    (iii)   Compute the budgeted variable cost to produced on bag of X
    (iv)   Prepare a statement of budgeted net income for the said quarter and show both per unit and total cost data

Answer:

WN 1: Production budget for Product X:

Particulars	Product X
Sales	50,000
Add: Closing stock	11,000
Less: Opening stock	(15,000)
Production	**46,000**

WN 2: Raw material consumption budget for Y, Z and Empty Bags:

Particulars	Y	Z	Empty Bags
Production	46,000	46,000	46,000
Input: Output ratio	2.5:1	7.5:1	1:1

RM required		1,15,000	3,45,000		46,000	

WN 3: Raw material purchase budget:

Particulars	Y	Z	Empty Bags
RM consumption	1,15,000	3,45,000	46,000
Add: Closing stock	26,000	47,000	28,000
Less: Opening stock	(32,000)	(57,000)	(37,000)
RM purchase quantity	**1,09,000**	**3,35,000**	**37,000**
Purchase Price	120	20	80
Value of purchases	**1,30,80,000**	**67,00,000**	**29,60,000**

WN 4: Computation of budgeted variable cost to produce one unit:

Particulars	Calculation	Amount
Raw material:		
Material Y	120 x 2.50	300.00
Material Z	20 x 7.50	150.00
Empty bags	80 x 1.00	80.00
Labour cost	50 x (9/60)	7.50
Variable manufacturing cost		45.00
Variable cost of production (per unit)		**582.50**

WN 5: Net income statement for the quarter:

Particulars	Calculation	Total	Per unit
Sales	900.00 x 50,000	4,50,00,000	900.00
Less: Variable cost of production	582.50 x 50,000	(2,91,25,000)	(582.50)
Less: Variable selling expenses	900.00 x 5% x 50,000	(22,50,000)	(45.00)
Less: Fixed manufacturing cost		(30,00,000)	(60.00)
Less: Fixed administration cost		(20,50,000)	(41.00)
Profit		**85,75,000**	**171.50**

12. **Functional budgets:**

A firm is engaged in the manufacture of two products 'A' and 'B'. Product A uses one unit of component 'P' and two units of components 'Q'. Product B uses two units of component 'P', one unit of component 'Q' and two units of component 'R'. Component 'R' which is assembled in the factory uses one unit of component 'Q'. Components 'P' and 'Q' are purchased from the market.

The firm has prepared the following forecast of sales and inventory for the next year:

Particulars	Product A	Product B
Sales	8,000	15,000
Inventory at the end of year	1,000	2,000
Inventory at the beginning of the year	3,000	5,000

The production of both the products and the assembling of the component 'R' will be spread out uniformly throughout the year. The firm at present the orders its inventory of components 'P' and 'Q' in quantities equivalent to 3 months' consumption. The firm has been advised that savings in the provisioning of components can arise by changing over to the ordering quantities. The firm has compiled the following data relating to the two components:

Particulars	Component P	Component Q
Component usage per annum	30,000	48,000
Price per unit	2.00	0.80
Order placing costs per order	15.00	15.00
Carrying costs per annum	20%	20%

Required:

 (i) Prepare a budget of production and requirements of components for the next year
 (ii) Find the economic order quantity
 (iii) Based on the economic order quantity, calculate the savings arising from switching over to the new ordering system both in terms of cost and reduction in working capital

Answer:

WN 1: Production budget:

Particulars	A	B
Sales	8,000	15,000
Add: Closing stock	1,000	2,000
Less: Opening stock	(3,000)	(5,000)
Production	**6,000**	**12,000**

WN 2: Component requirement budget:

Particulars	P	Q	R
Product A			
Production	6,000	6,000	6,000
Input: Output ratio	1:1	2:1	-
RM required	6,000	12,000	-
Product B			
Production	12,000	12,000	12,000
Input: Output ratio	2:1	1:1	2:1
RM required	24,000	12,000	24,000
Total RM required	**30,000**	**24,000**	**24,000**
Component Q required to manufacture R		24,000	
Final component required to be purchased	**30,000**	**48,000**	**0**

