

***CA INTERMEDIATE***

***COST***

***&***

***MANAGEMENT ACCOUNTING***

***Volume 1***

***By***  
***CA Namit Arora Sir***

***This book is dedicated to my Siblings***

***Mr. Manik Arora (Brother)***

***&***

***Ms. Aarzoo Arora (Sister)***

# ***PREFACE TO THIS EDITION***

*This is a comprehensive book having thoroughly explained concepts with lucid and systematic presentation of the subject matter. All attempts are made in this book to keep concept easier to understand and remember with 100% coverage of institute materials.*

*A special attention is given to presentation keeping in mind the examination needs to the student. **The book is primarily written exclusively for CA - Inter.***

*For any suggestion please mail me at [canamitarora@gmail.com](mailto:canamitarora@gmail.com)*

## ***A word to the students***

*My dear student, hard work is the key to success. Though smart work is publicized in today's world but to be smart, you have to work hard. So always be attentive in class and have thorough revision after the class. It is also important to be motivated and inspired for working hard. The key for success is:*

***“Work hard in class, be attentive, grab the concepts  
&  
Work smart during revision, select important questions for next  
revision.”***

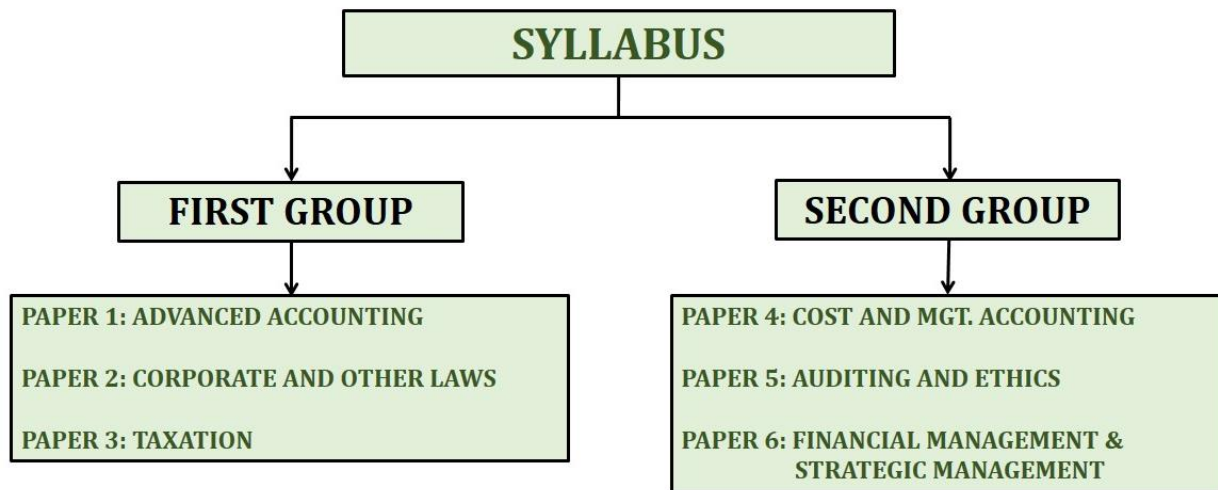
***ALL THE BEST  
CA. NAMIT ARORA***

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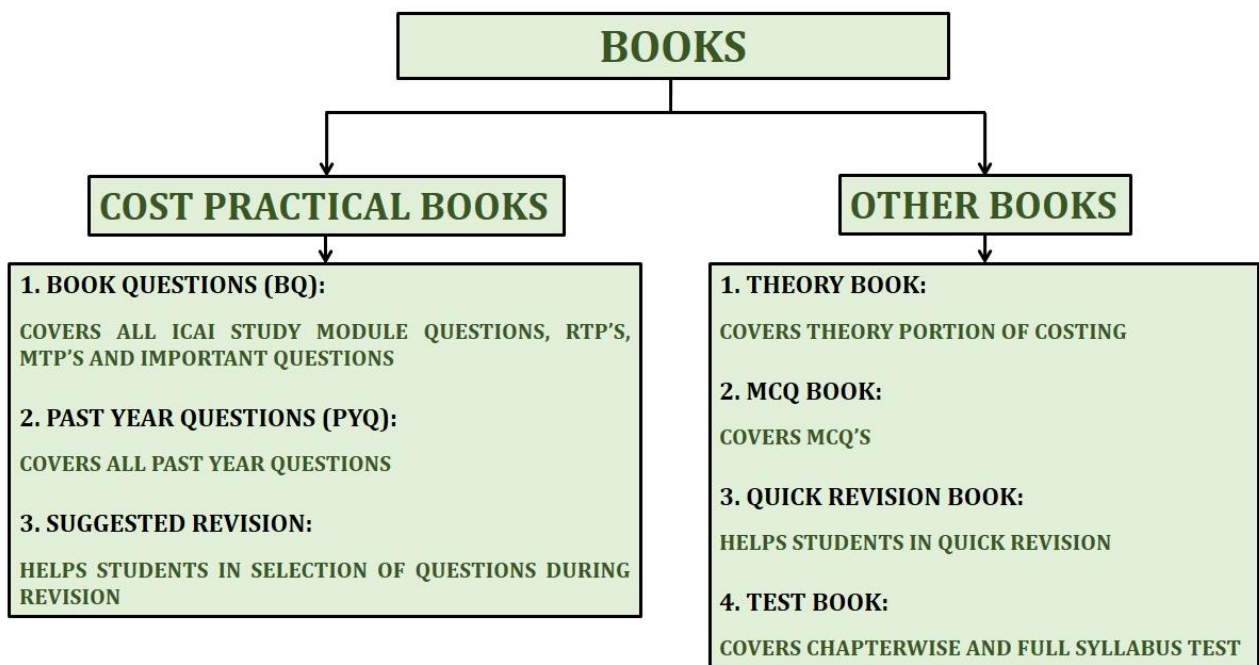
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# INTRODUCTION

## 1. CA Intermediate Syllabus:



## 2. Study Pattern and Books:



## 3. Cost and Management Accounting:

(a) **Cost:** It can be defined as the **amount of expenditure** (actual or notional) incurred on or attributable to a specified article, product or activity.

(b) **Management Accounting:** Management accounting is an integral part of management function. It assists management by provision of relevant information for planning, organising, controlling, decision making etc.

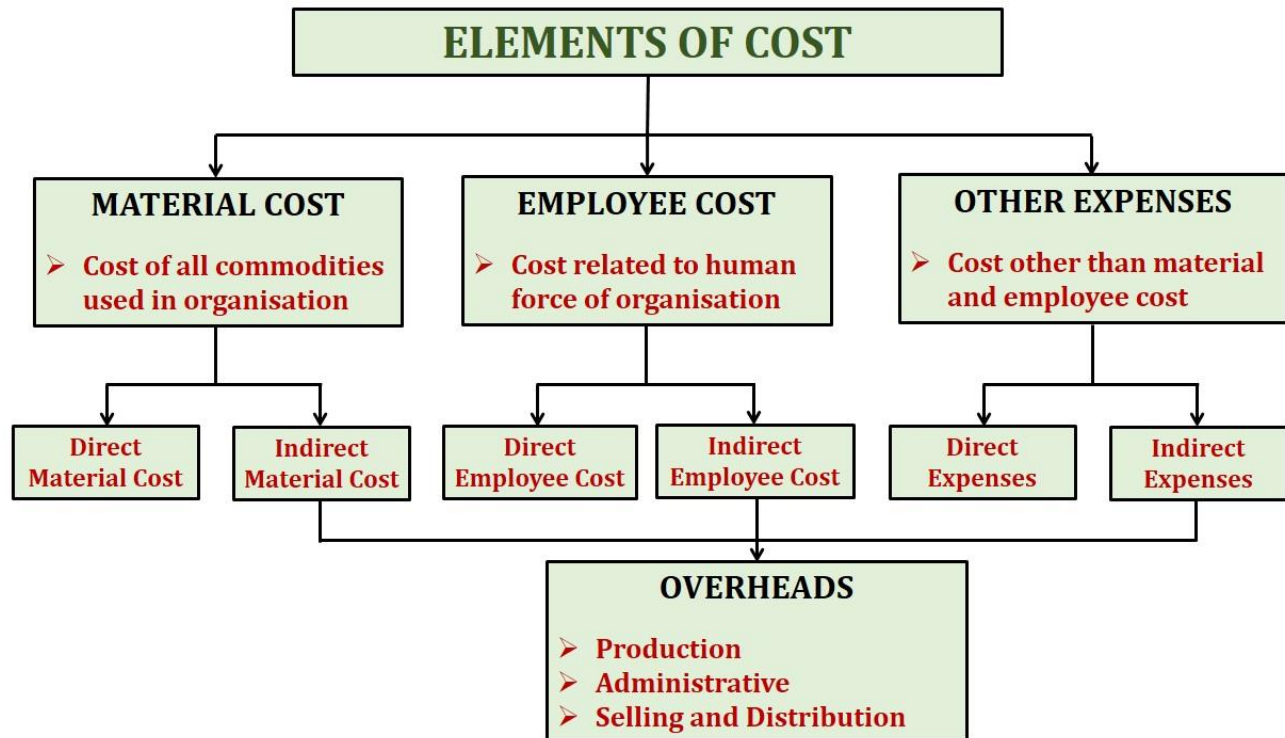
(c) **Cost Management:** It is an application of management accounting concepts, methods of collections, analysis and presentation of data to provide the information needed to plan, monitor and control costs.



#### 4. Objectives of Cost Accounting:

- (a) Ascertainment of Cost,
- (b) Determination of Selling Price and Profitability,
- (c) Cost Control,
- (d) Cost Reduction and
- (e) Assisting management in decision making.

#### 5. Elements of Cost:



6. **Cost Sheet (Basic Understanding):** A Cost Sheet or Cost Statement is a document which provides a detailed cost information.

#### Proforma Cost Sheet (Basic)

| Particulars                        | Amount |
|------------------------------------|--------|
| Direct Material Cost               | XXX    |
| Direct Employee Cost               | XXX    |
| Direct Expenses                    | XXX    |
| <i>Direct Cost/Prime Cost</i>      | XXX    |
| Production Overheads               | XXX    |
| Administrative Overheads           | XXX    |
| Selling and Distribution Overheads | XXX    |
| <i>Total Cost</i>                  | XXX    |
| Add: Profit                        | XXX    |
| <i>Sales</i>                       | XXX    |

# ***CHAPTER - 1***

## ***MATERIAL COST***

### ***LEARNING OUTCOMES***

*After studying this chapter you will be able to*

- *State the meaning, need and importance of materials,*
- *Discuss the procedures and documentations involved in procuring, storing and issuing material.*
- *Discuss the various inventory control techniques and determination of various stock levels.*
- *Compute Economic Order Quantity (EOQ) and apply the EOQ to determine the optimum order quantity.*
- *Discuss the various methods of inventory accounting and Prepare stock ledger/ account.*
- *Identify and explain normal and abnormal loss and its accounting treatment.*

**ECONOMIC ORDER QUANTITY (EOQ) WITH DIFFERENT CASES****BQ 1**

**Find out the Economic Order Quantity from the following information. Also state the number of orders to be placed in a year.**

|                                    |                         |
|------------------------------------|-------------------------|
| Consumption of materials per annum | 10,000 kgs.             |
| Order placing cost per order       | ₹50                     |
| Cost per kg of raw materials       | ₹2                      |
| Storage cost                       | 8% of average inventory |

**Answer**

$$\text{EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 10,000 \times 50}{0.08 \times 2}} = \mathbf{2,500 \text{ kgs}}$$

$$\begin{aligned} \text{No. of orders to be placed in a year} &= \text{Annual consumption of RM} \div \text{EOQ} \\ &= 10,000 \text{ kgs} \div 2,500 \text{ kgs} = \mathbf{4 \text{ orders p.a.}} \end{aligned}$$

**BQ 2**

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

|                   |               |
|-------------------|---------------|
| Annual Demand     | 5,000 units   |
| Unit price        | ₹20.00        |
| Order cost        | ₹16.00        |
| Storage rate      | 2% per annum  |
| Interest rate     | 12% per annum |
| Obsolescence rate | 6% per annum  |

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

**Answer**

$$\mathbf{(a)} \quad \text{EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 5,000 \times 16}{20 \times 20\%}} = \mathbf{200 \text{ units}}$$

$$\begin{aligned} \text{Total cost} &= \text{Purchase cost} + \text{Ordering cost} + \text{Carrying cost} \\ &= (5,000 \text{ units} \times ₹20) + \left(\frac{A}{\text{ROQ}} \times O\right) + \left(\frac{1}{2} \times \text{ROQ} \times C\right) \\ &= ₹1,00,000 + \left(\frac{5,000}{200} \times 16\right) + \left(\frac{1}{2} \times 200 \times 20\% \text{ of } ₹20\right) = \mathbf{₹1,00,800} \end{aligned}$$

**(b)** If an incorrect price ₹12.80 is used:

$$\text{EOQ} = \sqrt{\frac{2 \times 5,000 \times 16}{12.80 \times 20\%}} = \mathbf{250 \text{ units}}$$

$$\begin{aligned} \text{Total cost} &= \text{Purchase cost} + \text{Ordering cost} + \text{Carrying cost} \\ &= (5,000 \text{ units} \times ₹12.80) + \left(\frac{A}{\text{ROQ}} \times O\right) + \left(\frac{1}{2} \times \text{ROQ} \times C\right) \\ &= ₹64,000 + \left(\frac{5,000}{250} \times 16\right) + \left(\frac{1}{2} \times 250 \times 20\% \text{ of } ₹12.80\right) = \mathbf{₹64,640} \end{aligned}$$

**BQ 3**

The demand for a certain product is random. It has been estimated that the monthly demand of the product has a normal distribution with a mean of 390 units. The unit price of product is ₹25. Ordering cost is ₹40 per order and inventory carrying cost is estimated to be 35% per year.

**You are required to calculate EOQ.**

**Answer**

**MATERIAL COST 1.2**

$$\text{EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 12 \times 390 \times 40}{35\% \times 25}} = 206.85 \text{ units}$$

**BQ 4**

|                                         |   |                |
|-----------------------------------------|---|----------------|
| Annual consumption of raw materials     | : | 10,500 units   |
| Opening stock of raw materials          | : | 1,000 units    |
| Company wants to maintain closing stock | : | 500 units      |
| Ordering cost per order                 | : | ₹250           |
| Purchase price per unit                 | : | ₹200           |
| Carrying cost per unit                  | : | ₹10% per annum |

**Determine Economic Order Quantity.**

**Answer**

$$\text{EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 10,000 \times 250}{10\% \times 200}} = 500 \text{ units}$$

$$\begin{aligned} A &= \text{Annual purchase} \\ &= \text{Annual Consumption} + \text{Closing Stock} - \text{Opening Stock} \\ &= 10,500 + 500 - 1,000 = 10,000 \text{ units} \end{aligned}$$

**BQ 5**

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 ₹15,000. The company is financing its working capital using a bank cash credit @13% p.a. Product X is sold at ₹1,040 per unit. Material A and B is purchased at ₹150 and ₹200 respectively.

**Compute economic order quantity (EOQ):**

- (a) If purchase order for the both materials is placed separately.  
 (b) If purchase order for the both materials is not placed separately.

**Answer**

**(a) Computation of EOQ when purchase order for the both materials is placed separately:**

$$\text{EOQ} = \sqrt{\frac{2AO}{C}}$$

$$\text{Material A} = \sqrt{\frac{2 \times 19,28,000 \times 15,000}{13\% \text{ of } 150}} = 54,462 \text{ units}$$

$$\text{Material B} = \sqrt{\frac{2 \times 77,56,000 \times 15,000}{13\% \text{ of } 200}} = 94,600 \text{ units}$$

**(b) Computation of EOQ when purchase order for the both materials is not placed separately:**

$$\text{Material A \& B} = \sqrt{\frac{2 \times (19,28,000 + 77,56,000) \times 15,000}{13\% \text{ of } 190}} = 1,08,452 \text{ units}$$

$$\text{Material A} = 1,08,452 \times \frac{19,28,000}{19,28,000 + 77,56,000} = 21,592 \text{ units}$$

**MATERIAL COST 1.3**

$$\text{Material B} = 1,08,452 \times \frac{77,56,000}{19,28,000 + 77,56,000} = 86,860 \text{ units}$$

**Working notes:****1. Calculation of annual requirement to be purchased of Material A and B:**

$$\begin{aligned} \text{Annual production of Product X} &= \text{Annual demand} - \text{Opening stock} \\ &= 5,00,000 - 12,000 = 4,88,000 \text{ units} \\ \text{Annual requirement for RM} &= \text{Annual production} \times \text{Material per unit} - \text{Opening stock} \\ \text{Material A} &= 4,88,000 \times 4 \text{ units} - 24,000 \text{ units} = 19,28,000 \text{ units} \\ \text{Material B} &= 4,88,000 \times 16 \text{ units} - 52,000 \text{ units} = 77,56,000 \text{ units} \end{aligned}$$

**2. Calculation of Average Purchase Price:**

$$\text{Average Purchase Price} = \frac{(150 \times 19,28,000) + (200 \times 77,56,000)}{19,28,000 + 77,56,000} = ₹190$$

**BQ 6**

Anil & Company buys its annual requirement of 36,000 units in 6 installments. Each unit costs ₹1 and the ordering cost is ₹25. The inventory carrying cost is estimated at 20% of unit value. FIND the total annual cost of the existing inventory policy. Calculate, how much money can be saved by Economic Order Quantity?

**Answer****1. Total Annual cost in Existing Inventory Policy:**

$$\begin{aligned} \text{Ordering cost} &= \frac{A}{\text{ROQ}} \times O = 6 \times ₹25 = ₹150 \\ \text{Carrying cost} &= \frac{1}{2} \times \text{ROQ} \times C = \frac{1}{2} \times 6,000 \times 0.20 = ₹600 \\ \text{Total} &= ₹150 + ₹600 = ₹750 \end{aligned}$$

**2. Total Annual cost in EOQ:**

$$\begin{aligned} \text{Ordering cost} &= \frac{A}{\text{ROQ}} \times O = \frac{36,000}{3,000} \times ₹25 = ₹300 \\ \text{Carrying cost} &= \frac{1}{2} \times \text{ROQ} \times C = \frac{1}{2} \times 3,000 \times 0.20 = ₹300 \\ \text{Total} &= ₹300 + ₹300 = ₹600 \\ \text{Saving in cost} &= ₹750 - ₹600 = ₹150 \end{aligned}$$

**Working Note:**

$$\text{EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 36,000 \times 25}{20\% \times 1}} = 3,000 \text{ Units}$$

**Note:** As the units purchase cost of ₹1 does not change in both the computation, the same has not been considered to arrive at total cost of inventory for the purpose of savings..

**BQ 7**

A Company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2023-24:

|                          |                |
|--------------------------|----------------|
| Annual demand of Alpha   | 8,000 units    |
| Cost of placing an order | ₹200 per order |
| Cost per unit of Alpha   | ₹400           |
| Carrying cost p.a.       | 20%            |

**MATERIAL COST 1.4**

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:**

1. Compute the economic order quantity
2. Advise whether the quantity discount offer can be accepted.

**Answer**

$$1. \quad \text{EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 8,000 \times 200}{20\% \times 400}} = 200 \text{ units}$$

**2. Evaluation of 4% discount offer**

| Particulars                                                                           | At EOQ (order size 200 units) | At order size 4,000 units |
|---------------------------------------------------------------------------------------|-------------------------------|---------------------------|
| Purchase cost 8,000 units @ ₹400/₹384 per unit                                        | 32,00,000                     | 30,72,000                 |
| Ordering cost ( $A/\text{ROQ} \times ₹200$ )                                          | 8,000                         | 400                       |
| Carrying cost ( $\frac{1}{2} \times \text{ROQ} \times C$ ) ( $C = 20\%$ of ₹400/₹384) | 8,000                         | 1,53,600                  |
| <b>Total cost</b>                                                                     | <b>32,16,000</b>              | <b>32,26,000</b>          |

**Advise:** The total cost of inventory is lower if EOQ is adopted. Hence, the company is advised not to accept the quantity discount.