WN 3: Computation of EOQ and savings from shifting to EOQ:

Particulars	Calculation	Product P	Product Q
Annual demand		30,000	48,000
Ordering cost per order		15.00	15.00
Carrying cost per unit per annum	20% x 2.00 20% x 0.80	0.40	0.16
EOQ	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$	1,500	3,000

WN 4: Computation of savings in cost by shifting to EOQ:

Particulars	Product P		Product Q	
	Existing	EOQ	Existing	EOQ
Annual demand	30,000	30,000	48,000	48,000
Quantity per order	7,500	1,500	12,000	3,000
No of orders (AD/QPD)	4	20	4	16
Ordering cost per order	15	15	15	15
Total ordering cost	60	300	60	240
Average inventory	3,750	750	6,000	1,500
Carrying cost per unit	0.40	0.40	0.16	0.16
Total carrying cost	1,500	300	960	240
Total of ordering and carrying cost	1,560	600	1,020	480
Savings in cost	-	1,060	-	540

13. **Production budget:**

The following information has been made available from the records of XYZ ltd for the six months of 2007 (and the sales of January 2008) in respect of Product X:

- Units to be sold in different months are:

July 2007	1,100	November 2007	2,500
August 2007	1,100	December 2007	2,300
September 2007	1,700	January 2008	2,000
October 2007	1,900		

- There will be no work in progress at the end of any month

- Finished units equal to half the sales of the next month will be in stock at the end of every month (including June 2007)
- Budgeted production and production cost for the year ending 31st December 2007 are:
  - Production = 22,000 units
  - Direct material per unit = Rs.10
  - Direct wages per unit = Rs.4
  - Total factory overhead apportioned to production = Rs.88,000

You are required to prepare production budget for the six months of 2007.

Answer:

Particulars	July	August	September	October	November	December
Sales	1,100	1,100	1,700	1,900	2,500	2,300
Add: Closing stock (50% of next month sales)	550	850	950	1,250	1,150	1,000
Less: Opening stock	(550)	(550)	(850)	(950)	(1,250)	(1,150)
Production	**1,100**	**1,400**	**1,800**	**2,200**	**2,400**	**2,150**
Cost per unit	18	18	18	18	18	18
Cost of Production	**19,800**	**25,200**	**32,400**	**39,600**	**43,200**	**38,700**

Note:

- Opening stock of July = Closing stock of June.
- Closing stock of June = 50% of July sales = 1,100 x 50% = 550
- Cost per unit = 10 + 4 + (88,000/22,000) = 18 per unit

14. Functional budget with loss:

G Ltd. manufactures two products called 'M' and 'N'. Both products use a common raw material Z. The raw material Z is purchased @ Rs. 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):

Particulars	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 order is Rs. 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:

- (i) Prepare functional budgets for the year ended 31st March 2016 under the following headings:
  - a. Production budget for Products M and N (in units).
  - b. Purchases budget for Material Z (in kgs and value).
- (ii) Calculate the Economic Order Quantity for Material Z (in kgs).
- (iii) 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.

Answer:

WN 1: Production budget:

Particulars	Product M	Product N
Sales	28,000	13,000
Add: Stock increase (CS – OS)	320	160
Good units to be produced (A)	**28,320**	**13,160**
Rejection rate	4%	6%
Good production rate (B)	96%	94%

Total Production (A/B)	29,500	14,000

WN 2: Raw material consumption/purchase budget:

Particulars	Calculation	Amount
Product M		
Production		29,500
Input: Output ratio		5:1
Good RM required	29,500 x 5	1,47,500
Wastage %		10%
Good RM %		90%
Total RM required	**1,47,500/90%**	**1,63,889**
Product N		
Production		14,000
Input: Output ratio		6
Good RM required	14,000 x 6	84,000
Wastage %		5%
Good RM %		95%
Total RM required	**84,000/95%**	**88,421**
Overall RM to be purchased/consumed		**2,52,310**

WN 3: Computation of EOQ:

Particulars	Calculation	Amount
Annual demand		2,52,310
Ordering cost per order		320
Carrying cost per unit per annum	11% x 36	3.96
EOQ	$\sqrt{\dfrac{2 \times \text{Annual demand} \times \text{Ordering cost per order}}{\text{Carrying cost per unit per annum}}}$	6,386 units

WN 4: Computation of maximum possible production if the supplier can give only 4,000 kgs at a time:

Particulars	Calculation	Amount
Annual requirement		2,52,310
Maximum purchase	4,000 kg x 40 orders	1,60,000
% of requirement met	$\dfrac{1,60,000}{2,52,310} \times 100$	63.4141%
Planned production of A		29,500
Possible production of A	29,500 x 63.4141%	**18,707**
Planned production of B		14,000
Possible production of B	14,000 x 63.4141%	**8,878**

15. Calculation of budget ratios:

Following data is available for ABC Limited:

Standard working hours	8 hours per day of 5 days per week
Maximum capacity	50 employees
Actual working	40 employees
Actual hours expected to be worked per four weeks	6,400 hours
Standard hours expected to be earned per four weeks	8,000 hours
Actuals hours worked in the four-week period	6,000 hours
Standard hours earned in the four-week period	7,000 hours

The related period is of 4 weeks. In this period there was one special day holiday due to national event.
Calculate the following ratios:
- ❖ Efficiency ratio
- ❖ Activity ratio
- ❖ Calendar ratio
- ❖ Standard capacity usage ratio
- ❖ Actual capacity usage ratio

❖ Actual usage of budgeted capacity ratio

Answer:

Computation table:

Standard Hours	Actual Hours	Possible Hours	Budgeted Hours
7,000	6,000	6,080	6,400

Note 1: Computation of Possible Hours:

- 20 days = 6,400 hours
- 19 days = ?
- 19 days = 6,080 hours

Note 2: Computation of FOH Ratios:

$$\text{Efficiency Ratio} = \frac{\text{Standard Time}}{\text{Actual Time}} \times 100 = \frac{7,000}{6,000} \times 100 = 116.67\%$$

$$\text{Calendar Ratio} = \frac{\text{Possible Hours}}{\text{Budgeted Hours}} \times 100 = \frac{6,080}{6,400} \times 100 = 95\%$$

$$\textbf{Activity Ratio} = \frac{\textbf{Standard Hours}}{\textbf{Budgeted Hours}} \times \textbf{100} = \frac{\textbf{7,000}}{\textbf{6,400}} \times \textbf{100} = \textbf{109}.\textbf{38}\%$$

$$\text{Standard Capacity Usage Ratio} = \frac{\text{Budgeted hours}}{\text{Maximum hours}} \times 100 = \frac{6,400}{8,000} \times 100 = 80\%$$

$$\text{Actual Capacity Usage Ratio} = \frac{\text{Actual hours}}{\text{Maximum hours}} \times 100 = \frac{6,000}{8,000} \times 100 = 75\%$$

$$\text{Actual Usage of Budgeted Capacity Ratio} = \frac{\text{Actual hours}}{\text{Budgeted hours}} \times 100 = \frac{6,000}{6,400} \times 100 = 93.75\%$$

16. Functional budget:

Nakata Ltd a Vehicle manufacturer has prepared sales budget for the next few months, and the following draft figures are available:

Month	No of vehicles
October	40,000
November	35,000
December	45,000
January	60,000
February	65,000

To manufacture a vehicle a standard cost of Rs.5,71,400 is incurred and sold through dealers at a uniform selling price of Rs.8,57,100 to customers. Dealers are paid 15% 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 each month to cover 40% of next month's production. 48,000 units of Part-X are in stock as on 1st October.