**BQ 8**

Purchase manager has decided to place orders for minimum quantity of 500 units of a particular item in order to get a discount of 10%. From the records, it was found out that in the last year, 8 orders each of 200 units have been placed. Ordering cost is ₹500 per order, inventory carrying cost 40% of the inventory value and the purchase cost per unit is ₹400.

**Is the purchase manager justified in his decision? What is the effect of his decision to the company?**

**Answer****Evaluation of 10% discount offer**

| Particulars                                                                              | At ROQ 200 units              | At ROQ 500 units                     |
|------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------|
| 1. Purchase cost 1,600 units @ ₹400/₹360 per unit                                        | 6,40,000                      | 5,76,000                             |
| 2. Ordering cost:<br>Number of orders<br>Ordering cost (number of orders $\times$ ₹500)  | $1,600 \div 200 = 8$<br>4,000 | $1,600 \div 500 = 3.2$ or 4<br>2,000 |
| 3. Carrying cost ( $\frac{1}{2} \times \text{ROQ} \times C$ ) ( $C = 40\%$ of ₹400/₹360) | 16,000                        | 36,000                               |
| <b>Total cost (1+2+3)</b>                                                                | <b>6,60,000</b>               | <b>6,14,000</b>                      |

**Yes, Purchase manager justified in his decision and cost would reduce by ₹46,000 (₹6,60,000 – ₹6,14,000)**

**Working Note:**

$$\text{Annual requirement of Raw Materials} = 200 \text{ units} \times 8 \text{ orders} = 1,600 \text{ units}$$

**LEVEL SETTING (VARIOUS STOCK LEVELS)****BQ 9**

**Two components, A and B are used as follows:**

|                   |                                    |
|-------------------|------------------------------------|
| Normal usage      | 50 per week each                   |
| Maximum usage     | 75 per week each                   |
| Minimum usage     | 25 per week each                   |
| Re-order quantity | A: 300; B: 500                     |
| Re-order period   | A: 4 to 6 weeks<br>B: 2 to 4 weeks |

**Calculate for each component (a) Re-ordering level, (b) Minimum level, (c) Maximum level, (d) Average stock level.**

**Answer**

|                                |   |                                                                    |                  |
|--------------------------------|---|--------------------------------------------------------------------|------------------|
| <b>(a) Re-ordering level</b>   | = | Maximum usage per week × Maximum delivery period                   |                  |
| Component A                    | = | 75 units × 6 weeks                                                 | <b>450 units</b> |
| Component B                    | = | 75 units × 4 weeks                                                 | <b>300 units</b> |
| <b>(b) Minimum level</b>       | = | Re-order level – (Normal usage × Average period)                   |                  |
| Component A                    | = | 450 units – (50 units × 5 weeks)                                   | <b>200 units</b> |
| Component B                    | = | 300 units – (50 units × 3 weeks)                                   | <b>150 units</b> |
| <b>(c) Maximum level</b>       | = | Re-order level + Re-order quantity – (Min. usage × Minimum period) |                  |
| Component A                    | = | (450 units + 300 units) – (25 units × 4 weeks)                     | <b>650 units</b> |
| Component B                    | = | (300 units + 500 units) – (25 units × 2 weeks)                     | <b>750 units</b> |
| <b>(d) Average stock level</b> | = | $\frac{1}{2}$ (Minimum stock level + Maximum stock level)          |                  |
| Component A                    | = | $\frac{1}{2}$ (200 units + 650 units)                              | <b>425 units</b> |
| Component B                    | = | $\frac{1}{2}$ (150 units + 750 units)                              | <b>450 units</b> |

**BQ 10**

|                                                 |   |              |
|-------------------------------------------------|---|--------------|
| Cost of placing a purchase order                | : | ₹20          |
| Number of units to be purchased during the year | : | 5,000 units  |
| Purchase price inclusive of transportation cost | : | ₹50 per unit |
| Annual cost of storage                          | : | ₹5 per unit  |

**Details of lead time:**

|                         |   |         |
|-------------------------|---|---------|
| Average                 | : | 10 days |
| Maximum                 | : | 15 days |
| Minimum                 | : | 5 days  |
| For emergency purchases | : | 4 days  |

**Rate of consumption:**

|         |   |                  |
|---------|---|------------------|
| Average | : | 15 units per day |
| Maximum | : | 20 units per day |

**On the basis of above information, you are required to calculate:**

**(i) Re-ordering level, (ii) Maximum level, (iii) Minimum level and (iv) Danger level.**

**Answer**

|                              |   |                                                     |                  |
|------------------------------|---|-----------------------------------------------------|------------------|
| <b>(i) Re-ordering Level</b> | = | Maximum usage × Maximum lead time                   |                  |
|                              | = | 20 units per day × 15 days                          | <b>300 units</b> |
| <b>(ii) Maximum Level</b>    | = | ROL + ROQ – (Minimum usage × Minimum lead time)     |                  |
|                              | = | 300 units + 200 units – (10 units per day × 5 days) |                  |
|                              | = | <b>450 units</b>                                    |                  |
| <b>(iii) Minimum Level</b>   | = | ROL – (Average usage × Average lead time)           |                  |
|                              | = | 300 units – (15 units per day × 10 days)            | <b>150 units</b> |
| <b>(iv) Danger Level</b>     | = | Average usage × Lead time for emergency purchases   |                  |
|                              | = | 15 units per day × 4 days                           | <b>60 units</b>  |

**Working Notes:**

$$1. \quad ROQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 5,000 \times 20}{5}} = \mathbf{200 \text{ units}}$$

$$\begin{aligned}
 2. \quad \text{Average usage} &= \frac{\text{Minimum usage} + \text{Maximum usage}}{2} \\
 15 \text{ units} &= \frac{\text{Minimum usage} + 20 \text{ units}}{2} \\
 \text{Minimum usage} &= \text{10 units per day}
 \end{aligned}$$

**BQ 11**

From the details given below, calculate:

(i) Re-ordering level, (ii) Maximum level, (iii) Minimum level and (iv) Danger level.

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

|                                                             |          |
|-------------------------------------------------------------|----------|
| Cost of placing a purchase order is                         | ₹4,000   |
| Number of units to be purchased during the year is          | 5,00,000 |
| Purchase price per unit inclusive of transportation cost is | ₹50      |
| Annual cost of storage per unit is                          | ₹10      |

**Details of lead time:** Average 10 days, Maximum 15 days, Minimum 5 days and for emergency purchases 4 days

**Rate of consumption:** Average 1,500 units per day and Maximum 2,000 units per day

**Answer**

$$\begin{aligned}
 (i) \quad \text{Re-ordering Level} &= \text{Maximum usage} \times \text{Maximum lead time} \\
 &= 2,000 \text{ units per day} \times 15 \text{ days} = \text{30,000 units} \\
 (ii) \quad \text{Maximum Level} &= \text{ROL} + \text{ROQ} - (\text{Minimum usage} \times \text{Minimum lead time}) \\
 &= 30,000 \text{ units} + 20,000 \text{ units} - (1,000 \text{ units per day} \times 5 \text{ days}) \\
 &= \text{45,000 units} \\
 (iii) \quad \text{Minimum Level} &= \text{ROL} - (\text{Average usage} \times \text{Average lead time}) \\
 &= 30,000 \text{ units} - (1,500 \text{ units per day} \times 10 \text{ days}) = \text{15,000 units} \\
 (iv) \quad \text{Danger Level} &= \text{Average usage} \times \text{Lead time for emergency purchases} \\
 &= 1,500 \text{ units per day} \times 4 \text{ days} = \text{6,000 units}
 \end{aligned}$$

**Working Notes:**

$$\begin{aligned}
 1. \quad \text{ROQ} &= \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 5,00,000 \times 4,000}{10}} = \text{20,000 units} \\
 2. \quad \text{Average usage} &= \frac{\text{Minimum usage} + \text{Maximum usage}}{2} \\
 1,500 \text{ units} &= \frac{\text{Minimum usage} + 2,000 \text{ units}}{2} \\
 \text{Minimum usage} &= \text{1,000 units per day}
 \end{aligned}$$

**BQ 12**

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

| RM | Usage for one unit of product | ROQ (in kg) | Price per kg | Delivery period (in weeks) |         |      | ROL (in kg) | Mini. level |
|----|-------------------------------|-------------|--------------|----------------------------|---------|------|-------------|-------------|
|    |                               |             |              | Mini.                      | Average | Max. |             |             |
| A  | 10 kg                         | 10,000      | 0.10         | 1                          | 2       | 3    | 8,000       | -           |
| B  | 4 kg                          | 5,000       | 0.30         | 3                          | 4       | 5    | 4,750       | -           |
| C  | 6 kg                          | 10,000      | 0.15         | 2                          | 3       | 4    | -           | 2,000 kg    |

Weekly production varies from 175 to 225 units, averaging 200 units of the said product.

**What would be the following quantities?**



**MATERIAL COST 1.7**

(i) Minimum stock of A (ii) Maximum stock of B (iii) Re-order level of C (iv) Average stock level of A

**Answer**

(i) **Minimum stock of A** =  $ROL - (Average\ usage \times Average\ lead\ time)$   
 =  $8,000\ kg - [(200\ units \times 10\ kg) \times 2\ weeks]$  = **4,000 kg**

(ii) **Maximum stock of B** =  $ROL - (Minimum\ usage \times Minimum\ lead\ time) + ROQ$   
 =  $4,750 - [(175\ units \times 4\ kg) \times 3\ weeks] + 5,000$   
 =  $9,750 - 2,100$  = **7,650 kg**

(iii) **Re-order Level of C** =  $Maximum\ re-order\ period \times Maximum\ usage$   
 =  $4\ weeks \times 1,350\ (225\ units \times 6\ kg)$  = **5,400 kg**

**Or**

=  $Minimum\ stock\ of\ C + (Average\ usage \times Average\ lead\ time)$   
 =  $2,000 + [(200\ units \times 6\ kg) \times 3\ weeks]$  = **5,600 kg**

(iv) **Average level of A** =  $Minimum\ stock\ level + \frac{1}{2} ROQ$   
 =  $4,000 + \frac{1}{2} \times 10,000$   
 =  $4,000 + 5,000$  = **9,000 kg**

**Or**

=  $\frac{Minimum\ stock + Maximum\ stock}{2}$   
 =  $\frac{4,000 + 16,250}{2}$  = **10,125 kg**

**Working Notes:**

**Max. Stock of A** =  $ROL (Minimum\ usage \times Minimum\ re-order\ period) + ROQ$   
 =  $8,000\ kg - [(175\ units \times 10\ kg) \times 1\ week] + 10,000$  = **16,250 kg**

**BQ 13**

A Company uses three raw materials Pi, Qu, and Ar for a particular product for which the following data apply:

| RM | Usage for one unit of product | ROQ (in kg) | Price per kg | Delivery period (in weeks) |         |      | ROL (in kg) | Mini. level |
|----|-------------------------------|-------------|--------------|----------------------------|---------|------|-------------|-------------|
|    |                               |             |              | Mini.                      | Average | Max. |             |             |
| Pi | 5 kg                          | 10,000      | 0.10         | 1                          | 2       | 3    | 8,000       | -           |
| Qu | 2 kg                          | 5,000       | 0.30         | 3                          | 4       | 5    | 4,750       | -           |
| Ar | 3 kg                          | 10,000      | 0.15         | 2                          | 3       | 4    | -           | 2,000 kg    |

Weekly production varies from 350 to 450 units, averaging 400 units of the said product.

**What would be the following quantities?**

(i) Minimum stock of Pi (ii) Maximum stock of Qu (iii) Re-order level of Ar (iv) Average stock level of Pi

**Answer**

(i) **Minimum stock of Pi** =  $ROL - (Average\ usage \times Average\ lead\ time)$   
 =  $8,000\ kg - [(400\ units \times 5\ kg) \times 2\ weeks]$  = **4,000 kg**

(ii) **Maximum stock of Qu** =  $ROL - (Minimum\ usage \times Minimum\ lead\ time) + ROQ$   
 =  $4,750 - [(350\ units \times 2\ kg) \times 3\ weeks] + 5,000$   
 =  $9,750 - 2,100$  = **7,650 kg**

(iii) **Re-order Level of Ar** =  $Maximum\ re-order\ period \times Maximum\ usage$   
 =  $4\ weeks \times 1,350\ (450\ units \times 3\ kg)$  = **5,400 kg**

**Or**

=  $Minimum\ stock\ of\ C + (Average\ usage \times Average\ lead\ time)$   
 =  $2,000 + [(400\ units \times 3\ kg) \times 3\ weeks]$  = **5,600 kg**

**MATERIAL COST 1.8**

$$\begin{aligned}
 \text{(iv) Average level of Pi} &= \text{Minimum stock level} + \frac{1}{2} \text{ ROQ} \\
 &= 4,000 + \frac{1}{2} \times 10,000 \\
 &= 4,000 + 5,000 &= \mathbf{9,000 \text{ kg}} \\
 &\quad \text{Or} \\
 &= \frac{\text{Minimum stock} + \text{Maximum stock}}{2} \\
 &= \frac{4,000 + 16,250}{2} &= \mathbf{10,125 \text{ kg}}
 \end{aligned}$$

**Working Notes:**

$$\begin{aligned}
 \text{Max. Stock of Pi} &= \text{ROL (Minimum usage} \times \text{Minimum re-order period)} + \text{ROQ} \\
 &= 8,000 \text{ kg} - [(350 \text{ units} \times 5 \text{ kg}) \times 1 \text{ week}] + 10,000 &= \mathbf{16,250 \text{ kg}}
 \end{aligned}$$

**BQ 14**

A company manufactures 10,000 units of a product per month. The cost of placing an order is ₹200. The purchase price of the raw material is ₹20 per kg. The re-order period is 4 to 8 weeks. The consumption of raw materials varies from 200 kg to 900 kg per week, the average consumption being 550 kg. The carrying cost of inventory is 20% per annum.

**You are required to calculate:**

- |                             |                                |
|-----------------------------|--------------------------------|
| <b>1.</b> Re-order quantity | <b>4.</b> Minimum level        |
| <b>2.</b> Re-order level    | <b>5.</b> Average stock level. |
| <b>3.</b> Maximum level     |                                |

**Answer**

$$\begin{aligned}
 \mathbf{1. \text{ Re-order quantity (ROQ)}} &= \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 28,600 \times 200}{20 \times 20\%}} &= \mathbf{1,691 \text{ kgs}} \\
 \mathbf{*Annual consumption (A)} &= \text{Average Consumption per week} \times 52 \text{ weeks} \\
 &= 550 \text{ kgs} \times 52 \text{ weeks} &= \mathbf{28,600 \text{ kgs}} \\
 \mathbf{2. \text{ Re-order level (ROL)}} &= \text{Maximum usage} \times \text{Maximum re-order period} \\
 &= 900 \text{ kgs} \times 8 \text{ weeks} &= \mathbf{7,200 \text{ kgs}} \\
 \mathbf{3. \text{ Maximum level}} &= \text{ROL} + \text{ROQ} - (\text{Minimum usage} \times \text{Minimum re-order period}) \\
 &= 7,200 \text{ kgs} + 1,691 \text{ kgs} - (200 \text{ kgs} \times 4 \text{ weeks}) \\
 &= \mathbf{8,091 \text{ kgs}} \\
 \mathbf{4. \text{ Minimum level}} &= \text{ROL} - (\text{Normal usage} \times \text{Normal re-order period}) \\
 &= 7,200 \text{ kgs} - (550 \text{ kgs} \times 6 \text{ weeks}) &= \mathbf{3,900 \text{ kgs}} \\
 \mathbf{5. \text{ Average stock level}} &= \frac{1}{2} (\text{Minimum level} + \text{Maximum level}) \\
 &= \frac{1}{2} (3,900 \text{ kgs} + 8,091 \text{ kgs}) &= \mathbf{5,995.5 \text{ kgs}} \\
 &\quad \text{Or} \\
 &= (\text{Minimum level} + \frac{1}{2} \times \text{ROQ}) \\
 &= (3,900 \text{ kgs} + \frac{1}{2} \times 1,691 \text{ kgs}) &= \mathbf{4,745.5 \text{ kgs}}
 \end{aligned}$$

**BQ 15**

Shri Ram Enterprises manufactures a special product ZED. The following particulars were collected for the year:

- |                                                  |                                            |
|--------------------------------------------------|--------------------------------------------|
| <b>(a)</b> Monthly demand of ZED 1,000 units     | <b>(e)</b> Minimum usage 25 units per week |
| <b>(b)</b> Cost of placing an order ₹100         | <b>(f)</b> Maximum usage 75 unit per week  |
| <b>(c)</b> Inventory Carrying cost 15% per annum | <b>(g)</b> Cost of material ₹100 per unit  |
| <b>(d)</b> Re-order period 4 to 6 weeks.         | <b>(h)</b> Normal usage 50 units per week  |

**Calculate from the above:**

- Re-order-quantity. If the supplier is willing to supply 1,500 units at a discount of 5%, is it worth accepting.

2. Re-order level    3. Minimum Level    4. Maximum Level    5. Average Stock Level.

**Answer**

$$1. \text{ Re-order quantity} = \sqrt{\frac{2 \times 2,600 \times 100}{15}} = 186 \text{ units}$$

$$\begin{aligned} * \text{Annual Requirement} &= 52 \text{ weeks} \times \text{Normal usage of input units per week} \\ &= 52 \text{ weeks} \times 50 \text{ units per week} = 2,600 \text{ units} \end{aligned}$$

**Evaluation of 5% discount offer**

| Particulars                                                                            | At EOQ 186 units                   | At ROQ 1,500 units               |
|----------------------------------------------------------------------------------------|------------------------------------|----------------------------------|
| 1. Purchase cost 2,600 units @ ₹100/₹95 p.u.                                           | 2,60,000                           | 2,47,000                         |
| 2. Ordering cost:<br>Number of orders<br>Ordering cost (number of orders × ₹100)       | 2,600 ÷ 186 = 13.97 or 14<br>1,400 | 2,600 ÷ 1,500 = 1.73 or 2<br>200 |
| 3. Carrying cost ( $\frac{1}{2} \times \text{ROQ} \times C$ )<br>(C = 15% of ₹100/₹95) | 1,395                              | 10,688                           |
| <b>Total cost (1+2+3)</b>                                                              | <b>2,62,795</b>                    | <b>2,57,888</b>                  |

**Advise:** The total cost of inventory is lower if discount is adopted. Hence, it is worth accepting.

$$2. \text{ Re-order Level} = \text{Maximum Re-order period} \times \text{Maximum Usage} = 6 \text{ weeks} \times 75 \text{ units} = 450 \text{ units}$$

$$\begin{aligned} 3. \text{ Minimum Level} &= \text{ROL} - (\text{Normal usage} \times \text{Average re-order period}) \\ &= 450 \text{ units} - (50 \text{ units} \times 5 \text{ weeks}) \\ &= 450 \text{ units} - 250 \text{ units} = 200 \text{ units} \end{aligned}$$

$$\begin{aligned} 4. \text{ Maximum Level} &= \text{ROL} - (\text{Minimum usage} \times \text{Minimum re-order period}) + \text{ROQ} \\ &= 450 \text{ units} - (25 \text{ units} \times 4 \text{ weeks}) + 186 \text{ units} = 536 \text{ units} \end{aligned}$$

$$\begin{aligned} 5. \text{ Average Stock Level} &= \frac{1}{2} \times (\text{Minimum Stock Level} + \text{Maximum Stock Level}) \\ &= \frac{1}{2} \times (200 \text{ units} + 536 \text{ units}) = 368 \text{ units} \\ &\text{Or} \\ &= \frac{1}{2} \times \text{ROQ} + \text{Minimum Stock Level} \\ &= \frac{1}{2} \times 186 + 200 \text{ units} = 293 \text{ units} \end{aligned}$$

**BQ 16**

Aditya Brothers supplies surgical gloves to nursing homes and polyclinics in the city. These surgical gloves are sold in pack of 10 pairs at a price of ₹250 per pack.