There are 9,500 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

(i) PREPARE Production budget (in nos.) for the month of October, November, December and January.
(ii) PREPARE a Purchase budget for Part-X (in units) for the months of October, November and December.
(iii) CALCULATE the budgeted gross profit for the quarter October to December

Answer:

WN 1: Production budget for the month of October, November, December and January:

Particulars	October	November	December	January
Sales	40,000	35,000	45,000	60,000
Add: Closing stock (20% of next month sales)	7,000	9,000	12,000	13,000
Less: Opening stock	(9,500)	(7,000)	(9,000)	(12,000)

Production	37,500	37,000	48,000	61,000

WN 2: RM Consumption budget for the month of October, November, December and January:

Particulars	October	November	December	January
Production	37,500	37,000	48,000	61,000
Input: Output ratio	4:1	4:1	4:1	4:1
RM Consumption	**1,50,000**	**1,48,000**	**1,92,000**	**2,44,000**

WN 3: RM Purchase budget for the month of October, November and December:

Particulars	October	November	December
RM Consumption	1,50,000	1,48,000	1,92,000
Add: Closing stock (40% of next month consumption)	59,200	76,800	97,600
Less: Opening stock	(48,000)	(59,200)	(76,800)
RM Purchased	**1,61,200**	**1,65,600**	**2,12,800**

WN 4: Income statement for the quarter of October to December:

Particulars	Calculation	Amount
Selling price		8,57,100
Less: Dealer commission	15% x 8,57,100	(1,28,565)
Less: Manufacturing cost		(5,71,400)
Profit per vehicle		1,57,135
Units to be sold	40,000 + 35,000 + 45,000	1,20,000
Budgeted gross profit		**1885.62 crores**

17. **Computation of selling price:**

A manufacturing company has an installed capacity of 1,50,000 units per annum. Its cost structure is given below:

Particulars	Amount
Variable cost per unit	
Materials	10
Labour (subject to a minimum of Rs.1,00,000 per month)	10
Overheads	4
Fixed overheads per annum	1,92,300
Semi-variable overheads per annum at 75% capacity (It will increase by Rs.4,000 per annum for increase of every 5% of the capacity utilization or any part thereof)	60,000

The capacity utilisation for the next year is budgeted at 75% for first three months, 80% for the next six months and 90% for the remaining three months.

Required: If the company is planning to have a profit of 20% on the selling price, calculate the selling price per unit for the next year

Answer:

WN 1: Computation of production cost:

Particulars	First three months	Next 6 months	Last three months	Total
Capacity utilization	75%	80%	90%	
Production per month (100% capacity)	12,500	12,500	12,500	
Production per month (actual capacity)	9,375	10,000	11,250	
Total production	28,125	60,000	33,750	1,21,875
Material cost	2,81,250	6,00,000	3,37,500	12,18,750
Labour cost (Note 1)	3,00,000	6,00,000	3,37,500	12,37,500
Overheads	1,12,500	2,40,000	1,35,000	4,87,500
Semi-variable overheads (Note 2)	15,000	32,000	18,000	65,000
Fixed Overheads	48,075	96,150	48,075	1,92,300

Total cost	7,56,825	15,68,150	8,76,075	32,01,050

Note 1: Computation of labour cost:
- The company has to pay minimum of Rs.1,00,000 per month. The labour cost for first three months based on production is Rs.2,81,250 (28,125 x 10). However, we need to pay minimum of Rs.1,00,000 and hence labour cost would be Rs.3,00,000

Note 2: Computation of semi-variable overheads:
- Semi-variable overheads at 75% capacity is Rs.60,000 per annum and same increases by 4,000 for every 5% increase
- Semi-variable overheads for first three months = 60,000 x (3/12) = Rs.15,000
- Semi-variable overheads for next six months = 64,000 x (6/12) = Rs.32,000
- Semi-variable overheads for last three months = 72,000 x (3/12) = Rs.18,000

WN 2: Computation of selling price:

Particulars	Calculation	Amount
Total cost	WN 1	32,01,050
Add: Profit	1/5 on sales = 1/4 on cost	8,00,263
Total sales		40,01,313
No of units		1,21,875
Selling price	**(40,01,313/1,21,875)**	**32.83**

18. **Computation of selling price:**

Maximum production capacity of JK Ltd. is 5,20,000 units per annum. Details of estimated cost of production are as follows:
- Direct material Rs. 15 per unit.
- Direct wages Rs. 9 per unit (subject to a minimum of Rs. 2,50,000 per month).
- Fixed overheads Rs. 9,60,000 per annum.
- Variable overheads Rs. 8 per unit.
- Semi-variable overheads are Rs. 5,60,000 per annum up to 50 per cent capacity and additional Rs.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 Rs. 44 during the first three months. You are required, what selling price per unit should be fixed for the remaining nine months to yield a total profit of Rs.15,62,500 for the whole year.

Answer:

WN 1: Computation of production cost:

Particulars	First three months	Last 9 months
Capacity utilization	60%	90%
Production per month (100% capacity)	43,333	43,333
Production per month (actual capacity)	26,000 (43,333 x 60%)	39,000 (43,333 x 90%)
Total production	78,000 (26,000 x 3)	3,51,000 (39,000 x 9)
Material cost (units x 15)	11,70,000	52,65,000
Labour cost (Note 1)	7,50,000	31,59,000
Fixed overheads	2,40,000	7,20,000
Variable overheads (units x 8)	6,24,000	28,08,000
Semi-variable overheads (Note 2)	1,77,500	6,45,000
Total Cost	**29,61,600**	**1,25,97,000**

Note1: Computation of labour cost:
- Minimum labour cost is Rs.2,50,000 per month. Variable labour cost is Rs.9 per unit. Hence for the first 3 months the labour cost works out to be Rs.7,02,000. However, the minimum cost has to be Rs.7,50,000 for three months and the same is taken as labour cost.

Note 2: Computation of semi-variable overheads:

- The company is working at 60 percent utilization for first three months. Annual semi-variable overheads for 60 percent utilization is Rs.7,10,000. Hence semi-variable overheads for first three months is Rs.1,77,500 (7,10,000 x 3/12)
- The company is working at 90 percent utilization for next nine months. Annual semi-variable overheads for 90 percent utilization is Rs.8,60,000. Hence semi-variable overheads for nine months is Rs.6,45,000 (8,60,000 x 9/12)

WN 2: Fixation of selling price:

Particulars	Calculation	Amount
Total cost	WN 1	1,55,58,500
Add: Profit	Given	15,62,500
Total sales		1,71,21,000
Less: Sales value of first 3 months	78,000 x 44	(34,32,000)
Sales value of balance 9 months		1,36,89,000
No of units sold in 9 months		3,51,000
Selling price	**(1,36,89,000/3,51,000)**	**39.00**

19. **Flexible budget:**

You are given the following data of a manufacturing concern:

Particulars	Amount
Variable expenses (at 50% capacity)	
Materials	48,00,000
Labour	51,20,000
Others	7,60,000
Semi variable expenses (at 50% capacity)	
Maintenance and repairs	5,00,000
Indirect labour	19,80,000
Sales department salaries	5,80,000
Sundry administrative expenses	5,20,000
Fixed expenses:	
Wages and salaries	16,80,000
Rent, rates and taxes	11,20,000
Depreciation	14,00,000
Sundry administrative expenses	17,80,000

The fixed expenses remain constant for all levels of production. Semi variable expenses remain constant between 45% and 65% of capacity whereas it increases by 10% between 65% and 80% capacity and it increases by 20% between 80% and 100% capacity.

Sales at various levels are as under:

Capacity	Sales
75%	2,40,00,000
100%	3,20,00,000

Prepare flexible budget at 75% and 100% capacity.