For the month of April 2023, it has been estimated that a demand for 60,000 packs of surgical gloves will arise. Aditya Brothers purchases these gloves from manufacturer at ₹228 per pack within 5 days lead time. The ordering and related cost is ₹240 per order. The storage cost is 10% per annum of average inventory investment.

**Required**

- (i) Calculate Economic Order Quantity (EOQ).
- (ii) Calculate the number of orders needed every year.
- (iii) Calculate the total cost of ordering and storage of the surgical gloves.
- (iv) Determine when should the next order to be placed. (Assuming that the company does maintain a safety stock and that the present inventory level is 10,000 packs with a year of 360 working days).

**Answer**

$$\begin{aligned} (i) \text{ EOQ} &= \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 60,000 \times 12 \times 240}{228 \times 10\%}} \\ &= 3,893.3 \text{ or } 3,893 \text{ packs} \end{aligned}$$

**MATERIAL COST 1.10**

$$\begin{aligned}
 \text{(ii) No. of orders per year} &= \frac{\text{Annual Requirement}}{\text{EOQ}} = \frac{7,20,000}{3,893} \\
 &= \mathbf{184.9 \text{ or } 185 \text{ orders}}
 \end{aligned}$$

**(iii) Total cost of ordering and carrying:**

$$\begin{aligned}
 \text{Ordering cost} &= \text{Number of orders} \times O \\
 &= 185 \times ₹240 = ₹44,400 \\
 \text{Carrying cost} &= \frac{1}{2} \times \text{ROQ} \times C \\
 &= \frac{1}{2} \times 3,893 \times 22.80 = ₹44,380.20 \\
 \text{Total} &= ₹44,400 + ₹44,380.20 = \mathbf{₹88,780.20}
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv) Normal usage per day} &= 7,20,000 \text{ packs} \div 360 \text{ days} = 2,000 \text{ packs} \\
 \text{Present inventory} &= 10,000 \text{ packs} \\
 \text{Present inventory} &= 10,000 \text{ packs} \div 2,000 \text{ packs} = 5 \text{ days} \\
 \text{Normal lead time} &= 5 \text{ days}
 \end{aligned}$$

Since, Present inventory level is equal to normal lead time; **next order should be placed immediately** to avoid stock out situation.

**BQ 17****The following data are available:**

|                         |   |                                    |
|-------------------------|---|------------------------------------|
| Annual consumption      | : | 24,300 units (360 days)            |
| Cost per unit           | : | ₹10                                |
| Order cost              | : | ₹40 per order                      |
| Inventory carrying cost | : | 24% per annum of average inventory |
| Normal lead time        | : | 18 days                            |
| Safety stock            | : | 12 days consumption                |

**You are required to find out:**

- How many units should be ordered each time?
- When the order should be placed.
- What would be the ideal stock level (immediately before the supply of material ordered is received)?

**Answer**

$$\begin{aligned}
 \text{(a) Re-order quantity} &= \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 24,300 \times 40}{10 \times 24\%}} = \mathbf{900 \text{ units}} \\
 \text{(b) Re-order level} &= \text{Safety stock} + \text{Consumption during lead time} \\
 &= \frac{24,300}{360} \times 12 + \frac{24,300}{360} \times 18 \\
 &= 810 + 1,215 = \mathbf{2,025 \text{ units}} \\
 \text{(c) Ideal Stock Level} &= \text{ROL} - \text{Consumption during lead time} \\
 &= 2,025 - 1,215 = \mathbf{810 \text{ units}}
 \end{aligned}$$

**BQ 18**

Aditya Ltd. produces a product 'Exe' using a raw material Dee. To produce one unit of Exe, 2 kg of Dee is required. As per the sales forecast conducted by the company, it will 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 the Economic Order Quantity (EOQ).
- Maximum consumption per day is 20 kg. more than the 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.

5. The purchase price is ₹125 per kg.

There is an opening stock of 900 units of the finished product Exe. The rate of interest charged by bank on Cash Credit facility is 13.76%. To place an order company has to incur ₹720 on paper and documentation work.

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

- (a) Re-order Quantity
- (b) Re-order level
- (c) Maximum Stock level
- (d) Minimum Stock level
- (e) Average Stock level
- (f) Calculate the impact on the profitability of the company by not ordering the EOQ.  
[Take 364 days for a year]

**Answer**

(a) **Re-order quantity** =  $\text{EOQ} - 200 \text{ kg}$   
 $= \sqrt{\frac{2 \times 17,200 \times 720}{125 \times 13.76\%}} - 200 \text{ kg} = 1,000 \text{ kg}$

(b) **Re-order Level** = Maximum consumption per day × Maximum lead time  
 $= 70 \text{ kg} \times 8 \text{ days} = 560 \text{ kg}$

(c) **Maximum Level** =  $\text{ROL} + \text{ROQ} - (\text{Minimum consumption per day} \times \text{Minimum lead time})$   
 $= 560 \text{ kg} + 1,000 \text{ kg} - (30 \text{ kg} \times 4 \text{ days}) = 1,440 \text{ kg}$

(d) **Minimum Level** =  $\text{ROL} - (\text{Average consumption per day} \times \text{Average lead time})$   
 $= 560 \text{ kg} - (50 \text{ kg} \times 6 \text{ days}) = 260 \text{ kg}$

(e) **Average Stock Level** =  $\frac{1}{2} \times (\text{Minimum Stock Level} + \text{Maximum Stock Level})$   
 $= \frac{1}{2} \times (1,440 \text{ kg} + 260 \text{ kg}) = 850 \text{ kg}$   
**Or**  
 $= \frac{1}{2} \times \text{ROQ} + \text{Minimum Stock Level}$   
 $= \frac{1}{2} \times 1,000 \text{ kg} + 260 \text{ kg} = 760 \text{ kg}$

**(f) Impact on Profitability**

| Particulars                                                | At ROQ (1,000 kg)                                                 | At EOQ (1,200 kg)                                                  |
|------------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------|
| Number of orders                                           | $\frac{17,200}{1,000} = 17.20 \text{ or } 18$                     | $\frac{17,200}{1,200} = 14.33 \text{ or } 15$                      |
| Ordering cost                                              | $18 \times 720 = 12,960$                                          | $15 \times 720 = 10,800$                                           |
| Carrying cost ( $\frac{1}{2} \times \text{ROQ} \times C$ ) | $8,600$<br>$(\frac{1}{2} \times 1,000 \times 125 \times 13.76\%)$ | $10,320$<br>$(\frac{1}{2} \times 1,200 \times 125 \times 13.76\%)$ |
| <b>Total ordering and carrying cost</b>                    | <b>21,560</b>                                                     | <b>21,120</b>                                                      |
| <b>Impact on profit</b>                                    | <b>-</b>                                                          | <b>440</b>                                                         |

**Working notes:**

1. **Calculation of annual consumption and purchase of raw materials 'Dee':**

|                                                                             |                   |
|-----------------------------------------------------------------------------|-------------------|
| Sales forecast of the product 'Exe'                                         | 10,000 units      |
| Less: Opening stock of 'Exe'                                                | (900 units)       |
| Fresh units of 'Exe' to be produced                                         | 9,100 units       |
| Raw material required to produce 9,100 units of 'Exe' (9,100 units × 2 kg.) | <b>18,200 kg.</b> |
| Less: Opening Stock of 'Dee'                                                | 1,000 kg.         |
| Annual purchase for raw material 'Dee'                                      | <b>17,200 kg.</b> |

2. **Minimum consumption per day of raw material 'Dee':**

|                                    |   |                                           |   |       |
|------------------------------------|---|-------------------------------------------|---|-------|
| Average consumption per day        | = | $18,200 \text{ kg} \div 364 \text{ days}$ | = | 50 kg |
| Hence, Maximum consumption per day | = | $50 \text{ kg} + 20 \text{ kg}$           | = | 70 kg |

**MATERIAL COST 1.12**

$$\begin{aligned} \text{So minimum consumption per day} &= \text{Average} \times 2 - \text{Max.} = 50 \times 2 - 70 \\ &= 30 \text{ kg} \end{aligned}$$

**BQ 19**

A Ltd. produces a product 'X' using a raw material D. To produce one unit of X, 4 kg of D is required. As per the sales forecast conducted by the company, it will be able to sell 20,000 units of X in the coming year. The following is the information regarding the raw material D:

1. The Re-order quantity is 400 kg. less than the Economic Order Quantity (EOQ).
2. Maximum consumption per day is 40 kg. more than the average consumption per day.
3. There is an opening stock of 2,000 kg.
4. Time required to get the raw materials from the suppliers is 4 to 8 days.
5. The purchase price is ₹250 per kg.

There is an opening stock of 1,800 units of the finished product X. The carrying cost of inventory is 14% p.a. To place an order company has to incur ₹1,340 on paper and documentation work.

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

- (a) Re-order Quantity
- (b) Re-order Level
- (c) Maximum Stock level
- (d) Minimum Stock level
- (e) Calculate the impact on the profitability of the company by not ordering the EOQ.  
[Take 300 days for a year]

**Answer**

(a) **Re-order quantity** =  $\text{EOQ} - 400 \text{ kg}$   
 $= \sqrt{\frac{2 \times 70,800 \times 1,340}{250 \times 14\%}} - 400 \text{ kg}$   
 $= 2,328 - 400 = \mathbf{1,928 \text{ kg}}$

(b) **Re-order Level** = Maximum consumption per day  $\times$  Maximum lead time  
 $= \{(72,800 \div 300) + 40 \text{ kg}\} \times 8 \text{ days} = \mathbf{2,261 \text{ kg}}$

(c) **Maximum Level** =  $\text{ROL} + \text{ROQ} - (\text{Minimum consumption per day} \times \text{Minimum lead time})$   
 $= 2,261 \text{ kg} + 1,928 \text{ kg} - \{(72,800 \div 300) - 40 \text{ kg}\} \times 4 \text{ days}$   
 $= \mathbf{3,378 \text{ kg}}$

(d) **Minimum Level** =  $\text{ROL} - (\text{Average consumption per day} \times \text{Average lead time})$   
 $= 2,261 \text{ kg} - \{(72,800 \div 300) \times 6 \text{ days}\} = \mathbf{805 \text{ kg}}$

**(e) Impact on Profitability**

| Particulars                                                | At ROQ (1,928 kg)                                                 | At EOQ (2,328 kg)                                                 |
|------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| Number of orders                                           | $\frac{70,800}{1,928} = 36.72 \text{ or } 37$                     | $\frac{70,800}{2,328} = 30.41 \text{ or } 31$                     |
| Ordering cost                                              | $37 \times 1,340 = 49,580$                                        | $31 \times 1,340 = 41,540$                                        |
| Carrying cost ( $\frac{1}{2} \times \text{ROQ} \times C$ ) | $33,740$<br>( $\frac{1}{2} \times 1,928 \times 250 \times 14\%$ ) | $40,740$<br>( $\frac{1}{2} \times 2,328 \times 250 \times 14\%$ ) |
| <b>Total ordering and carrying cost</b>                    | <b>83,320</b>                                                     | <b>82,280</b>                                                     |
| <b>Impact on profit</b>                                    | <b>-</b>                                                          | <b>1,040</b>                                                      |

**Working notes:****1. Calculation of annual consumption and purchase of raw materials 'D':**

|                                                                                    |                   |
|------------------------------------------------------------------------------------|-------------------|
| Sales forecast of the product 'X'                                                  | 20,000 units      |
| Less: Opening stock of 'X'                                                         | (1,800 units)     |
| Fresh units of 'X' to be produced                                                  | 18,200 units      |
| Raw material required to produce 72,800 units of 'X' (18,200 units $\times$ 4 kg.) | <b>72,800 kg.</b> |

**MATERIAL COST 1.13**

Less: Opening Stock of 'D'  
Annual purchase for raw material 'D'

2,000 kg.  
**70,800 kg.**

**BQ 20**

M/s Tanishka Materials Private Limited produces a product which names "ESS". The consumption of raw material for the production of "ESS" is 210 Kgs to 350 Kgs per week. Other information is as follows:

|                                 |   |                                         |
|---------------------------------|---|-----------------------------------------|
| Procurement Time                | : | 5 to 9 Days                             |
| Purchase price of Raw Materials | : | ₹100 per kg                             |
| Ordering Cost per Order         | : | ₹200                                    |
| Storage Cost                    | : | 1% per month plus ₹2 per unit per annum |
| Consider 365 days a year.       |   |                                         |

**You are required to Calculate:**

- Economic Order Quantity
- Re-Order Level (ROL)
- Maximum Stock Level
- Minimum Stock Level
- Average Stock Level
- Number of Orders to be placed per year
- Total Inventory Cost
- If the supplier is willing to offer 1% discount on purchase of total annual quantity in two orders, whether offer is acceptable?
- If the answer is no, what should be the counteroffer w.r.t. percentage of discount?

**Answer**

$$(a) \quad EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 14,600 \times 200}{12\% \times 100 + 2}} = \mathbf{646 \text{ kg}}$$

$$\text{*Annual consumption of raw material} = [(210+350) \div 2] \div 7 \text{ days} \times 365 = \mathbf{14,600 \text{ kg}}$$

$$(b) \quad \text{Re-order Level} = \text{Maximum consumption per day} \times \text{Maximum lead time} \\ = (350 \div 7) \times 9 \text{ days} = \mathbf{450 \text{ kg}}$$

$$(c) \quad \text{Maximum Stock Level} = \text{ROL} + \text{ROQ} - (\text{Minimum consumption per day} \times \text{Minimum lead time}) \\ = 450 \text{ kg} + 646 \text{ kg} - (210 \div 7) \times 5 \text{ days} \\ = \mathbf{946 \text{ kg}}$$

$$(d) \quad \text{Minimum Stock Level} = \text{ROL} - (\text{Average consumption per day} \times \text{Average lead time}) \\ = 450 \text{ kg} - [(210+350) \div 2] \div 7 \text{ days} \times (5 + 9) \div 2 \\ = \mathbf{170 \text{ kg}}$$

$$(e) \quad \text{Average Stock Level} = \frac{1}{2} \times (\text{Minimum Stock Level} + \text{Maximum Stock Level}) \\ = \frac{1}{2} \times (946 \text{ kg} + 170 \text{ kg}) = \mathbf{558 \text{ kg}}$$

**Or**

$$= \frac{1}{2} \times \text{ROQ} + \text{Minimum Stock Level} \\ = \frac{1}{2} \times 646 \text{ kg} + 170 \text{ kg} = \mathbf{493 \text{ kg}}$$

$$(f) \quad \text{Number of Orders} = \text{Annual consumption} \div \text{EOQ} \\ = 14,600 \text{ kg} \div 646 \text{ kg} = \mathbf{22.6 \text{ or } 23}$$

$$(g) \quad \text{Total Inventory Cost} = \text{Purchase cost} + \text{Ordering cost} + \text{Carrying cost} \\ = (\text{Purchase Quantity} \times \text{Price}) + \left(\frac{A}{\text{ROQ}} \times O\right) + \left(\frac{1}{2} \times \text{ROQ} \times C\right) \\ = (14,600 \times ₹100) + (23 \times ₹200) + \left(\frac{1}{2} \times 646 \times ₹14\right)$$



$$= ₹14,69,122$$

**(h) Evaluation of 1% discount offer in two orders:**

$$\begin{aligned} \text{Inventory Cost at Offer Price} &= \text{Purchase cost} + \text{Ordering cost} + \text{Carrying cost} \\ &= (14,600 \times ₹99) + (2 \times ₹200) + (\frac{1}{2} \times 7,300) \times (12\% \text{ of } ₹99 + ₹2) \\ &= ₹14,96,462 \end{aligned}$$

**Advice:** As total inventory cost at offer price is ₹27,340 (14,96,462 – 14,69,122) higher, offer should not be accepted.

**(i) Counter offer:**

$$\begin{aligned} \text{Let discount rate (\%)} &= D \\ \text{Counter offer Price} &= ₹100 - D &= ₹100 - D \\ \text{Revised Carrying Cost} &= [(\text{₹}100 - D) \times 12\%] + ₹2 &= ₹12 - 0.12D + ₹2 \\ &= ₹14 - 0.12D \end{aligned}$$

**Total Inventory Cost at Counter offer Price:**

$$\begin{aligned} &= \text{Purchase cost} + \text{Ordering cost} + \text{Carrying cost} \\ &= \{14,600 \times (\text{₹}100 - D)\} + (2 \times ₹200) + (\frac{1}{2} \times 7,300) \times (\text{₹}14 - 0.12D) \\ &= ₹14,60,000 - 14,600D + ₹400 + ₹51,100 - 438D \\ &= ₹15,11,500 - 15,038D \end{aligned}$$

Now,

$$\begin{aligned} ₹14,69,122 &= ₹15,11,500 - 15,038D \\ ₹42,378 &= 15,038D \\ D &= 2.82 \end{aligned}$$

**Therefore, discount should be at least 2.82% in offer price.**

**BQ 21**

If the minimum stock level and average stock level of raw-material A are 4,000 and 9,000 units respectively, find out its 'Re-order quantity'.

**Answer**

$$\begin{aligned} \text{Average Stock} &= \frac{1}{2} \times \text{ROQ} + \text{Minimum Stock} \\ 9,000 &= \frac{1}{2} \times \text{ROQ} + 4,000 \\ 5,000 &= \frac{1}{2} \times \text{ROQ} \\ \text{ROQ} &= 5,000 \times 2 &= 10,000 \text{ units} \end{aligned}$$

**MOST ECONOMICAL PURCHASE LEVEL****BQ 22**

EXE Limited has received an offer of quantity discounts on its order of materials as under::

| Price per ton (₹) | Ton (Nos.)              |
|-------------------|-------------------------|
| ₹1,200            | Less than 500           |
| ₹1,180            | 500 and less than 1000  |
| ₹1,160            | 1000 and less than 2000 |
| ₹1,140            | 2000 and less than 3000 |
| ₹1,120            | 3000 and above          |

The annual requirement for the materials is 5,000 tons. The delivery cost per order is ₹1,200 and the stock holding cost is estimated at 20% of material cost per annum. **(1) You are required to calculate the most**



economical purchase level, and (2) What will be your answer to the above question if there are no discounts offered and the price per ton is ₹1,500?