Answer:

Preparation of flexible budget for 75% and 100% capacity:

- Let us assume 100% capacity to be 100 units and hence the given data is for 50 units

Particulars	75% capacity (75 units)		100% capacity (100 units)	
	Calculation	Amount	Calculation	Amount
Variable costs:				
Direct material	96,000 x 75	72,00,000	96,000 x 100	96,00,000
Direct labour	1,02,400 x 75	76,80,000	1,02,400 x 100	1,02,40,000
Others	15,200 x 75	11,40,000	15,200 x 100	15,20,000
Total variable cost		**1,60,20,000**		**2,13,60,000**
Semi-variable expenses:				
Maintenance and repairs	5,00,000 + 10%	5,50,000	5,00,000 + 20%	6,00,000
Indirect labour	19,80,000 + 10%	21,78,000	19,80,000 + 20%	23,76,000
Sales dept salaries	5,80,000 + 10%	6,38,000	5,80,000 + 20%	6,96,000
Sundry admin expenses	5,20,000 + 10%	5,72,000	5,20,000 + 20%	6,24,000

Total Semi-variable expenses		39,38,000		42,96,000
Fixed costs:				
Wages and salaries		16,80,000		16,80,000
Rent, rates and taxes		11,20,000		11,20,000
Depreciation		14,00,000		14,00,000
Sundry admin expenses		17,80,000		17,80,000
Total Fixed costs		59,80,000		59,80,000
Total costs		2,59,38,000		3,16,36,000
Profit/Loss		(19,38,000)		3,64,000
Sales		2,40,00,000		3,20,00,000

20. Flexible budget:

S Limited has prepared budget for the coming year for its two products A and B:

Particulars	Product A	Product B
Production and sales units	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 and 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 both products. You are required to prepare flexible budget for both the products:

- Before marketing efforts
- After marketing efforts

Answer:

WN 1: Flexible budget before marketing efforts:

Particulars	Product A	Product B
Units sold	6,000	9,000
Sales	7,20,000	7,02,000
Less: Material cost	(3,60,000)	(3,78,000)
Less: Direct Labour	(1,80,000)	(1,62,000)
Less: Variable overheads	(72,000)	(54,000)
Less: Fixed overheads	(48,000)	(36,000)
Profit	**60,000**	**72,000**

WN 2: Flexible budget after marketing efforts:

Particulars	Product A	Product B
Units sold	7,500	9,500
Sales	9,00,000	7,41,000
Less: Material cost	(4,50,000)	(3,99,000)
Less: Direct Labour	(2,25,000)	(1,71,000)
Less: Variable overheads (Note 1)	(99,000)	(62,700)
Less: Fixed overheads (Note 2)	(50,400)	(37,800)
Profit	**75,600**	**70,500**

Note 1: Computation of variable overheads:

- Variable overheads increase by 10%. Any change in variable overheads is to be considered as change in variable overheads per unit
- **Product A:** VOH per unit was Rs.12 and the same will increase to Rs.13.20. Total variable overhead is equal to Rs.99,000 (7,500 x 13.20)
- **Product B:** VOH per unit was Rs.6 and the same will increase to Rs.6.60. Total variable overhead is equal to Rs.62,700 (9,500 x 6.60)

Note 2: Computation of fixed overheads:

- Fixed overheads increase by 5% and any change in fixed overheads is to be considered as change in total fixed overheads
- Product A: FOH is currently Rs.48,000 and the same will increase to Rs.50,400 (48,000 + 5%)
- Product B: FOH is currently Rs.36,000 and the same will increase to Rs.37,800 (36,000 + 5%)

Additional Homework Problems:
1. **Flexible budget:**

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 Rs. 21,64,400 as detailed below:

Particulars	Amount
Fixed cost (manufacturing)	2,28,000
Variable costs:	
Power	18,000
Repairs	16,000
Other variable cost	6,400
Direct material	6,16,000
Direct labour	12,80,000
Total variable costs	**19,36,400**

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 Rs. 400 as at present, indicate the effect on net profit. Administration, selling and distribution overheads continue at Rs. 72,000.