**Answer**

**(1) Statement of Most Economical Purchase Level**

| Order Size (ROQ) | Total Ordering Cost (A/ROQ × 1,200)       | Total Carrying Cost ( $\frac{1}{2} \times \text{ROQ} \times 20\% \text{ of Price}$ ) | Purchase Cost (5,000 × Price) | Total Cost |
|------------------|-------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------|------------|
| 400              | {(5,000/400) 12.5 or 13 × 1,200} = 15,600 | 48,000<br>( $\frac{1}{2} \times 400 \times 20\% \times 1,200$ )                      | 60,00,000<br>(5,000 × 1,200)  | 60,63,600  |
| 500              | {(5,000/500) 10 × 1,200} = 12,000         | 59,000<br>( $\frac{1}{2} \times 500 \times 20\% \times 1,180$ )                      | 59,00,000<br>(5,000 × 1,180)  | 59,71,000  |
| 1,000            | {(5,000/1,000) 5 × 1,200} = 6,000         | 1,16,000<br>( $\frac{1}{2} \times 1,000 \times 20\% \times 1,160$ )                  | 58,00,000<br>(5,000 × 1,160)  | 59,22,000  |
| 2,000            | {(5,000/2,000) 2.5 or 3 × 1,200} = 3,600  | 2,28,000<br>( $\frac{1}{2} \times 2,000 \times 20\% \times 1,140$ )                  | 57,00,000<br>(5,000 × 1,140)  | 59,31,600  |
| 3,000            | {(5,000/3,000) 1.6 or 2 × 1,200} = 2,400  | 3,36,000<br>( $\frac{1}{2} \times 3,000 \times 20\% \times 1,120$ )                  | 56,00,000<br>(5,000 × 1,120)  | 59,38,400  |

The above table shows that the total cost of 5,000 units including ordering and carrying cost is minimum (₹59,22,000) when the order size is 1,000 units. **Hence the most economical purchase level is 1,000 units.**

**(2) If there will be no discount offer then the purchase quantity should be equal to EOQ. The EOQ is as follows:**

$$\text{EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 5,000 \times 1,200}{20\% \text{ of } 1,500}} = 200 \text{ tons}$$

**BQ 23**

The cost of a single bearing with no discount is ₹30. The annual demand is 250 units. Ordering cost is ₹20 per order and annual inventory carrying cost is ₹4 per unit. Determine the optimal order quantity and the associated minimal total cost of inventory and purchasing costs, if shortages are not allowed. Assume that following quantity discount schedule for a particular bearing is available to a retail store:

| Order size (units) | Discount |
|--------------------|----------|
| 0 – 49             | 0%       |
| 50 – 99            | 5%       |
| 100 – 199          | 10%      |
| 200 and above      | 12%      |

**Answer**

**Statement of Computing Total cost at various order sizes**

| Order Size (ROQ) | Total Ordering Cost (A/ROQ × 20) | Total Carrying Cost ( $\frac{1}{2} \times \text{ROQ} \times 4$ ) | Purchase Cost (250 × Price) | Total Cost |
|------------------|----------------------------------|------------------------------------------------------------------|-----------------------------|------------|
| 40               | {(250/40) 6.25 or 7 × 20} = 140  | 80                                                               | 7,500<br>(250 × 30 × 100%)  | 7,720      |
| 50               | {(250/50) 5 × 20} = 100          | 100                                                              | 7,125<br>(250 × 30 × 95%)   | 7,325      |
| 100              | {(250/100) 2.5 or 3 × 20} = 60   | 200                                                              | 6,750<br>(250 × 30 × 90%)   | 7,010      |
| 200              | {(250/200) 1.25 or 2 × 20} = 40  | 400                                                              | 6,600<br>(250 × 30 × 88%)   | 7,040      |

**Optimum order quantity is 100 units having minimum total cost of inventory and purchase cost of ₹7,010.**

**OPTIMUM SAFETY STOCK LEVEL****BQ 24**

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

The castings are used evenly throughout the year in the production process on a 360-day-per-year basis. The company estimates that it costs ₹9,000 to place a single purchase order and about ₹300 to carry one casting in inventory for a year.

The high carrying costs result from the need to keep the castings in carefully controlled temperature and humidity conditions, and from the high cost of insurance. Delivery from the foundry generally takes 6 days, but it can take as much as 10 days.

*The days of delivery time and percentage of their occurrence are shown in the following tabulation:*

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

**Required**

1. Compute the economic order quantity (EOQ).
2. 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?
3. 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?
4. Assume 5% stock-out risk. What would be the total cost of ordering and carrying inventory for one year?
5. Refer to the original data. Assume that using process re-engineering the company reduces its cost of placing a purchase order to only ₹600. In addition, company estimates that when the waste and inefficiency caused by inventories are considered, the true cost of carrying a unit in stock is ₹720 per year.
  - (a) Compute the new EOQ.
  - (b) How frequently would the company be placing an order, as compared to the old purchasing policy?

**Answer****1. Computation of economic order quantity (EOQ):**

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

**2. Assuming a 15% risk of being out of stock:**

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

$$\begin{aligned} \text{Safety stock} &= \frac{\text{Annual Demand}}{360} \times (\text{Maximum lead time} - \text{Average lead time}) \\ &= \frac{54,000}{360} \times (7 \text{ days} - 6 \text{ days}) = \mathbf{150 \text{ castings}} \\ \text{Re-order point} &= \text{Safety stock} + \text{Average lead time consumption} \\ &= 150 \text{ castings} + (6 \text{ days} \times 150 \text{ casting}) = \mathbf{1,050 \text{ castings}} \end{aligned}$$

**3. Assuming a 5% risk of being out of stock:**

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

$$\begin{aligned} \text{Safety stock} &= \frac{\text{Annual Demand}}{360} \times (\text{Maximum lead time} - \text{Average lead time}) \\ &= \frac{54,000}{360} \times (9 \text{ days} - 6 \text{ days}) = \mathbf{450 \text{ castings}} \end{aligned}$$

**MATERIAL COST 1.17**

$$\begin{aligned} \text{Re-order point} &= \text{Safety stock} + \text{Average lead time consumption} \\ &= 450 \text{ castings} + (6 \text{ days} \times 150 \text{ casting}) = \mathbf{1,350 \text{ castings}} \end{aligned}$$

**4. At 5% stock-out risk the total cost of ordering and carrying cost is as follows:**

$$\begin{aligned} \text{Total cost of ordering} &= \frac{\text{Annual Demand}}{\text{EOQ}} \times \text{Cost per order} \\ &= \frac{54,000}{1,800} \times ₹9,000 = \mathbf{₹2,70,000} \\ \text{Total cost of carrying} &= (\text{Safety stock} + \frac{1}{2} \text{EOQ}) \times \text{Carrying cost per unit p.a.} \\ &= (450 \text{ units} + \frac{1}{2} \times 1,800 \text{ units}) \times ₹300 = \mathbf{₹4,05,000} \end{aligned}$$

$$\mathbf{5. (a) \text{ Computation of new EOQ}} = \sqrt{\frac{2 \times 54,000 \times 600}{720}} = \mathbf{300 \text{ castings}}$$

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

Under new purchasing policy IPL Ltd. has to place order in every 2<sup>nd</sup> day (360 days ÷ 180 orders), however under the old purchasing policy it was every 12th day.

**BQ 25**

M/s Tyrotubes trades in four wheeler tyres and tubes. It stocks sufficient quantity of tyres of almost every vehicle. In year end 2023-24, the report of sales manager revealed that M/s Tyrotubes experienced stock-out of tyres.

| <i>Stock-out of tyres</i> | <i>No. of times</i> |
|---------------------------|---------------------|
| 100                       | 2                   |
| 80                        | 5                   |
| 50                        | 10                  |
| 20                        | 20                  |
| 10                        | 30                  |
| 0                         | 33                  |

M/s Tyrotubes losses ₹150 per unit due to stock-out and spends ₹50 per unit on carrying of inventory.

**Determine optimum safety stock level.**

**Answer**

**Computation of Stock-out and Inventory Carrying Cost**

| <i>Safety stock (1)</i> | <i>Stock-out (units) (2)</i> | <i>Probability (3)</i> | <i>Stock-out cost (4) = (2) × ₹150</i> | <i>Expected stock-out cost (5) = (3) × (4)</i> | <i>Inventory carrying cost (6) = (1) × ₹50</i> | <i>Total cost (7) = (5) + (6)</i> |
|-------------------------|------------------------------|------------------------|----------------------------------------|------------------------------------------------|------------------------------------------------|-----------------------------------|
| 100                     | 0                            | 0                      | 0                                      | 0                                              | 5,000                                          | <b>5,000</b>                      |
| 80                      | 20                           | 0.02                   | 3,000                                  | 60                                             | 4,000                                          | <b>4,060</b>                      |
| 50                      | 50                           | 0.02                   | 7,500                                  | 150                                            |                                                |                                   |
|                         | 30                           | 0.05                   | 4,500                                  | 225                                            |                                                |                                   |
|                         |                              |                        | 12,000                                 | 375                                            | 2,500                                          | <b>2,875</b>                      |
| 20                      | 80                           | 0.02                   | 12,000                                 | 240                                            |                                                |                                   |
|                         | 60                           | 0.05                   | 9,000                                  | 450                                            |                                                |                                   |
|                         | 30                           | 0.10                   | 4,500                                  | 450                                            |                                                |                                   |
|                         |                              |                        | 25,500                                 | 1,140                                          | 1,000                                          | <b>2,140</b>                      |
| 10                      | 90                           | 0.02                   | 13,500                                 | 270                                            |                                                |                                   |
|                         | 70                           | 0.05                   | 10,500                                 | 525                                            |                                                |                                   |
|                         | 40                           | 0.10                   | 6,000                                  | 600                                            |                                                |                                   |
|                         | 10                           | 0.20                   | 1,500                                  | 300                                            |                                                |                                   |
|                         |                              |                        | 31,500                                 | 1,695                                          | 500                                            | <b>2,195</b>                      |
| 0                       | 100                          | 0.02                   | 15,000                                 | 300                                            |                                                |                                   |
|                         | 80                           | 0.05                   | 12,000                                 | 600                                            |                                                |                                   |

**MATERIAL COST 1.18**

|  |    |      |        |       |   |              |
|--|----|------|--------|-------|---|--------------|
|  | 50 | 0.10 | 7,500  | 750   |   |              |
|  | 20 | 0.20 | 3,000  | 600   |   |              |
|  | 10 | 0.30 | 1,500  | 450   |   |              |
|  |    |      | 39,000 | 2,700 | 0 | <b>2,700</b> |

At safety stock level of 20 units, total cost is least i.e ₹2,140. Hence optimum safety stock is 20 units.

**Working Notes:**

**Computation of Probability of Stock-out**

|                  |      |      |      |      |      |      |       |
|------------------|------|------|------|------|------|------|-------|
| Stock-out(units) | 100  | 80   | 50   | 20   | 10   | 0    | Total |
| No. of times     | 2    | 5    | 10   | 20   | 30   | 33   | 100   |
| Probability      | 0.02 | 0.05 | 0.10 | 0.20 | 0.30 | 0.33 | 1.00  |

**ABC ANALYSIS**

**BQ 26**

From the following details, draw a plan of ABC selective control:

| Item No. | Units  | Unit cost (₹) |
|----------|--------|---------------|
| 1        | 7,000  | 5.00          |
| 2        | 24,000 | 3.00          |
| 3        | 1,500  | 10.00         |
| 4        | 600    | 22.00         |
| 5        | 38,000 | 1.50          |
| 6        | 40,000 | 0.50          |
| 7        | 60,000 | 0.20          |
| 8        | 3,000  | 3.50          |
| 9        | 300    | 8.00          |
| 10       | 29,000 | 0.40          |
| 11       | 11,500 | 7.10          |
| 12       | 4,100  | 6.20          |

**Answer**

**Statement of Total Cost and Ranking**

| Items | Units           | % of Total units | Unit cost (₹) | Total cost (₹)  | % of Total cost | Ranking   |
|-------|-----------------|------------------|---------------|-----------------|-----------------|-----------|
| 1     | 7,000           | 3.1963           | 5.00          | 35,000          | 9.8378          | <b>4</b>  |
| 2     | 24,000          | 10.9589          | 3.00          | 72,000          | 20.2378         | <b>2</b>  |
| 3     | 1,500           | 0.6849           | 10.00         | 15,000          | 4.2162          | <b>7</b>  |
| 4     | 600             | 0.2740           | 22.00         | 13,200          | 3.7103          | <b>8</b>  |
| 5     | 38,000          | 17.3516          | 1.50          | 57,000          | 16.0216         | <b>3</b>  |
| 6     | 40,000          | 18.2648          | 0.50          | 20,000          | 5.6216          | <b>6</b>  |
| 7     | 60,000          | 27.3973          | 0.20          | 12,000          | 3.3730          | <b>9</b>  |
| 8     | 3,000           | 1.3699           | 3.50          | 10,500          | 2.9513          | <b>11</b> |
| 9     | 300             | 0.1370           | 8.00          | 2,400           | 0.6746          | <b>12</b> |
| 10    | 29,000          | 13.2420          | 0.40          | 11,600          | 3.2605          | <b>10</b> |
| 11    | 11,500          | 5.2512           | 7.10          | 81,650          | 22.9502         | <b>1</b>  |
| 12    | 4,100           | 1.8721           | 6.20          | 25,420          | 7.1451          | <b>5</b>  |
| -     | <b>2,19,000</b> | <b>100</b>       | -             | <b>3,55,770</b> | <b>100</b>      | -         |

**Basis for selective control (Assumed in ICAI SM, in exam it will be given in question)**

₹50,000 & above  
₹15,000 to ₹50,000  
Below ₹15,000

'A' items  
'B' items  
'C' items

**On this basis, a plan of A B C selective control is given below:**

| <b>Ranking</b>     | <b>Item No.</b> | <b>% of Total units</b> | <b>Total cost (₹)</b> | <b>% of Total cost</b> | <b>Category</b> |
|--------------------|-----------------|-------------------------|-----------------------|------------------------|-----------------|
| 1                  | 11              | 5.2512                  | 81,650                | 22.9502                |                 |
| 2                  | 2               | 10.9589                 | 72,000                | 20.2378                |                 |
| 3                  | 5               | 17.3516                 | 57,000                | 16.0216                |                 |
| <b>Total</b>       | <b>3</b>        | <b>33.5617</b>          | <b>2,10,650</b>       | <b>59.2096</b>         | <b>A</b>        |
| 4                  | 1               | 3.1963                  | 35,00                 | 9.8378                 |                 |
| 5                  | 12              | 1.8721                  | 25,420                | 7.1451                 |                 |
| 6                  | 6               | 18.2648                 | 20,000                | 5.6216                 |                 |
| 7                  | 3               | 0.6849                  | 15,000                | 4.2162                 |                 |
| <b>Total</b>       | <b>4</b>        | <b>24.0181</b>          | <b>95,420</b>         | <b>26.8207</b>         | <b>B</b>        |
| 8                  | 4               | 0.2740                  | 13,200                | 3.7103                 |                 |
| 9                  | 7               | 27.3973                 | 12,000                | 3.3730                 |                 |
| 10                 | 10              | 13.2420                 | 11,600                | 3.2605                 |                 |
| 11                 | 8               | 1.3699                  | 10,500                | 2.9513                 |                 |
| 12                 | 9               | 0.1370                  | 2,400                 | 0.6746                 |                 |
| <b>Total</b>       | <b>5</b>        | <b>42.4202</b>          | <b>49,700</b>         | <b>13.9697</b>         | <b>C</b>        |
| <b>Grand Total</b> | <b>12</b>       | <b>100</b>              | <b>3,55,770</b>       | <b>100</b>             |                 |

**BQ 27**

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

| <b>No. of varieties of inventory</b> | <b>% of item</b> | <b>% value of inventory holding (average)</b> | <b>% of inventory usage (in end-product)</b> |
|--------------------------------------|------------------|-----------------------------------------------|----------------------------------------------|
| 3,875                                | 96.875           | 20                                            | 5                                            |
| 110                                  | 2.750            | 30                                            | 10                                           |
| 15                                   | 0.375            | 50                                            | 85                                           |
| 4,000                                | 100.00           | 100                                           | 100                                          |

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

**Answer**

**Classification of the items of inventory as per ABC Analysis**

| <b>Category</b> | <b>No. of items</b> | <b>% of items</b> | <b>% value of inventory holding (average)</b> | <b>% of inventory usage (in end-product)</b> |
|-----------------|---------------------|-------------------|-----------------------------------------------|----------------------------------------------|
| A               | 15                  | 0.375             | 50                                            | 85                                           |
| B               | 110                 | 2.750             | 30                                            | 10                                           |
| C               | 3,875               | 96.875            | 20                                            | 5                                            |
| <b>Total</b>    | <b>4,000</b>        | <b>100.00</b>     | <b>100</b>                                    | <b>100</b>                                   |

**Reasons:**

**Category A:** 15 numbers of inventory items should be classified as those of A category because of the following reasons:

1. They constitute 0.375% of total number of varieties of inventory items handled by stores of factory. This is the minimum as per the given classification in the table
2. The total usage of these items is 50% of total use value of inventory holding (average) which is maximum according to the given table.
3. The consumption of these items is about 85% of usage in end product.

**Category B:** 110 number of inventory items should be classified as those of B category because of the following reasons:

**MATERIAL COST 1.20**

1. They constitute 2.750% of total number of varieties of inventory items handled by the stores of the factory.
2. They require moderate investment of about 30% of total use value of inventory holding (average).
3. Their consumption is moderate about 10% of inventory usage in the end product.

**Category C:** 3,875 numbers of varieties of inventory items should be classified as those of category C because of the following reasons:

1. They constitute 96.875% of total varieties of inventory items handled by stores of factory.
2. They require investment of 20% of total use value of average of average inventory holding.
3. Their consumption is minimum, i.e. just 5% of inventory usage in end product.

### INVENTORY TURNOVER RATIO

**BQ 28**

The following data are available in respect of material X for the year ended 31<sup>st</sup> March, 2024.

|                           |           |
|---------------------------|-----------|
| Opening stock             | ₹90,000   |
| Purchases during the year | ₹2,70,000 |
| Closing stock             | ₹1,10,000 |

**Calculate (1) Inventory turnover ratio, and (2) The number of days for which the average inventory is held.**

**Answer**

#### Statement Showing Inventory Turnover Ratio and Number of Days

| Particulars                                                                    | Material X       |
|--------------------------------------------------------------------------------|------------------|
| Opening stock                                                                  | 90,000           |
| Add: Purchases                                                                 | 2,70,000         |
| Less: Closing stock                                                            | (1,10,000)       |
| Materials consumed                                                             | 2,50,000         |
| Average inventory (Opening stock + Closing stock) ÷ 2                          | 1,00,000         |
| <b>Inventory turnover ratio (Materials consumed ÷ Average inventory)</b>       | <b>2.5 times</b> |
| <b>Number of days for which the average inventory is held (365 ÷ IT Ratio)</b> | <b>146 days</b>  |

**BQ 29**

**From the following data for the year ended 31.03.24, Calculate the inventory turnover ratio for the two items and put forward your comments on them:**

| Particulars              | Material A | Material B |
|--------------------------|------------|------------|
| Opening stock 01.04.2023 | 10,000     | 9,000      |
| Purchases                | 52,000     | 27,000     |
| Closing stock 31.03.2024 | 6,000      | 11,000     |

**Answer**

#### Statement Showing Inventory Turnover Ratio

| Particulars                                                              | Material A     | Material B       |
|--------------------------------------------------------------------------|----------------|------------------|
| Opening stock                                                            | 10,000         | 9,000            |
| Add: Purchases                                                           | 52,000         | 27,000           |
| Less: Closing stock                                                      | 62,000         | 36,000           |
|                                                                          | (6,000)        | (11,000)         |
| Materials consumed                                                       | 56,000         | 25,000           |
| Average inventory (Opening stock + Closing stock) ÷ 2                    | 8,000          | 10,000           |
| <b>Inventory turnover ratio (Materials consumed ÷ Average inventory)</b> | <b>7 times</b> | <b>2.5 times</b> |
| <b>Inventory turnover (365 ÷ IT Ratio)</b>                               | <b>52 days</b> | <b>146 days</b>  |

**Comment:** Material A is moving faster than Material B.

## VALUATION OF MATERIAL

### BQ 30

SKD Company Ltd., not registered under GST, purchased material P from a company which is registered under GST. The following information is available for the one lot of 1,000 units of material purchased:

|                                                                          |                         |
|--------------------------------------------------------------------------|-------------------------|
| Listed price of one lot                                                  | ₹50,000                 |
| Trade discount                                                           | @ 10% on listed price   |
| CGST and SGST (Credit Not available)                                     | 12% (6% CGST + 6% SGST) |
| Cash discount<br>(Will be given only if payment is made within 30 days.) | @10%                    |
| Freight and Insurance                                                    | ₹3,400                  |
| Toll Tax paid                                                            | ₹1,000                  |
| Demurrage                                                                | ₹1,000                  |
| Commission and brokerage on purchases                                    | ₹2,000                  |
| Amount deposited for returnable containers                               | ₹6,000                  |
| Amount of refund on returning the container                              | ₹4,000                  |
| Other Expenses                                                           | @ 2% of total cost      |

20% of material shortage is due to normal reasons. The payment to the supplier was made within 20 days of the purchases.

**You are required to calculate cost per unit of material purchased to SKD Company Ltd.**

### Answer

#### Computation of Total cost of material purchased of SKD Manufacturing Company

| Particulars                                             | Units    | ₹         |
|---------------------------------------------------------|----------|-----------|
| Listed Price of Materials                               | 1,000    | 50,000    |
| Less: Trade discount @ 10% on invoice price             |          | (5,000)   |
|                                                         |          | 45,000    |
| Add: CGST @ 6% of ₹ 45,000                              |          | 2,700     |
| Add: SGST @ 6% of ₹ 45,000                              |          | 2,700     |
|                                                         |          | 50,400    |
| Add: Toll Tax                                           |          | 1,000     |
| Freight and Insurance                                   |          | 3,400     |
| Commission and Brokerage Paid                           |          | 2,000     |
| Add: Cost of returnable containers:                     |          |           |
| Amount deposited                                        | ₹6,000   |           |
| Less: Amount refunded                                   | (₹4,000) | 2,000     |
|                                                         |          | 58,800    |
| Add: Other Expenses @ 2% of Total Cost (₹58,800 × 2/98) |          | 1,200     |
| Total Cost of Material                                  | 1,000    | 60,000    |
| Less: Shortage due to Normal Loss @ 20%                 | (200)    | -         |
| Total cost of material of good units                    | 800      | 60,000    |
| <b>Cost per unit (₹60,000/800 units)</b>                | <b>1</b> | <b>75</b> |

### Note:

1. GST is payable on net price i.e., listed price less discount.
2. Cash discount is treated as interest and finance charges; hence it is ignored.
3. Demurrage is penalty imposed by the transporter for delay in uploading or off-loading of materials. It is an abnormal cost and not included.
4. Shortage due to normal reasons should not be deducted from cost to ascertain total cost of good units.

### BQ 31

At what price per unit would part number A 32 be entered in the stores ledger, if the following invoice was received from the supplier?



**MATERIAL COST 1.22**

| <b>Invoice</b>                                | <b>₹</b>      |
|-----------------------------------------------|---------------|
| 200 units part A 32 @ ₹5.00 per unit          | 1,000.00      |
| Less: 20% discount                            | 200.00        |
|                                               | 800.00        |
| Add: GST @ 12%                                | 96.00         |
|                                               | 896.00        |
| Add: Packing charges (5 non-returnable boxes) | 50.00         |
|                                               | <b>946.00</b> |

**Notes:**

1. A 2 percent discount will be given for payment in 30 days.
2. Documents substantiating payment of GST is enclosed for claiming Input credit.

**Answer****Statement Showing Cost per Unit**

| <b>Particulars</b>                            | <b>₹</b>    |
|-----------------------------------------------|-------------|
| Net purchase price (1,000 - 200)              | 800.00      |
| Add: Packing charges (5 non-returnable boxes) | 50.00       |
| Total cost                                    | 850.00      |
| ÷ Number of units                             | ÷200        |
| <b>Cost per unit</b>                          | <b>4.25</b> |

**Note:**

1. Cash discount is treated as interest and finance charges hence, it is not considered for valuation of material.
2. Input credit is available for GST paid; hence it will not be added to purchase cost.

**BQ 32**

A in invoice in respect of a consignment of chemicals A and B provides following information:

| <b>Invoice</b>                                 | <b>₹</b>        |
|------------------------------------------------|-----------------|
| Chemical A: 10,000 kgs. at ₹10 per kg.         | 1,00,000        |
| Chemical B: 8,000 kgs. at ₹13 per kg.          | 1,04,000        |
| Basic custom duty @10% (Credit is not allowed) | 20,400          |
| Railway freight                                | 3,840           |
| <b>Total cost</b>                              | <b>2,28,240</b> |

A shortage of 500 kgs. in chemical A and 320 kgs. in chemical B is noticed due to normal breakages.

**You are required to determine the rate per kg. of each chemical, assuming a provision of 2% for further deterioration.**

**Answer****Statement Showing the Computation of Rate per kg. of each Chemical**

| <b>Particulars</b>            | <b>Chemical A</b> | <b>Chemical B</b> |
|-------------------------------|-------------------|-------------------|
| Purchase price                | 1,00,000          | 1,04,000          |
| Add: Basic custom duty @10%   | 10,000            | 10,400            |
| Add: Railway freight in 5 : 4 | 2,133             | 1,707             |
| Total cost                    | 1,12,133          | 1,16,107          |
| ÷ Effective quantity          | ÷ 9,310           | ÷ 7,526.4         |
| Rate per kg                   | <b>12.04</b>      | <b>15.43</b>      |

**Working notes: Calculation of Effective Quantity of each Chemical Available for Use**

| <b>Particulars</b>                     | <b>Chemical A</b> | <b>Chemical B</b> |
|----------------------------------------|-------------------|-------------------|
| Quantity purchased                     | 10,000            | 8,000             |
| Less: Shortage due to normal breakages | 500               | 320               |
|                                        | 9,500             | 7,680             |
| Less: Provision for deterioration @ 2% | 190               | 153.6             |
| <b>Quantity available</b>              | <b>9,310</b>      | <b>7,526.4</b>    |



**BQ 33**

HBL Ltd. 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)             | ₹140       | ₹640       |
| Rate of GST                                        | 18%        | 18%        |
| Freight per trip (fixed, irrespective of quantity) | -          | ₹28,000    |
| Loss of material in transit on purchase quantity   | -          | 2%         |
| Loss in process on purchase quantity               | 4%         | 5%         |

**Other information:**

- (a) The company has to pay 15% p.a. to bank for cash credit facility.  
 (b) Input credit is available on GST paid on materials.

**Required:**

- (1) Calculate cost per kg. of material X and Y.  
 (2) Calculate the Economic Order Quantity for both the materials.

**Answer**

**(1) Statement Showing Cost per kg. of Material X and Y**

| Particulars                       | Material X     | Material Y     |
|-----------------------------------|----------------|----------------|
| Purchase quantity (in kg)         | 2,50,000       | 3,44,086       |
| Purchase cost @ ₹140/ ₹640 per kg | ₹3,50,00,000   | ₹22,02,15,040  |
| Add: Freight (W.N.)               | -              | ₹9,80,000      |
| Total cost                        | ₹3,50,00,000   | ₹22,11,95,040  |
| ÷ Effective quantity              | ÷ 2,40,000     | ÷ 3,20,000     |
| Cost per kg                       | <b>₹145.83</b> | <b>₹691.23</b> |

$$\begin{aligned}
 (2) \quad EOQ &= \sqrt{\frac{2AO}{C}} \\
 \text{Material X} &= \sqrt{\frac{2 \times 2,50,000 \times 0}{145.83 \times 15\%}} = \text{Nil} \\
 \text{Material Y} &= \sqrt{\frac{2 \times 3,44,086 \times 28,000}{691.23 \times 15\%}} = \text{13,632.35 Kgs}
 \end{aligned}$$

**Working Note:**

(a) Freight = Number of orders × Freight per trip  
 = (3,44,086 kg ÷ 10,000 kg) × 28,000 = 34.40 or 35 orders × 28,000  
 = ₹9,80,000

**(b) Calculation of Quantity to be Purchased:**

| Particulars                                                   | Material X      | Material Y      |
|---------------------------------------------------------------|-----------------|-----------------|
| Annual production of product M (20,000 units × 4 quarters)    | 80,000          | 80,000          |
| Raw material required for one unit of M                       | 3 kg            | 4 kg            |
| Net quantity of raw material (in kg)                          | 2,40,000        | 3,20,000        |
| Add: Loss in transit : Y [(3,20,000 kg ÷ 93%) × 2%]           | -               | 6,882           |
| Add: Loss in process : X [(2,40,000 kg ÷ 96%) × 4%]           | 10,000          |                 |
| Y [(3,20,000 kg ÷ 93%) × 5%]                                  |                 | 17,204          |
| <b>Raw material quantity required to be purchased (in kg)</b> | <b>2,50,000</b> | <b>3,44,086</b> |

## STOCK VALUATION AND STORES LEDGER

### BQ 34

'AT' Ltd. furnishes the following store transactions for September, 2023:

|          |                                                         |                           |
|----------|---------------------------------------------------------|---------------------------|
| 01.09.23 | Opening balance                                         | 25 units value ₹162.50    |
| 04.09.23 | Issues Req. No. 85                                      | 8 units                   |
| 06.09.23 | Receipts from B & Co. GRN No. 26                        | 50 units @ ₹5.75 per unit |
| 07.09.23 | Issues Req. No. 97                                      | 12 units                  |
| 10.09.23 | Return to B & Co.                                       | 10 units                  |
| 12.09.23 | Issues Req. No. 108                                     | 15 units                  |
| 13.09.23 | Issues Req. No. 110                                     | 20 units                  |
| 15.09.23 | Receipts from M & Co. GRN No. 33                        | 25 units @ ₹6.10 per unit |
| 17.09.23 | Issues Req. No. 12                                      | 10 units                  |
| 19.09.23 | Received replacement from B & Co. GRN No. 38            | 10 units                  |
| 23.09.23 | Returned from department, material of M & Co. MRR No. 4 | 5 units                   |
| 22.09.23 | Transfer from Job 182 to Job 187 in the dept. MTR 6     | 5 units                   |
| 26.09.23 | Issues Req. No. 146                                     | 10 units                  |
| 29.09.23 | Transfer from Dept. "A" to Dept. "B" MTR 10             | 5 units                   |
| 30.09.23 | Shortage in stock taking                                | 2 units                   |

**Prepare the priced stores ledger on FIFO method and state how you would treat the shortage in stock taking.**

### Answer

#### Stores Ledger of AT Ltd. for the month of September, 2023 (FIFO Method)

| Date<br>Sep'23 | Receipts    |      |      |        | Issues      |      |      |        | Balance |      |        |
|----------------|-------------|------|------|--------|-------------|------|------|--------|---------|------|--------|
|                | GRN/<br>MRR | Qty. | Rate | Amount | Req.<br>No. | Qty. | Rate | Amount | Qty.    | Rate | Amount |
| 1              | -           | -    | -    | -      | -           | -    | -    | -      | 25      | 6.50 | 162.50 |
| 4              | -           | -    | -    | -      | 85          | 8    | 6.50 | 52     | 17      | 6.50 | 110.50 |
| 6              | 26          | 50   | 5.75 | 287.50 | -           | -    | -    | -      | 17      | 6.50 |        |
|                |             |      |      |        |             |      |      |        | 50      | 5.75 | 398.00 |
| 7              | -           | -    | -    | -      | 97          | 12   | 6.50 | 78     | 5       | 6.50 |        |
|                |             |      |      |        |             |      |      |        | 50      | 5.75 | 320.00 |
| 10             | -           | -    | -    | -      | Return      | 10   | 5.75 | 57.50  | 5       | 6.50 |        |
|                |             |      |      |        |             |      |      |        | 40      | 5.75 | 262.50 |
| 12             | -           | -    | -    | -      | 108         | 5    | 6.50 | 32.50  |         |      |        |
|                |             |      |      |        |             | 10   | 5.75 | 57.50  | 30      | 5.75 | 172.50 |
| 13             | -           | -    | -    | -      | 110         | 20   | 5.75 | 115    | 10      | 5.75 | 57.50  |
| 15             | 33          | 25   | 6.10 | 152.50 | -           | -    | -    | -      | 10      | 5.75 |        |
|                |             |      |      |        |             |      |      |        | 25      | 6.10 | 210.00 |
| 17             | -           | -    | -    | -      | 121         | 10   | 5.75 | 57.50  | 25      | 6.10 | 152.50 |
| 19             | 38          | 10   | 5.75 | 57.50  | -           | -    | -    | -      | 25      | 6.10 |        |
|                |             |      |      |        |             |      |      |        | 10      | 5.75 | 210.00 |
| 20             | 4           | 5    | 5.75 | 28.75  | -           | -    | -    | -      | 5       | 5.75 |        |
|                |             |      |      |        |             |      |      |        | 25      | 6.10 |        |
|                |             |      |      |        |             |      |      |        | 10      | 5.75 | 238.75 |
| 26             | -           | -    | -    | -      | 146         | 5    | 5.75 | 28.75  | 20      | 6.10 |        |
|                |             |      |      |        |             | 5    | 6.10 | 30.50  | 10      | 5.75 | 179.50 |
| 30             | -           | -    | -    | -      | Shortage    | 2    | 6.10 | 12.20  | 18      | 6.10 |        |
|                |             |      |      |        |             |      |      |        | 10      | 5.75 | 167.30 |

### Working Notes:

- The material received as replacement from vendor is treated as fresh supply.

**MATERIAL COST 1.25**

2. In the absence of information the price of the material received from within on 20.09.23 has been-taken as the price of the earlier issue made on 17.09.23. In FIFO method physical flow of the material is irrelevant, and issue price is based on first in first out.
3. The issue of material on 26.09.23 is made out of the material received from a user department on 20.09.23.
4. The entries for transfer of material from one job and department to another on 22.09.23 and 29.09.23 respectively, do not affect the store ledger. However, adjustment entries for calculation of cost of respective jobs and departments are made in cost accounts.
5. The material found short as a result of stock taking has been written off at the relevant issue price.

**BQ 35**

The following information is provided by Sunrise Industries for the fortnight of April 2024.

Material Exe: Stock on 01.04.24 100 units at ₹5 per unit.

| <i>Purchases</i> |              | <i>Cost per Unit</i> | <i>Issues</i> |              |
|------------------|--------------|----------------------|---------------|--------------|
| <i>Date</i>      | <i>Units</i> |                      | <i>Date</i>   | <i>Units</i> |
| 05.04.24         | 300          | ₹6                   | 06.04.24      | 250          |
| 08.04.24         | 500          | ₹7                   | 10.04.24      | 400          |
| 12.04.24         | 600          | ₹8                   | 14.04.24      | 500          |

- (1) Calculate using FIFO and LIFO methods of pricing issues:
  - a. The value of material consumed during the period.
  - b. The value of stock of materials on 15.04.24.
- (2) Explain why the figures in (a) and (b) in part 1 of this question are different under the two methods of pricing of material issues used. You need not to draw up stores ledger.

**Answer****(1) a. Value of Material Exe Consumed****During 01.04.2024 to 15.04.2024 (FIFO Method)**

| <i>Date</i> | <i>Description</i> | <i>Quantity in Units</i> | <i>Rate (₹)</i> | <i>Amount</i> |
|-------------|--------------------|--------------------------|-----------------|---------------|
| 01.04.24    | Opening balance    | 100                      | 5               | 500           |
| 05.04.24    | Purchased          | 300                      | 6               | 1,800         |
| 06.04.24    | Issued             | 100                      | 5               |               |
|             |                    | 150                      | 6               | 1,400         |
| 08.04.24    | Purchased          | 500                      | 7               | 3,500         |
| 10.04.24    | Issued             | 150                      | 6               |               |
|             |                    | 250                      | 7               | 2,650         |
| 12.04.24    | Purchased          | 600                      | 8               | 4,800         |
| 12.04.24    | Issued             | 250                      | 7               |               |
|             |                    | 250                      | 8               | 3,750         |
| 15.04.24    | Balance            | 350                      | 8               | <b>2,800</b>  |

Total value of material Exe consumed during the period under FIFO method comes to ₹7,800 (i.e. ₹1,400 + ₹2,650 + ₹3,750) and the balance of stock on 15.04.24 is of ₹2,800.

**During 01.04.24 to 15.04.24 (LIFO Method)**

| <i>Date</i> | <i>Description</i> | <i>Quantity in Units</i> | <i>Rate (₹)</i> | <i>Amount</i> |
|-------------|--------------------|--------------------------|-----------------|---------------|
| 01.04.24    | Opening balance    | 100                      | 5               | 500           |
| 05.04.24    | Purchased          | 300                      | 6               | 1,800         |
| 06.04.24    | Issued             | 250                      | 6               | 1,500         |
| 08.04.24    | Purchased          | 500                      | 7               | 3,500         |
| 10.04.24    | Issued             | 400                      | 7               | 2,800         |
| 12.04.24    | Purchased          | 600                      | 8               | 4,800         |
| 12.04.24    | Issued             | 500                      | 8               | 4,000         |
| 15.04.24    | Balance            | 350                      | -               | <b>2,300</b>  |

**MATERIAL COST 1.26**

Total value of material Exe issued under LIFO method comes to ₹8,300 (i.e. ₹1,500 + ₹2,800 + ₹4,000). The balance 350 units of ₹2,300 on 15.04.24 represents opening balance on 01.04.24 and purchases made on 05.04.24, 08.04.24 and 12.04.24 (100 units @ ₹5 + 50 units @ ₹6 + 100 units @ ₹7 + 100 units @ ₹8)

1. b. As shown in (a) above, the value of stock of materials on 15.4.2024:

Under FIFO method ₹2,800

Under LIFO method ₹2,300

(2) Total value of material Exe issued to production under FIFO and LIFO methods comes to ₹7,800 and ₹8,300 respectively.

The above computations show that the value of stock of materials on 15.04.24 is ₹2,800 under FIFO method and ₹2,300 under LIFO method.

The reasons for the difference of ₹500 (i.e. ₹8,300 - ₹7,800) in the value of material Exe, issued to production under FIFO and LIFO methods are given below:

| Date     | Qty. Issued | Value FIFO | Total | Value LIFO | Total |
|----------|-------------|------------|-------|------------|-------|
| 06.04.24 | 250         | 1,400      |       | 1,500      |       |
| 10.04.24 | 400         | 2,650      |       | 2,800      |       |
| 14.04.24 | 500         | 3,750      | 7,800 | 4,000      | 8,300 |

(a) On 6.04.2024, 250 units were issued to production. Under FIFO their value comes to ₹1,400 (100 units × ₹5 + 150 units × ₹6) and under LIFO ₹1,500 (250 × ₹6). Hence, ₹100 more was charged to production under LIFO.

(b) On 10.04.2024, 400 units were issued to production. Under FIFO their value comes to ₹2,650 (150 × ₹6 + 250 × ₹7) and under LIFO ₹2,800 (400 × ₹7). Hence, ₹150 more was charged to production under LIFO.

(c) On 14.04.2024, 500 units were issued to production. Under FIFO their value comes to ₹3,750 (250 × ₹7 + 250 × ₹8) and under LIFO ₹4,000 (500 × ₹8). Hence, ₹250 more was charged to production under LIFO.

Thus the total excess amount charged to production under LIFO comes to ₹500.

The reasons for the difference of ₹500 (₹2,800 – ₹2,300) in the value of 350 units of Closing Stock of material Exe under FIFO and LIFO are as follows:

(a) In the case of FIFO, all the 350 units of the closing stock belongs to the purchase of material made on 12.04.2024, whereas under LIFO these units were from opening balance and purchases made on 5.04.2024, 8.04.2024 and 12.04.2024.

(b) Due to different purchase price paid by the concern on different days of purchase, the value of closing stock differed under FIFO and LIFO. Under FIFO 350 units of closing stock were valued @ ₹8 p.u. whereas under LIFO first 100 units were valued @ ₹5 p.u., next 50 units @ ₹6 p.u., next 100 units @ ₹7 p.u. and last 100 units @ ₹8 p.u.

Thus, under FIFO, the value of closing stock increased by ₹500.