Answer:

Flexible budget for 4,000 and 6,000 units:

Particulars	4,000 units		6,000 units	
	Calculation	Amount	Calculation	Amount
Variable costs:				
Power	2.25 x 4,000	9,000	2.25 x 6,000	13,500
Repairs	2.00 x 4,000	8,000	2.00 x 6,000	12,000
Other variable cost	0.80 x 4,000	3,200	0.80 x 6,000	4,800
Direct material	77 x 4,000	3,08,000	77 x 6,000	4,62,000
Direct labour	160 x 4,000	6,40,000	160 x 6,000	9,60,000
Total variable cost		**9,68,200**		**14,52,300**
Fixed costs:				
Manufacturing cost		2,28,000		2,28,000
Admin and selling expenses		72,000		72,000
Total Fixed costs		**3,00,000**		**3,00,000**
Total costs		**12,68,200**		**17,52,300**
Profit (balancing figure)		**3,31,800**		**6,47,700**
Total sales	400 x 4,000	**16,00,000**	400 x 6,000	**24,00,000**

2. **Production budget:**

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:

Particulars	Minimax (MM)	Heavyhigh (HH)
Budgeted production	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

Particulars	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.

Answer:
Production budget for the first quarter month wise:

Particulars	April		May		June	
	MM	**HH**	**MM**	**HH**	**MM**	**HH**
Sales	8,000	6,000	10,000	8,000	12,000	9,000
Add: Closing stock (25% of next month sales)	2,500	2,000	3,000	2,250	4,000	3,500
Less: Opening stock (Note 1)	(2,000)	(1,500)	(2,500)	(2,000)	(3,000)	(2,250)
Production	**8,500**	**6,500**	**10,500**	**8,250**	**13,000**	**10,250**
Cost per unit (Note 2)	352.22	404.17	352.22	404.17	352.22	404.17
Cost of Production	**29,93,870**	**26,27,105**	**36,98,310**	**33,34,403**	**45,78,860**	**41,42,743**

Note 1: Opening stock:
- Opening stock of April = Closing stock of March
- Closing stock of March is equal to 25 percent of next month (April) sales

Note 2: Cost per unit:
- MM = 220 + 130 + (4,00,000/1,80,000) = Rs.352.22 per unit
- HH = 280 +120 + (5,00,000/1,20,000) = Rs.404.17 per unit

3. **Production Budget**

AK Limited produces and sells a single product. Sales budget for calendar year 2013 by 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 Rs. 40. The standard cost details for one unit of the product are as follows:
- Variable Cost Rs. 34.50 per unit
- Fixed Overheads Rs. 2 hours 30 minutes @Rs. 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 calculate:
i. Prepare production budget quarter wise
ii. Compute Break-even point

Answer:
WN 1: Production budget quarter-wise

Particulars	Quarter I	Quarter II	Quarter III	Quarter IV	Total
70% of current quarter sales	12,600	15,400	17,500	18,900	64,400
30% of next quarter sales	6,600	7,500	8,100	7,400	29,600
Total Production	**19,200**	**22,900**	**25,600**	**26,300**	**94,000**

Note 1: Computation of production of Quarter IV:
Annual Production budget:

Particulars	Units
Annual Sales	92,000
Add: Closing stock	8,000
Less: Opening stock	(6,000)
Annual Production	**94,000**

- Production of Quarter IV = 94,000 – 19,200 – 22,900 – 25,600 = 26,300 units
- 30% of next quarter sales for Quarter IV = 26,300 – 18,900 = 7,400 units

WN 2: Computation of Break-even Point:

Particulars	Amount
Fixed cost (1,10,000 hours x Rs.2)	2,20,000
Contribution per unit (40 – 34.50)	5.50

Break-even point (2,20,000/5.50)	40,000 units

Total sales in quarter II would be equal to 40,000 units and hence BEP will be achieved in II quarter

4. Profitability statement:

The cost accountant of manufacturing company provides you the following details for year 2007:

Direct Material	1,75,000	Other Variable Costs	80,000
Direct wages	1,00,000	Other fixed costs	80,000
Fixed factory overheads	1,00,000	Profit	1,15,000
Variable factory overheads	1,00,000	Sales	7,50,000

During the year, the company manufactured two products A and B and the output and costs were:

Particulars	A	B
Output (units)	2,00,000	1,00,000
Selling price per unit	Rs.2.00	Rs.3.50
Direct materials per unit	Rs.0.50	Rs.0.75
Direct wages per unit	Rs.0.25	Rs.0.50

Variable factory overheads are absorbed as a percentage of direct wages. Other variable costs have been computed as: Product A Re.0.25 per unit; and B Re.0.30 per unit. During 2008, it is expected that the demand for product A will fall by 25 % and for B by 50%. It is decided to manufacture a further product C, the cost for which are estimated as follows:

Particulars	Product C
Output (units)	2,00,000
Selling price per unit	1.75
Direct materials per unit	0.40
Direct wages per unit	0.25

It is anticipated that the other variable costs per unit will be the same as for product A.