**BQ 36**

The following transactions in respect of material Y occurred during the six months ended 30<sup>th</sup> September:

| Month     | Purchase (in Units) | Price per unit | Issued Units |
|-----------|---------------------|----------------|--------------|
| April     | 200                 | ₹25            | Nil          |
| May       | 300                 | ₹24            | 250          |
| June      | 425                 | ₹26            | 300          |
| July      | 475                 | ₹23            | 550          |
| August    | 500                 | ₹25            | 800          |
| September | 600                 | ₹20            | 400          |

**Required:**

1. 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? EXPLAIN. Detailed stores ledgers are not required.
2. STATE when and why would you recommend the LIFO method of pricing material issues?

**Answer**

- (a) Total number of units purchased = 2,500 and Total number of units issued = 2,300. The closing stock at the end of six months' period i.e., on 30<sup>th</sup> September will be 200 units. Upto the end of August, total purchases coincide with the total issues i.e., 1,900 units. It means that at the end of August, there was no closing stock. In the month of September, 600 units were purchased out of which 400 units were issued. Since there was only one purchase and one issue in the month of September and there was no opening stock on 1<sup>st</sup> September, the Closing Stock of 200 units is to be valued at ₹20 per unit.

In the 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.

- (b) **LIFO method** has an edge over FIFO or any other method of pricing material issues due to the following advantages:

1. The cost of the materials issued will be either nearer or will reflect the current market price; Thus, the cost of goods produced will be related to the trend of the market price of materials. Such a trend in price of materials enables the matching of cost of production with current sales revenues.
2. The use of the method during the period of rising prices does not reflect undue high profit in the income statement, as it was under the first-in-first-out or average method. In fact, the profit shown here is relatively lower because the cost of production takes into account the rising trend of material prices.
3. In the case of falling prices, profit tends to rise due to lower material cost, yet the finished products appear to be more competitive and are at market price.
4. During the period of inflation, LIFO will tend to show the correct profit and thus, avoid paying undue taxes to some extent.

**BQ 37**

*The following information is extracted from the stores ledger of material X:*

|                   |               |                   |
|-------------------|---------------|-------------------|
|                   | Opening Stock | Nil               |
| <b>Purchases:</b> |               |                   |
|                   | January 1     | 100 @ ₹1 per unit |
|                   | January 20    | 100 @ ₹2 per unit |
| <b>Issues:</b>    |               |                   |
|                   | January 22    | 60 for Job W 16   |
|                   | January 23    | 60 for Job W 17   |

Compute the receipts and issues valuation by adopting the First-In-First-Out, Last-In-First-Out and the Weighted Average Method.

Tabulate the values allocated to Job W16, Job W17 and the closing stock under the methods aforesaid and discuss from different points of view which method you would prefer.

**Answer**

**Stores Ledger of Material X (FIFO Method)**

| Date   | Receipts |      |       | Issues |      |       | Balance |      |       |
|--------|----------|------|-------|--------|------|-------|---------|------|-------|
|        | Units    | Rate | Value | Units  | Rate | Value | Units   | Rate | Value |
| Jan 1  | 100      | 1    | 100   | -      | -    | -     | 100     | 1    | 100   |
| Jan 20 | 100      | 2    | 200   | -      | -    | -     | 100     | 1    | 100   |
|        |          |      |       |        |      |       | 100     | 2    | 200   |
| Jan 22 | -        | -    | -     | 60     | 1    | 60    | 40      | 1    | 40    |
|        |          |      |       |        |      |       | 100     | 2    | 200   |
| Jan 23 | -        | -    | -     | 40     | 1    | 40    |         |      |       |
|        |          |      |       | 20     | 2    | 40    | 80      | 2    | 160   |

**Stores Ledger of Material X (LIFO Method)**

| <b>Date</b> | <b>Receipts</b> |             |              | <b>Issues</b> |             |              | <b>Balance</b> |             |              |
|-------------|-----------------|-------------|--------------|---------------|-------------|--------------|----------------|-------------|--------------|
|             | <b>Units</b>    | <b>Rate</b> | <b>Value</b> | <b>Units</b>  | <b>Rate</b> | <b>Value</b> | <b>Units</b>   | <b>Rate</b> | <b>Value</b> |
| Jan 1       | 100             | 1           | 100          | -             | -           | -            | 100            | 1           | 100          |
| Jan 20      | 100             | 2           | 200          | -             | -           | -            | 100            | 1           | 100          |
|             |                 |             |              |               |             |              | 100            | 2           | 200          |
| Jan 22      | -               | -           | -            | 60            | 2           | 120          | 100            | 1           | 100          |
|             |                 |             |              |               |             |              | 40             | 2           | 80           |
| Jan 23      | -               | -           | -            | 40            | 2           | 80           |                |             |              |
|             |                 |             |              | 20            | 1           | 20           | 80             | 1           | 80           |

**Stores Ledger of Material X (Weighted Average Method)**

| <b>Date</b> | <b>Receipts</b> |             |              | <b>Issues</b> |             |              | <b>Balance</b> |             |              |
|-------------|-----------------|-------------|--------------|---------------|-------------|--------------|----------------|-------------|--------------|
|             | <b>Units</b>    | <b>Rate</b> | <b>Value</b> | <b>Units</b>  | <b>Rate</b> | <b>Value</b> | <b>Units</b>   | <b>Rate</b> | <b>Value</b> |
| Jan 1       | 100             | 1           | 100          | -             | -           | -            | 100            | 1           | 100          |
| Jan 20      | 100             | 2           | 200          | -             | -           | -            | 200            | 1.5         | 300          |
| Jan 22      | -               | -           | -            | 60            | 1.5         | 90           | 140            | 1.5         | 210          |
| Jan 23      | -               | -           | -            | 60            | 1.5         | 90           | 80             | 1.5         | 120          |

**Statement of Material value allocated to Job W 16, Job W 17 and Closing stock, under aforesaid Methods**

| <b>Job</b>             | <b>FIFO</b> | <b>LIFO</b> | <b>Weighted Average</b> |
|------------------------|-------------|-------------|-------------------------|
| Materials for Job W 16 | 60          | 120         | 90                      |
| Materials for Job W 17 | 80          | 100         | 90                      |
| Closing Stock          | 160         | 80          | 120                     |
| <b>Total</b>           | <b>300</b>  | <b>300</b>  | <b>300</b>              |

From the point of view of cost of material charged to each job, it is minimum under FIFO and maximum under LIFO (Refer to Tables). During the period of rising prices, the use of FIFO give rise to high profits and that of LIFO low profits. In the case of weighted average there is no significant adverse or favourable effect on the cost of material as well as on profits.

From the point of view of valuation of closing stock it is apparent from the above statement that it is maximum under FIFO, moderate under weighted average and minimum under LIFO.

It is clear from the Tables that the use of weighted average evens out the fluctuations in the prices. Under this method, the cost of materials issued to the jobs and the cost of material in hands reflects greater uniformity than under FIFO and LIFO. Thus from different points of view, weighted average method is preferred over LIFO and FIFO.

**BQ 38**

Imbrios India Ltd. is recently incorporated start-up company back in the year 2019. It is engaged in creating embedded products and Internet of Things (IoT) solutions for the Industrial market. It is focused on innovation, design, research and development of products and services. One of its embedded products is LogMax, a system on module (SoM) Carrier board for industrial use. It is a small, flexible and embedded computer designed as per industry specifications. In the beginning of the month of September 2023, company entered into a job agreement of providing 4800 LogMax to NIT, Mandi. Following details w.r.t. issues, receipts, returns of Store Department handling Micro-controller, a component used in the designated assembling process have been extracted for the month of September, 2023:

|         |                                                                                                   |
|---------|---------------------------------------------------------------------------------------------------|
| Sep. 1  | Opening stock of 6,000 units @ ₹285 per unit                                                      |
| Sep. 8  | Issued 4875 units to mechanical division vide material requisition no. Mech 009/23                |
| Sep. 9  | Received 17,500 units @ ₹276 per unit vide purchase order no. 159/23                              |
| Sep. 10 | Issued 12,000 units to technical division vide material requisition no. Tech 012/23               |
| Sep. 12 | Returned to stores 2375 units by technical division against material requisition no. Tech 012/23. |
| Sep. 15 | Received 9,000 units @ ₹288 per units vide purchase order no. 160/ 23                             |



**MATERIAL COST 1.29**

|         |                                                                                         |
|---------|-----------------------------------------------------------------------------------------|
| Sep. 17 | Returned to supplier 700 units out of quantity received vide purchase order no. 160/23. |
| Sep. 20 | Issued 9,500 units to technical division vide material requisition no. Tech 165/23      |

On 25<sup>th</sup> September, 2023, the stock manager of the company expressed his need to leave for his hometown due to certain contingency and immediately left the job same day. Later, he also switched his phone off. As the company has the tendency of stock-taking every end of the month to check and report for the loss due to rusting of the components, the new stock manager, on 30<sup>th</sup> September, 2023, found that 900 units of Micro-controllers were missing which was apparently misappropriated by the former stock manager. He, further, reported loss of 300 units due to rusting of the components.

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

**Answer****Stores Ledger of Imbrios India Ltd. (Weighted Average Method)**

| Date<br>Sep. | Receipts |        |           | Issues |        |           | Balance of Stock |        |           |
|--------------|----------|--------|-----------|--------|--------|-----------|------------------|--------|-----------|
|              | Units    | Rate   | Value     | Units  | Rate   | Value     | Units            | Rate   | Value     |
| 1            | -        | -      | -         | -      | -      | -         | 6,000            | 285    | 17,10,000 |
| 8            | -        | -      | -         | 4,875  | 285    | 13,89,375 | 1,125            | 285    | 3,20,625  |
| 9            | 17,500   | 276    | 48,30,000 | -      | -      | -         | 18,625           | 276.54 | 51,50,625 |
| 10           | -        | -      | -         | 12,000 | 276.54 | 33,18,480 | 6,625            | 276.55 | 18,32,145 |
| 12           | 2,375    | 276.54 | 6,56,783  | -      | -      | -         | 9,000            | 276.55 | 24,88,928 |
| 15           | 9,000    | 288    | 25,92,000 | -      | -      | -         | 18,000           | 282.27 | 50,80,928 |
| 17           | -        | -      | -         | 700    | 288    | 2,01,600  | 17,300           | 282.04 | 48,79,328 |
| 20           | -        | -      | -         | 9,500  | 282.04 | 26,79,380 | 7,800            | 282.04 | 21,99,948 |
| 30           | -        | -      | -         | 900    | 282.04 | 2,53,836  | 6,900            | 282.04 | 19,46,112 |
| 30           | -        | -      | -         | 300    | -      | -         | 6,600            | 294.87 | 19,46,112 |

**Note:**

- 900 units is abnormal loss, hence it will be transferred to Costing Profit & Loss A/c.
- 300 units is normal loss, hence it will be absorbed by good units.

**BQ 39**

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 |
|----------|--------------------------------------------|--------|---------------|
| 15-12-23 | Purchase Order-008                         | 10,000 | ₹9,930        |
| 30-12-23 | Purchase Order-009                         | 10,000 | ₹9,780        |
| 01-01-24 | Opening stock                              | 3,500  | ₹9,810        |
| 05-01-24 | GRN*-008 (against the Purchase Order-008)  | 10,000 | -             |
| 05-01-24 | MRN**-003 (against the Purchase Order-008) | 500    | -             |
| 06-01-24 | Material Requisition-011                   | 3,000  | -             |
| 07-01-24 | Purchase Order-010                         | 10,000 | ₹9,750        |
| 10-01-24 | Material Requisition-012                   | 4,500  | -             |
| 13-01-24 | GRN-009 (against the Purchase Order-009)   | 10,000 | -             |
| 13-01-24 | MRN-004 (against the Purchase Order-009)   | 400    | -             |
| 15-01-24 | Material Requisition-013                   | 2,200  | -             |
| 24-01-24 | Material Requisition-014                   | 1,500  | -             |
| 25-01-24 | GRN-010 (against the Purchase Order-010)   | 10,000 | -             |
| 28-01-24 | Material Requisition-015                   | 4,000  | -             |
| 31-01-24 | Material Requisition-016                   | 3,200  | -             |

\*GRN- Goods Received Note; \*\*MRN- Material Returned Note

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

- (a) Re-order level  
 (b) Maximum stock level  
 (c) Minimum stock level  
 (d) Prepare Store Ledger for the period January 2024 and determine the value of stock as on 31-01-2024.  
 (e) Value of components used during the month of January, 2024.  
 (f) Inventory turnover ratio.

**Answer**

- (a) **Re-order level** = Maximum usage × Maximum lead time  
 = 4,500 units × 21 days = **94,500 units**
- (b) **Maximum stock level** = Re-order level + Re-order Quantity – (Min. Usage × Min. lead time)  
 = 94,500 units + 10,000 units – (1,500 units × 14 days)  
 = 1,04,500 units – 21,000 units = **83,500 units**
- (c) **Minimum stock level** = Re-order level – (Avg. consumption × Avg. lead time)  
 = 94,500 units – (3,000 units × 17.5 days)  
 = 94,500 units – 52,500 units = **42,000 units**

**(d) Store Ledger for the month of January 2024: (Weighted Average Method)**

| Date     | Receipts |        |       |             | Issue  |       |       |             | Balance |       |             |
|----------|----------|--------|-------|-------------|--------|-------|-------|-------------|---------|-------|-------------|
|          | GRN/MRN  | Units  | Rate  | Amt. ('000) | MRN/MR | Units | Rate  | Amt. ('000) | Units   | Rate  | Amt. ('000) |
| 01-01-24 | -        | -      | -     | -           | -      | -     | -     | -           | 3,500   | 9,810 | 34,335      |
| 05-01-24 | 008      | 10,000 | 9,930 | 99,300      | 003    | 500   | 9,930 | 4,965       | 13,000  | 9,898 | 1,28,670    |
| 06-01-24 | -        | -      | -     | -           | 011    | 3,000 | 9,898 | 29,694      | 10,000  | 9,898 | 98,980      |
| 10-01-24 | -        | -      | -     | -           | 012    | 4,500 | 9,898 | 44,541      | 5,500   | 9,898 | 54,439      |
| 13-01-24 | 009      | 10,000 | 9,780 | 97,800      | 004    | 400   | 9,780 | 3,912       | 15,100  | 9,823 | 1,48,327    |
| 15-01-24 | -        | -      | -     | -           | 013    | 2,200 | 9,823 | 21,611      | 12,900  | 9,823 | 1,26,716    |
| 24-01-24 | -        | -      | -     | -           | 014    | 1,500 | 9,823 | 14,734      | 11,400  | 9,823 | 1,11,982    |
| 25-01-24 | 010      | 10,000 | 9,750 | 97,500      | -      | -     | -     | -           | 21,400  | 9,789 | 2,09,482    |
| 28-01-24 | -        | -      | -     | -           | 015    | 4,000 | 9,789 | 39,156      | 17,400  | 9,789 | 1,70,326    |
| 31-01-24 | -        | -      | -     | -           | 016    | 3,200 | 9,789 | 31,325      | 14,200  | 9,789 | 1,39,001    |

**Note:** Decimal figures may be rounded-off to the nearest rupee value wherever required

Value of 14,200 units of stock as on 31-01-2024 ('000) = **₹1,39,001**

**(e) Value of components used during the month of January 2024:**

Sum of material requisitions 011 to 016 ('000) = ₹29,694 + ₹44,541 + ₹21,611 + ₹14,734 + ₹39,156 + ₹31,325  
 = **₹1,81,061**

- (f) **Inventory Turnover Ratio** = Value of materials used ÷ Average stock value  
 = 1,81,061 ÷ (1,39,001 + 34,335) / 2  
 = 1,81,061 ÷ 86,668 = **2.09 times**

**Working notes:**

**1. Calculation of consumption rate:**

Maximum component usage = 4,500 units (Material requisition on 10-01-24)  
 Minimum component usage = 1,500 units (Material requisition on 24-01-24)

| Date       | Material Requisition number | Units |
|------------|-----------------------------|-------|
| 06-01-2024 | 11                          | 3,000 |



**MATERIAL COST 1.31**

|            |    |                 |
|------------|----|-----------------|
| 10-01-2024 | 12 | 4,500 (Maximum) |
| 15-01-2024 | 13 | 2,200           |
| 24-01-2024 | 14 | 1,500 (Minimum) |
| 28-01-2024 | 15 | 4,000           |
| 31-01-2024 | 16 | 3,200           |

**2. Calculation of lead time (purchase order date to material received date):**

Maximum lead time = 21 days (15-12-2023 to 05-01-2024)  
Minimum lead time = 14 days (30-12-2023 to 13-01-2024)

**3. Reorder Quantity** = 10,000 units (observed)

# PAST YEAR QUESTIONS

## PYQ 1

M/s Tubes Ltd. are the manufacturers of picture tubes for T.V. The following are the details of their operation during 1997:

|                               |                    |
|-------------------------------|--------------------|
| Average monthly market demand | 2,000 Tubes        |
| Ordering cost                 | ₹100 per order     |
| Inventory carrying cost       | 20% per annum      |
| Cost of tubes                 | ₹500 per tube      |
| Normal usage                  | 100 tubes per week |
| Minimum usage                 | 50 tubes per week  |
| Maximum usage                 | 200 tubes per week |
| Lead time to supply           | 6 - 8 weeks        |

**Compute from the above:**

- (1) Economic order quantity. If the supplier is willing to supply 1,500 units at a discount of 5%, is it worth accepting?
- (2) Maximum level of stock.
- (3) Minimum level of stock.
- (4) Re-order level.

**[(10 Marks) May 1998, Nov 2000]**

## Answer

$$(1) \quad EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 5,200 \times 100}{500 \times 20\%}} = 102 \text{ tubes approx.}$$

$$\begin{aligned} *A &= \text{Annual usage of tubes} = \text{Normal usage per week} \times 52 \text{ week} \\ &= 100 \text{ tubes} \times 52 \text{ weeks} = 5,200 \text{ tubes.} \end{aligned}$$

### Evaluation of 5% discount offer

| Particulars                                                                      | At EOQ 102 units          | At ROQ 1,500 units        |
|----------------------------------------------------------------------------------|---------------------------|---------------------------|
| 1. Purchase cost 5,200 units @ ₹500/₹475 p.u.                                    | 26,00,000                 | 24,70,000                 |
| 2. Ordering cost:                                                                |                           |                           |
| Number of orders                                                                 | 5,200 ÷ 102 = 50.98 or 51 | 5,200 ÷ 1,500 = 3.47 or 4 |
| Ordering cost (number of orders × ₹100)                                          | 5,100                     | 400                       |
| 3. Carrying cost ( $\frac{1}{2} \times ROQ \times C$ )<br>(C = 20% of ₹500/₹475) | 5,100                     | 71,250                    |
| <b>Total cost (1+2+3)</b>                                                        | <b>26,10,200</b>          | <b>25,41,650</b>          |

**Advise:** The total cost of inventory is lower if discount is adopted. Hence, it is worth accepting.

$$\begin{aligned} (2) \quad \text{Maximum Level of Stock} &= ROL + \text{Re-order quantity} - (\text{Min. Usage} \times \text{Min. Re-order Period}) \\ &= 1,600 \text{ tubes} + 102 \text{ tubes} - (50 \text{ tubes per week} \times 6 \text{ weeks}) \\ &= 1,402 \text{ tubes} \end{aligned}$$

$$\begin{aligned} (3) \quad \text{Minimum Level of Stock} &= \text{Re-order Level} - (\text{Normal Usage} \times \text{Average Re-order Period}) \\ &= 1,600 \text{ tubes} - (100 \text{ tubes per week} \times 7 \text{ weeks}) \\ &= 900 \text{ tubes} \end{aligned}$$

$$\begin{aligned} (4) \quad \text{Reorder Level} &= \text{Maximum Consumption} \times \text{Maximum Re-order Period} \\ &= 200 \text{ tubes per week} \times 8 \text{ weeks} = 1,600 \text{ tubes} \end{aligned}$$

## PYQ 2

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

**MATERIAL COST 1.33**

| <i>No. of varieties of inventory</i> | <i>% of item</i> | <i>% value of inventory holding (average)</i> | <i>% of inventory usage (in end-product)</i> |
|--------------------------------------|------------------|-----------------------------------------------|----------------------------------------------|
| 3,875                                | 96.875           | 20                                            | 5                                            |
| 110                                  | 2.750            | 30                                            | 10                                           |
| 15                                   | 0.375            | 50                                            | 85                                           |
| 4,000                                | 100.00           | 100                                           | 100                                          |

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

*[(6 Marks) Nov 1998]*

**Answer**

***Classification of the items of inventory as per ABC Analysis***

| <i>Category</i> | <i>No. of items</i> | <i>% of items</i> | <i>% value of inventory holding (average)</i> | <i>% of inventory usage (in end-product)</i> |
|-----------------|---------------------|-------------------|-----------------------------------------------|----------------------------------------------|
| A               | 15                  | 0.375             | 50                                            | 85                                           |
| B               | 110                 | 2.750             | 30                                            | 10                                           |
| C               | 3,875               | 96.875            | 20                                            | 5                                            |
| <b>Total</b>    | <b>4,000</b>        | <b>100.00</b>     | <b>100</b>                                    | <b>100</b>                                   |

***Reasons:***

***Category A:*** 15 numbers of inventory items should be classified as those of A category because of the following reasons:

1. They constitute 0.375% of total number of varieties of inventory items handled by stores of factory. This is the minimum as per the given classification in the table
2. The total usage of these items is 50% of total use value of inventory holding (average) which is maximum according to the given table.
3. The consumption of these items is about 85% of usage in end product.

***Category B:*** 110 number of inventory items should be classified as those of B category because of the following reasons:

1. They constitute 2.750% of total number of varieties of inventory items handled by the stores of the factory.
2. They require moderate investment of about 30% of total use value of inventory holding (average).
3. Their consumption is moderate about 10% of inventory usage in the end product.

***Category C:*** 3,875 numbers of varieties of inventory items should be classified as those of category C because of the following reasons:

1. They constitute 96.875% of total varieties of inventory items handled by stores of factory.
2. They require investment of 20% of total use value of average of average inventory holding.
3. Their consumption is minimum, i.e. just 5% of inventory usage in end product.

***PYQ 3***

G Ltd. produces a product which has a monthly demand of 4,000 units. The product requires a component X which is purchased at ₹20. For every finished product, one unit of component is required. The ordering cost is ₹120 per order and holding costs is 10% p.a.

***You are required to calculate:***

1. Economic order quantity.
2. If the minimum lot size to be supplied is 4,000 units, what is the extra cost, the company has to incur?
3. What is the minimum carrying cost, the company has to incur?

*[(5 Marks) May 1999]*

**Answer**

1. ***Computation of Economic Ordering Quantity:***

$$EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 4,000 \text{ units} \times 12 \times 120}{20 \times 10\%}} = 2,400 \text{ units}$$

**2. Calculation of extra cost:**

**(a)** Ordering & carrying cost (when order size is 2,400 units i.e. at EOQ):

$$\begin{aligned} \text{Ordering Cost} &= \text{No. of orders} \times \text{Cost per order} = \frac{48,000}{2,400} \times 120 = ₹2,400 \\ \text{Carrying Cost} &= \frac{1}{2} \times ROQ \times C = \frac{1}{2} \times 2,400 \times 2 = ₹2,400 \\ \text{Total} &= ₹2,400 + 2,400 = ₹4,800 \end{aligned}$$

**(b)** Ordering & carrying cost (when order size is 4,000 units):

$$\begin{aligned} \text{Ordering Cost} &= \text{No. of orders} \times \text{Cost per order} = \frac{48,000}{4,000} \times 120 = ₹1,440 \\ \text{Carrying Cost} &= \frac{1}{2} \times ROQ \times C = \frac{1}{2} \times 4,000 \times 2 = ₹4,000 \\ \text{Total} &= ₹2,400 + 2,400 = ₹5,440 \end{aligned}$$

$$\text{Extra cost (a) - (b)} = ₹5,440 - ₹4,800 = ₹640$$

**3. Minimum Carrying Cost:**

Carrying cost depends upon the size of the order. It will be minimum on the least order size. (In this part of the question the two order sizes are 2,400 units and 4,000 units. Here 2,400 units is the least of the two order sizes. At this order size carrying cost will be minimum.) The minimum carrying cost in this case can be computed as under:

$$\text{Minimum carrying cost} = \frac{1}{2} \times 2,400 \text{ units} \times 10\% \text{ of } ₹20 = ₹2,400$$

**PYQ 4**

The Complete Gardener is deciding on the economic order quantity for two brands of lawn fertilizer: Super Grow and Nature's Own. The following information is collected:

| Particulars                               | Fertilizer |              |
|-------------------------------------------|------------|--------------|
|                                           | Super Grow | Nature's Own |
| Annual Demand                             | 2,000 bags | 1,280 bags   |
| Annual relevant carrying cost per bag     | ₹480       | ₹560         |
| Relevant ordering cost per purchase order | ₹1,200     | ₹1,400       |

**Required:**

- (1)** Compute EOQ for Super Grow and Nature's Own.
- (2)** For the EOQ, what is the sum of the total annual relevant ordering costs and total annual relevant carrying costs for Super Grow and Nature's Own?
- (3)** For the EOQ, Compute the number of deliveries per year for Super Grow and Nature's Own.

**[(10 Marks) Nov 1999]**

**Answer**

$$\begin{aligned} \text{(1) EOQ} &= \sqrt{\frac{2AO}{C}} \\ \text{EOQ for Super Grow Fertilizer} &= \sqrt{\frac{2 \times 2,000 \times 1,200}{480}} = 100 \text{ bags} \\ \text{EOQ for Nature's Own Fertilizer} &= \sqrt{\frac{2 \times 1,280 \times 1,400}{560}} = 80 \text{ bags} \end{aligned}$$

$$\text{(2) Total annual relevant costs} = \text{Total annual relevant ordering costs} + \text{Total annual relevant carrying costs}$$

**MATERIAL COST 1.35**

relevant carrying costs

|                         |   |                                                                               |                  |
|-------------------------|---|-------------------------------------------------------------------------------|------------------|
| Super Grow Fertilizer   | = | $(2,000/100) \times 1,200 + (\frac{1}{2} \times 100 \text{ bags} \times 480)$ |                  |
|                         | = | $\text{₹}24,000 + \text{₹}24,000$                                             | = <b>₹48,000</b> |
| Nature's Own Fertilizer | = | $(1,280/80) \times 1,400 + (\frac{1}{2} \times 80 \text{ bags} \times 560)$   |                  |
|                         | = | $\text{₹}22,400 + \text{₹}22,400$                                             | = <b>₹44,800</b> |

|                                          |   |                                                |                    |
|------------------------------------------|---|------------------------------------------------|--------------------|
| <b>(3) Number of deliveries per year</b> | = | $\frac{\text{Annual requirement}}{\text{ROQ}}$ |                    |
| Super Grow Fertilizer                    | = | $2,000 \div 100$                               | = <b>20 orders</b> |
| Nature's Own Fertilizer                  | = | $1,280 \div 80$                                | = <b>16 orders</b> |

**PYQ 5**

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

**Required:**

- (a) Calculate the economic order quantity of raw materials.  
 (b) Advice, how frequently should orders for procurement be placed.  
 (c) If the company proposes to rationalise placement of orders on quarterly basis, what percentage of discount in the price of raw materials should be negotiated?

**[(10 Marks) Nov 2001]****Answer**

|                |   |                                                                                                                                                             |   |                                                |   |                        |
|----------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------|---|------------------------|
| <b>(a) EOQ</b> | = | $\sqrt{\frac{2AO}{C}}$                                                                                                                                      | = | $\sqrt{\frac{2 \times 40,000 \times 750}{15}}$ | = | <b>2,000 kgs</b>       |
| <b>A</b>       | = | Annual usage of raw Material (1 unit of raw material gives 2.5 units of Finished Goods. Therefore, for 1,00,000 units of finished goods, material required) |   |                                                |   |                        |
|                | = | $1,00,000 \div 2.5$                                                                                                                                         |   |                                                | = | <b>40,000 Kgs</b>      |
| <b>O</b>       | = | Ordering cost per order                                                                                                                                     |   |                                                |   |                        |
|                | = | handling cost per order + freight per order                                                                                                                 |   |                                                |   |                        |
|                | = | $\text{₹}360 + \text{₹}390$                                                                                                                                 |   |                                                | = | <b>₹750</b>            |
| <b>C</b>       | = | Carrying cost or holding cost of inventory per unit p.a.                                                                                                    |   |                                                |   |                        |
|                | = | Carrying cost per unit p.a. + interest cost of investment in inventory per unit p.a.                                                                        |   |                                                |   |                        |
|                | = | $(\text{₹}0.50 \text{ per unit per month} \times 12 \text{ months}) + \text{₹}9 \text{ per kg p.a.}$                                                        |   |                                                |   |                        |
|                | = | $\text{₹}6 + \text{₹}9$                                                                                                                                     |   |                                                | = | <b>₹15 per kg p.a.</b> |

**(b) Frequency of placing order/time interval between order**

|   |                                                                         |           |                                               |   |                  |
|---|-------------------------------------------------------------------------|-----------|-----------------------------------------------|---|------------------|
| = | $\frac{365 \text{ days or } 12 \text{ months}}{\text{* No. of orders}}$ | =         | $\frac{12 \text{ months}}{20 \text{ orders}}$ | = | <b>0.6 month</b> |
|   |                                                                         | <b>Or</b> |                                               |   |                  |
| = | $\frac{365 \text{ days}}{20 \text{ orders}}$                            | =         | <b>18 days (approx.)</b>                      |   |                  |

|                |   |                                                |   |                                                |   |                  |
|----------------|---|------------------------------------------------|---|------------------------------------------------|---|------------------|
| *No. of orders | = | $\frac{\text{Annual requirement}}{\text{EOQ}}$ | = | $\frac{40,000 \text{ kgs}}{2,000 \text{ kgs}}$ | = | <b>20 orders</b> |
|----------------|---|------------------------------------------------|---|------------------------------------------------|---|------------------|

**(c) Statement Showing % of Discount to be Negotiated for Placing Quarterly Orders**

| Particulars | At EOQ (order size 2,000 kgs) | At order size 10,000 kgs |
|-------------|-------------------------------|--------------------------|
|-------------|-------------------------------|--------------------------|

**MATERIAL COST 1.36**

|                                                                                 |        |               |
|---------------------------------------------------------------------------------|--------|---------------|
| Ordering cost ( $\frac{A}{ROQ} \times O$ )                                      | 15,000 | 3,000         |
| Carrying cost ( $\frac{1}{2} \times ROQ \times C$ )                             | 15,000 | 75,000        |
| Total cost                                                                      | 30,000 | 78,000        |
| <b>Extra Cost or Discount to be negotiated</b>                                  | -      | <b>48,000</b> |
| <b>% of Discount <math>\{(48,000 \div 40,000 \times 60) \times 100\}</math></b> | -      | <b>2%</b>     |

**PYQ 6**

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

**The company has been able to negotiate the following discount structure with the raw material supplier:**

| <b>Order Quantity (Kg)</b> | <b>Discount</b> |
|----------------------------|-----------------|
| Upto 6,000                 | Nil             |
| 6,000 - 8,000              | ₹400            |
| 8,000 - 16,000             | ₹2,000          |
| 16,000 - 30,000            | ₹3,200          |
| 30,000 - 45,000            | ₹4,000          |

**You are required to:**

- Calculate the re-order point taking 30 days in a month.
- Prepare a statement showing the total cost of procurement and storage of raw materials after considering the discount if 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.

**[(10 Marks) May 2002]**

**Answer**

**(a) Re-order point** = (Normal consumption per day  $\times$  Normal lead time) + Safety stock  
=  $[(40,000 \text{ kg} / 360 \text{ days}) \times 36 \text{ days}] + 1,000 \text{ kg}$   
= 4,000 kg + 1,000 kg = **5,000 kg**

**(b) Statement Showing the Total Cost of Procurement and Storage of Raw Materials  
(After considering the discount)**

| <b>Order Size</b> | <b>No. of Orders</b> | <b>Ordering Cost<br/>(No. of Orders <math>\times</math> ₹100)</b> | <b>Storage Cost<br/>(<math>\frac{1}{2} \times ROQ \times ₹2</math>)</b> | <b>Storage Cost of<br/>Safety Stock<br/>(1,000 <math>\times</math> ₹2)</b> | <b>Discount</b> | <b>Total Cost<br/>(Net of discount)</b> |
|-------------------|----------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------|-----------------------------------------|
| 40,000            | 1                    | 100                                                               | 40,000                                                                  | 2,000                                                                      | 4,000           | 38,100                                  |
| 20,000            | 2                    | 200                                                               | 20,000                                                                  | 2,000                                                                      | 3,200           | 19,000                                  |
| 10,000            | 4                    | 400                                                               | 10,000                                                                  | 2,000                                                                      | 2,000           | 10,400                                  |
| 6,666.66          | 6                    | 600                                                               | 6,667                                                                   | 2,000                                                                      | 400             | 8,867                                   |

- (c)** Number of orders which the company should place to minimize the costs after taking EOQ also into consideration is 20 orders each of size 2,000 kgs. The total cost of procurement and storage in this case comes to ₹6,000, which is minimum.

**Working Notes**

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

**MATERIAL COST 1.37**

$$\begin{aligned}
\text{Total cost} &= \text{Ordering cost} + \text{Storage cost} - \text{Discount} \\
&= \{(40,000 \div 2,000) \times 100\} + (\frac{1}{2} \times 2,000 \times 2) + (1,000 \times 2) - \text{Nil} \\
&= 2,000 + 2,000 + 2,000 - \text{Nil} = ₹6,000
\end{aligned}$$

**PYQ 7**

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

**You are required to calculate:**

- |                             |                                |
|-----------------------------|--------------------------------|
| <b>1.</b> Re-order quantity | <b>4.</b> Minimum level        |
| <b>2.</b> Re-order level    | <b>5.</b> Average stock level. |
| <b>3.</b> Maximum level     |                                |

**[(10 Marks) Nov 2007]**

**Answer**

$$\begin{aligned}
\text{1. Re-order quantity (ROQ)} &= \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 14,300 \times 100}{10 \times 20\%}} = \text{1,196 kgs} \\
\text{*Annual consumption of RM (A)} &= \text{Average Consumption per week} \times 52 \text{ weeks} \\
&= 275 \text{ kgs} \times 52 \text{ weeks} = \text{14,300 kgs} \\
\text{2. Re-order level (ROL)} &= \text{Maximum usage} \times \text{Maximum re-order period} \\
&= 450 \text{ kgs} \times 8 \text{ weeks} = \text{3,600 kgs} \\
\text{3. Maximum level} &= \text{ROL} + \text{ROQ} - (\text{Minimum usage} \times \text{Minimum re-order period}) \\
&= 3,600 \text{ kgs} + 1,196 \text{ kgs} - (100 \text{ kgs} \times 4 \text{ weeks}) \\
&= \text{4,396 kgs} \\
\text{4. Minimum level} &= \text{ROL} - (\text{Normal usage} \times \text{Normal re-order period}) \\
&= 3,600 \text{ kgs} - (275 \text{ kgs} \times 6 \text{ weeks}) = \text{1,950 kgs} \\
\text{5. Average stock level} &= \frac{1}{2} (\text{Minimum level} + \text{Maximum level}) \\
&= \frac{1}{2} (4,396 \text{ kgs} + 1,950 \text{ kgs}) = \text{3,173 kgs} \\
&\text{Or} \\
&= \frac{1}{2} (\text{ROQ} + \text{Minimum level}) \\
&= \frac{1}{2} (1,196 \text{ kgs} + 1,950 \text{ kgs}) = \text{2,548 kgs}
\end{aligned}$$

**PYQ 8**

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

The castings are used evenly throughout the year in the production process on a 360-day-per-year basis. The company estimates that it costs ₹9,000 to place a single purchase order and about ₹300 to carry one casting in inventory for a year.

The high carrying costs result from the need to keep the castings in carefully controlled temperature and humidity conditions, and from the high cost of insurance. Delivery from the foundry generally takes 6 days, but it can take as much as 10 days.

**The days of delivery time and percentage of their occurrence are shown in the following tabulation:**

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

**Required**

1. Compute the economic order quantity (EOQ).
2. 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?



**MATERIAL COST 1.38**

3. 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?
4. Assume 5% stock-out risk. What would be the total cost of ordering and carrying inventory for one year?
5. Refer to the original data. Assume that using process re-engineering the company reduces its cost of placing a purchase order to only ₹600. In addition, company estimates that when the waste and inefficiency caused by inventories are considered, the true cost of carrying a unit in stock is ₹720 per year.
  - (a) Compute the new EOQ.
  - (b) How frequently would the company be placing an order, as compared to the old purchasing policy?

**[(10 Marks) May 2004]****Answer****(a) Computation of economic order quantity (EOQ):**

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

**(b) Assuming a 15% risk of being out of stock:**

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

$$\begin{aligned} \text{Safety stock} &= \frac{\text{Annual Demand}}{360} \times (\text{Maximum lead time} - \text{Average lead time}) \\ &= \frac{54,000}{360} \times (7 \text{ days} - 6 \text{ days}) = \mathbf{150 \text{ castings}} \\ \text{Re-order point} &= \text{Safety stock} + \text{Average lead time consumption} \\ &= 150 \text{ castings} + (6 \text{ days} \times 150 \text{ casting}) = \mathbf{1,050 \text{ castings}} \end{aligned}$$

**(c) Assuming a 5% risk of being out of stock:**

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

$$\begin{aligned} \text{Safety stock} &= \frac{\text{Annual Demand}}{360} \times (\text{Maximum lead time} - \text{Average lead time}) \\ &= \frac{54,000}{360} \times (9 \text{ days} - 6 \text{ days}) = \mathbf{450 \text{ castings}} \\ \text{Re-order point} &= \text{Safety stock} + \text{Average lead time consumption} \\ &= 450 \text{ castings} + (6 \text{ days} \times 150 \text{ casting}) = \mathbf{1,350 \text{ castings}} \end{aligned}$$

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

$$\begin{aligned} \text{Total cost of ordering} &= \frac{\text{Annual Demand}}{\text{EOQ}} \times \text{Cost per order} \\ &= \frac{54,000}{1,800} \times ₹9,000 = \mathbf{₹2,70,000} \\ \text{Total cost of carrying} &= (\text{Safety stock} + \frac{1}{2} \text{EOQ}) \times \text{Carrying cost per unit p.a.} \\ &= (450 \text{ units} + \frac{1}{2} \times 1,800 \text{ units}) \times ₹300 = \mathbf{₹4,05,000} \end{aligned}$$

$$(e) \quad (a) \text{ Computation of new EOQ} = \sqrt{\frac{2 \times 54,000 \times 600}{720}} = \mathbf{300 \text{ castings}}$$

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

Under new purchasing policy IPL Ltd. has to place order in every 2<sup>nd</sup> day (360 days ÷ 180 orders), however under the old purchasing policy it was every 12th day.

**PYQ 9**

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

| <b>Price per tonne</b> | <b>Tonnes number</b>  |
|------------------------|-----------------------|
| ₹9,600                 | Less than 50          |
| ₹9,360                 | 50 and less than 100  |
| ₹9,120                 | 100 and less than 200 |
| ₹8,880                 | 200 and less than 300 |
| ₹8,640                 | 300 and above         |

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

**Required**

1. Compute the most economical purchase level.
2. Compute EOQ if there are no quantity discounts and the price per tonne is ₹10,500.