Prepare a budget to present to the management, showing the current position and the position for 2008. Comment on the comparative results.

Answer:

WN 1: Analysis of current position:

Particulars	Product A	Product B	Total
Units sold	2,00,000	1,00,000	
Sales	4,00,000	3,50,000	7,50,000
Less: Direct Material	(1,00,000)	(75,000)	(1,75,000)
Less: Direct wages	(50,000)	(50,000)	(1,00,000)
Less: Variable factory overheads	(50,000)	(50,000)	(1,00,000)
Less: Other variable costs	(50,000)	(30,000)	(80,000)
Contribution	**1,50,000**	**1,45,000**	**2,95,000**
Less: Fixed factory cost			(1,00,000)
Less: Other fixed cost			(80,000)
Profit			**1,15,000**

Note:

- Variable factory overheads are recovered as percentage of direct wages. Overall variable factory overheads is Rs.1,00,000 and Direct wages is Rs.1,00,000. Hence OAR would be 100 percent of wages

WN 2: Revised budget statement:

Particulars	Product A	Product B	Product C	Total
Units sold	1,50,000	50,000	2,00,000	
Sales	3,00,000	1,75,000	3,50,000	8,25,000
Less: Direct Material	(75,000)	(37,500)	(80,000)	(1,92,500)
Less: Direct wages	(37,500)	(25,000)	(50,000)	(1,12,500)
Less: Variable factory overheads	(37,500)	(25,000)	(50,000)	(1,12,500)
Less: Other variable costs	(37,500)	(15,000)	(50,000)	(1,02,500)
Contribution	**1,12,500**	**72,500**	**1,20,000**	**3,05,000**
Less: Fixed factory cost				(1,00,000)
Less: Other fixed cost				(80,000)
Profit				**1,25,000**

Comments:
- Introduction of Product C is likely to increase profits by Rs.10,000. Therefore, introduction of Product C is recommended.

5. **Master budget**

Floatglass Manufacturing Company requires you to present the Master budget for the next year from the following information:

Particulars	Amount
Sales:	
Toughened Glass	6,00,000
Bent Glass	2,00,000
Direct material cost	60% of sales
Direct wages	20 workers @ Rs.150 per month
Factory Overheads:	
Indirect labour – works manager	Rs.500 per month
Foreman	Rs.400 per month
Stores and spares	2.5% on sales
Depreciation on machinery	Rs.12,600
Light and Power	Rs.3,000
Repairs and maintenance	Rs.8,000
Other sundries	10% on direct wages
Administration, selling and distribution expenses	Rs.36,000 per year

Answer:

Master budget for the next year

Particulars	Amount	Amount
Sales:		
Toughened Glass	6,00,000	
Bent Glass	2,00,000	8,00,000
Less: Works Cost:		
Direct material (60% x 8,00,000)	4,80,000	
Direct wages (20 x 150 x 12)	36,000	
Prime Cost	**5,16,000**	
Factory Overheads:		
Works manager salary (500 x 12)	6,000	
Foreman salary (400 x 12)	4,800	
Stores and spares (8,00,000 x 2.5%)	20,000	
Depreciation	12,600	
Light and Power	3,000	
Repairs and maintenance	8,000	
Sundry expenses (10% x 36,000)	3,600	
Total Factory Overheads	58,000	
Works cost (5,16,000 + 58,000)		**(5,74,000)**
Gross Profit		2,26,000
Less: Administration and selling expenses		(36,000)
Net Profit		**1,90,000**