**[(5 Marks) Nov 2004]**

**Answer**

**1. Statement Showing Most Economical Purchase Level**

| <b>Order Size</b> | <b>No. of Orders (A/ROQ)</b> | <b>Cost of Purchase (500 × Price)</b> | <b>Ordering Cost (No. of Orders × ₹12,500)</b> | <b>Carrying Cost (½ × ROQ × Price × 25%)</b> | <b>Total Cost</b> |
|-------------------|------------------------------|---------------------------------------|------------------------------------------------|----------------------------------------------|-------------------|
| 40                | (500/40) = 12.5 or 13        | 48,00,000                             | 1,62,500                                       | 48,000                                       | 50,10,500         |
| 50                | (500/50) = 10                | 46,80,000                             | 1,25,000                                       | 58,500                                       | 48,63,500         |
| 100               | (500/100) = 5                | 45,60,000                             | 62,500                                         | 1,14,000                                     | 47,36,500         |
| 200               | (500/200) = 2.5 or 3         | 44,40,000                             | 37,500                                         | 2,22,000                                     | 46,99,500         |
| 300               | (500/300) = 1.67 or 2        | 43,20,000                             | 25,000                                         | 3,24,000                                     | 46,69,000         |

**Most economical purchase level is 300 units having lower total cost.**

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

**PYQ 10**

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           | ₹1                      |
| Ordering cost           | ₹12 per order           |
| Inventory carrying cost | 24% p.a.                |
| 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?

**[(5 Marks) May 2005]**

**Answer**

$$(a) \quad \text{Re-order quantity (EOQ)} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 12,000 \times 12}{1.00 \times 24\%}} = 1,095 \text{ units}$$

$$(b) \quad \begin{aligned} \text{Re-order level} &= \text{Safety stock} + \text{Consumption during lead time} \\ &= (12,000 \div 360) \times 30 + (12,000 \div 360) \times 15 \\ &= 1,000 + 500 = 1,500 \text{ units} \end{aligned}$$

$$\begin{aligned}
 \text{(c) Ideal Stock Level} &= \text{ROL - Consumption during lead time} \\
 &= 1,500 - 500 = \mathbf{1,000 \text{ units}}
 \end{aligned}$$

**PYQ 11**

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

**Required:**

1. Calculate the economic order quantity for Component X.
2. If the minimum lot size to be supplied is 52,000 units, what is the extra cost, the company has to incur?
3. What is the minimum carrying cost, the Company has to incur?

**[(10 Marks) May 1999, 2006]**

**Answer**

$$\text{1. EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 12,48,000 \times 350}{15 \times 12\%}} = \mathbf{22,030 \text{ units}}$$

$$\begin{aligned}
 \text{Annual consumption} &= 52,000 \text{ units of FG} \times 2 \text{ units of X for 1 unit of FG} \times 12 \text{ month} \\
 &= \mathbf{12,48,000 \text{ units}}
 \end{aligned}$$

**2. Statement Showing Extra Cost**

| Particulars                                                                    | At EOQ 22,030 units  | At ROQ 52,000 units  |
|--------------------------------------------------------------------------------|----------------------|----------------------|
| 1. Ordering cost:                                                              | 12,48,000 ÷ 22,030 = | 12,48,000 ÷ 52,000 = |
| Number of orders                                                               | 56.65 or 57          | 24                   |
| Ordering cost (number of orders × ₹350)                                        | 19,950               | 8,400                |
| 2. Carrying cost ( $\frac{1}{2} \times \text{ROQ} \times C$ ) (C = 12% of ₹15) | 19,827               | 46,800               |
| <b>Total cost (1+2)</b>                                                        | <b>39,777</b>        | <b>55,200</b>        |
| <b>Extra cost</b>                                                              | <b>-</b>             | <b>15,423</b>        |

**3. Minimum Carrying Cost:**

Carrying cost depends upon the size of the order. It will be minimum on the least order size. (In this part of the question the two order sizes are 22,030 units and 52,000 units. Here 22,030 units is the least of the two order sizes. At this order size carrying cost will be minimum.) The minimum carrying cost in this case can be computed as under:

$$\text{Minimum carrying cost} = \frac{1}{2} \times 22,030 \text{ units} \times 12\% \text{ of ₹15} = \mathbf{₹19,827}$$

**PYQ 12**

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

|                          |   |                    |
|--------------------------|---|--------------------|
| Monthly demand of Zed    | : | 7,500 units        |
| Cost of placing an order | : | ₹500               |
| Re-order period          | : | 5 to 8 weeks       |
| Cost per unit            | : | ₹60                |
| Carrying cost            | : | 10% p.a.           |
| Normal usage             | : | 500 units per week |
| Minimum usage            | : | 250 units per week |
| Maximum usage            | : | 750 units per week |

**Required:**

1. Re-order quantity
2. Re- order level
3. Minimum stock level
4. Maximum stock level
5. Average stock level.

**[(10 Marks) Nov 2006]**

**Answer**

$$\begin{aligned}
 1. \quad \text{Re-order Quantity} &= \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 26,000 \times 500}{60 \times 10\%}} = \mathbf{2,082 \text{ units}} \\
 A &= \text{Annual Requirement in units} \\
 &= \text{Normal usage per week} \times 52 \text{ weeks} \\
 &= 500 \text{ units} \times 52 \text{ weeks} = \mathbf{26,000 \text{ units}} \\
 2. \quad \text{Re-order level} &= \text{Maximum re-order period} \times \text{Maximum usage} \\
 &= 8 \text{ Weeks} \times 750 \text{ units per week} = \mathbf{6,000 \text{ units.}} \\
 3. \quad \text{Minimum stock level} &= \text{Re order level} - (\text{Normal usage} \times \text{Average re-order period}) \\
 &= 6,000 - (500 \text{ units per week} \times 6.5 \text{ weeks}) \\
 &= 6,000 - 3,250 = \mathbf{2,750 \text{ units}} \\
 4. \quad \text{Maximum stock level} &= \text{Re-order level} + \text{Re-order quantity} - (\text{Minimum usage} \times \text{Minimum re-order period}) \\
 &= 6,000 + 2,082 - (250 \text{ units per week} \times 5 \text{ weeks}) \\
 &= 6,000 + 2,082 - 1,250 = \mathbf{6,832 \text{ units}} \\
 5. \quad \text{Average stock level} &= \frac{1}{2} (\text{Minimum stock} + \text{Maximum stock}) \\
 &= \frac{1}{2} (2,750 + 6,832) = \mathbf{4,791 \text{ units}} \\
 &\quad \text{Or} \\
 &= \frac{1}{2} \times \text{ROQ} + \text{Minimum stock} \\
 &= \frac{1}{2} \times 2,082 + 2,750 = \mathbf{3,791 \text{ units}}
 \end{aligned}$$

**PYQ 13**

The average annual consumption of a material is 18,250 units at a price of ₹36.50 per unit. The storage cost is 20% on an average inventory and the cost of placing an order is ₹50. How much quantity is to be purchased at a time?

**[(2 Marks) May 2007]**

**Answer**

$$\text{EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 18,250 \times 50}{20\% \text{ of } 36.50}} = \sqrt{\frac{18,25,000}{7.3}} = \mathbf{500 \text{ units}}$$

**PYQ 14**

ZED Company supplies plastic crockery to fast food restaurants in metropolitan city. One of its products is a special bowl, disposable after initial use, for serving soups to its customers. Bowls are sold in pack 10 pieces at a price of ₹50 per pack.

The demand for plastic bowl has been forecasted at a fairly steady rate of 40,000 packs every year. The company purchases the bowl direct from manufacturer at ₹40 per pack within a three days lead time. The ordering and related cost is ₹8 per order. The storage cost is 10% per annum of average inventory investment.

**Required:**

1. Calculate Economic Order Quantity.
2. Calculate number of orders needed every year.
3. Calculate the total cost of ordering and storage bowls for the year.
4. Determine when should the next order to be placed (Assuming that the company does maintain a safety stock and that the present inventory level is 333 packs with a year of 360 working days).

**[(10 Marks) May 2008]**

**Answer**

$$1. \quad \text{EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 40,000 \times 8}{40 \times 10\%}} = \mathbf{400 \text{ packs}}$$

**MATERIAL COST 1.42**

$$2. \quad \text{No. of orders needed} = \frac{\text{Annual Requirement}}{\text{EOQ}} = \frac{40,000}{400} = 100 \text{ orders}$$

**3. Total cost of ordering and carrying (at EOQ level):**

$$\begin{aligned} \text{Ordering Cost} &= \text{No. of orders} \times \text{Cost per order} = \frac{40,000}{400} \times 8 = ₹800 \\ \text{Carrying Cost} &= \frac{1}{2} \times \text{ROQ} \times C = \frac{1}{2} \times 400 \times 4 = ₹800 \\ \text{Total} &= ₹800 + 800 = ₹1,600 \end{aligned}$$

$$\begin{aligned} 4. \quad \text{Normal usage per day} &= 111 \text{ packs (40,000 packs / 360 days)} \\ \text{Present inventory} &= 333 \text{ packs} \\ \text{Present inventory in terms of no. of days} &= 3 \text{ days consumption (333 packs / 111 Packs per day)} \\ \text{Normal lead time} &= 3 \text{ days} \end{aligned}$$

Since, Present inventory level is equal to normal lead time; **next order should be placed immediately** to avoid stock out situation.

**PYQ 15**

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

**[(2 Marks) Nov 2008]**

**Answer**

$$\begin{aligned} C &= ₹3.6 \text{ per unit per annum} \\ \text{Total carrying cost} &= \frac{1}{2} \times \text{EOQ} \times C \\ 9,000 &= \frac{1}{2} \times \text{EOQ} \times 3.60 \\ \text{EOQ} &= \frac{9,000 \times 2}{3.6} = 5,000 \text{ units} \end{aligned}$$

**Assumption:** Company follows EOQ policy.

**PYQ 16**

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

|                         |            |
|-------------------------|------------|
| Annual demand           | 2000 units |
| Unit price              | ₹20.00     |
| Ordering cost per order | ₹20.00     |
| Storage cost            | 2% p.a.    |
| Interest rate           | 8% p.a.    |
| Lead time               | Half month |

**Calculate economic order quantity and total annual inventory cost of the raw material.**

**[(5 Marks) Nov 2009]**

**Answer**

$$(1) \quad \text{EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 2,000 \times 20}{20 \times 10\% (2\% + 8\%)}} = \sqrt{\frac{80,000}{2}} = 200 \text{ units}$$

**(2) Total Annual Inventory Cost including purchase**

$$\begin{aligned} \text{Purchase cost (2,000 units} \times \text{₹20 each)} &= ₹40,000 \\ \text{Ordering Cost (*10 orders} \times \text{₹20 per order)} &= ₹200 \\ \text{Carrying cost } (\frac{1}{2} \times 200 \times \text{₹20} \times 10\%) &= ₹200 \\ \text{Total annual inventory cost including purchase} &= ₹40,400 \end{aligned}$$

$$* \text{ No. of Order (2,000} \div \text{200)} = 10 \text{ orders}$$

**PYQ 17**

Re-order quantity of material 'X' is 5,000 kgs; Maximum level 8,000 kgs; Minimum usage 50 kgs 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'.

**[(2 Marks) May 2010]**

**Answer**

$$\begin{aligned} \text{Maximum Level} &= \text{ROL} + \text{ROQ} - (\text{Min lead time} \times \text{Min consumption per day}) \\ 8,000 &= \text{ROL} + 5,000 - [4 \times 400 (50 \text{ kgs per hour} \times 8 \text{ hours per day})] \\ \text{Re-order Level} &= 8,000 - 5,000 + 1,600 = \mathbf{4,600 \text{ kg}} \end{aligned}$$

**PYQ 18**

ABC Limited has received an offer of quantity discounts on its order of materials as under:

| Price per tonne | Tones                 |
|-----------------|-----------------------|
| ₹4,800          | Less than 50          |
| ₹4,680          | 50 and less than 100  |
| ₹4,560          | 100 and less than 200 |
| ₹4,440          | 200 and less than 300 |
| ₹4,320          | 300 and above         |

The annual requirement for the material is 500 tonnes the ordering cost per order is ₹6,250 and the stock holding cost is estimated at 25% of the material cost per annum.

**Required:**

1. Compute the most economical purchase level,
2. Compute EOQ, if there are no quantity discounts and the price per ton is ₹5,250.

**[(5 Marks) Nov 2010]**

**Answer**

**1. Statement Showing Most Economical Purchase Level**

| Order Size | No. of Orders (A/ROQ) | Cost of Purchase (500 × Price) | Ordering Cost (No. of Orders × ₹6,250) | Carrying Cost ( $\frac{1}{2} \times \text{ROQ} \times \text{Price} \times 25\%$ ) | Total Cost |
|------------|-----------------------|--------------------------------|----------------------------------------|-----------------------------------------------------------------------------------|------------|
| 40         | (500/40) = 12.5 or 13 | 24,00,000                      | 81,250                                 | 24,000                                                                            | 25,05,250  |
| 50         | (500/50) = 10         | 23,40,000                      | 62,500                                 | 29,250                                                                            | 24,31,750  |
| 100        | (500/100) = 5         | 22,80,000                      | 31,250                                 | 57,000                                                                            | 23,68,250  |
| 200        | (500/200) = 2.5 or 3  | 22,20,000                      | 18,750                                 | 1,11,000                                                                          | 23,49,750  |
| 300        | (500/300) = 1.67 or 2 | 21,60,000                      | 12,500                                 | 1,62,000                                                                          | 23,34,500  |

**Most Economical order size is 300 units because at this level, the total cost is minimum i.e. ₹23,34,500.**

$$2. \quad \text{EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 500 \times 6,250}{5,250 \times 25\%}} = \sqrt{\frac{62,50,000}{1,312.50}} = \mathbf{69 \text{ tones}}$$

**PYQ 19**

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

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

**You are required:**

- (1) Calculate the Economics Order Quantity for material 'X'.
- (2) Should the company accept an offer of 2 percent discount by the supplier, if he wants to supply the annual

requirement of material 'X' in 4 equal quarterly installments?

**[(5 Marks) Nov 2012]**

**Answer**

$$(1) \quad EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 96,000 \times 1,000}{20 \times 15\%}} = 8,000 \text{ Kg}$$

**(2) Statement of Evaluation**

| Particulars                                                                | EOQ                                                           | Quarterly                                                         |
|----------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------|
| Purchase Price @ ₹20/₹19.60/kg of 96,000 kg                                | ₹19,20,000                                                    | ₹18,81,600                                                        |
| Ordering cost @ ₹1,000 per order                                           | 12 orders × ₹1,000<br>= ₹12,000                               | 4 orders × ₹1,000<br>= ₹4,000                                     |
| Carrying cost ( $\frac{1}{2} \times ROQ \times \text{Price} \times 15\%$ ) | $\frac{1}{2} \times 8,000 \times 20 \times 15\%$<br>= ₹12,000 | $\frac{1}{2} \times 24,000 \times 19.60 \times 15\%$<br>= ₹35,280 |
| <b>Total Cost</b>                                                          | <b>₹19,44,000</b>                                             | <b>₹19,20,880</b>                                                 |

**Advise:** Company should accept 2% discount offer (Net saving by acceptance is ₹23,120).

**Working Notes:**

(a) A = (3 kg × 32,000) 96,000 kg (1 unit of product 'M' requires 3 kgs of 'X')

Annual demand of 'M' = 8,000 units × 4 quarters = **32,000 units**

(b) No. of orders at EOQ =  $\frac{96,000}{8,000}$  = **12 orders**

(c) ROQ at 2% offer =  $\frac{96,000}{4 \text{ orders}}$  = **24,000 kg**

**PYQ 20**

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

|                          |   |                               |
|--------------------------|---|-------------------------------|
| Cost of placing an order | : | ₹800 per order                |
| Carrying cost            | : | 15% p.a. of average inventory |
| Re-order period          | : | 10 days                       |
| Safety stock             | : | 600 units                     |
| Company operates         | : | 300 days in a year            |

**You are required to calculate:**

1. Economic Order Quantity for material 'Rex'.
2. Re-order Level
3. Maximum Stock Level
4. Average Stock Level

**[(5 Marks) Nov 2013]**

**Answer**

$$1. \quad EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 60,000 \times 800}{10 \times 15\%}} = 8,000 \text{ units}$$

$$2. \quad \text{Re-order Level (ROL)} = \text{Safety Stock} + (\text{Re-order period} \times \text{Average consumption per day})$$

$$= 600 + \left( 10 \text{ Days} \times \frac{60,000 \text{ Units}}{300 \text{ Days}} \right) = 2,600 \text{ units}$$

$$3. \quad \text{Maximum Stock Level} = \text{ROL} + \text{ROQ} - (\text{Re-order period} \times \text{Average consumption per day})$$



**MATERIAL COST 1.45**

$$= 2,600 + 8,000 - \left( 10 \text{ Days} \times \frac{60,000 \text{ Units}}{300 \text{ Days}} \right) = 8,600 \text{ units}$$

**4. Average stock level** =  $\frac{1}{2}$  of ROQ + Safety stock  
 =  $\frac{1}{2}$  of 8,000 + 600 units = **4,600 units**

**PYQ 21**

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

**Required:**

- (a) Calculate the economic order quantity of raw materials.  
 (b) Advice, how frequently should order for procurement be placed.  
 (c) 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?

**[(10 Marks) May 2014]****Answer**

(a) **EOQ** =  $\sqrt{\frac{2AO}{C}}$  =  $\sqrt{\frac{2 \times 40,000 \times 750}{15}}$  = **2,000 kgs**

**Where,**

**A** = Annual usage of raw Material  
 = 1 unit of raw material gives 2.5 units of Finished Goods  
 Therefore, for 1,00,000 units of finished goods, material required  
 =  $\frac{1,00,000}{2.5}$  = **40,000 Kgs**

**O** = Ordering cost per order = handling cost per order + freight per order  
 = ₹370 + ₹380 = **₹750**

**C** = Carrying cost and holding cost of inventory per unit p.a.  
 = Carrying cost per unit p.a. + Interest cost of investment in inventory per unit p.a.  
 = (₹0.25 per kg per month × 12 months) + ₹12 per kg p.a.  
 = ₹3 + ₹12 = **₹15 per kg p.a.**

**(b) Frequency of placing order/time interval between order:**

$$= \frac{365 \text{ days or 12 months}}{\text{* No. of orders}} = \frac{12 \text{ months}}{20 \text{ orders}} = 0.6 \text{ month}$$

**Or**

$$= \frac{365 \text{ days}}{20 \text{ orders}} = 18 \text{ days (approx.)}$$

**Working Notes:**

\*No. of orders =  $\frac{\text{Annual requiremen t}}{\text{EOQ}}$  =  $\frac{40,000 \text{ kgs}}{2,000 \text{ kgs}}$  = **20 Orders**

**(c) Statement of % of Discount to be Negotiated for Placing Quarterly Orders**

| Particulars                                                | At EOQ (order size 2,000 kgs) | At order size 10,000 kgs |
|------------------------------------------------------------|-------------------------------|--------------------------|
| Ordering cost ( $\frac{A}{\text{ROQ}} \times O$ )          | 15,000                        | 3,000                    |
| Carrying cost ( $\frac{1}{2} \times \text{ROQ} \times C$ ) | 15,000                        | 75,000                   |

**MATERIAL COST 1.46**

|                                                                                 |        |               |
|---------------------------------------------------------------------------------|--------|---------------|
| Total cost                                                                      | 30,000 | 78,000        |
| <b>Extra Cost or Discount to be negotiated</b>                                  | -      | <b>48,000</b> |
| <b>% of Discount <math>\{(48,000 \div 40,000 \times 80) \times 100\}</math></b> | -      | <b>1.5%</b>   |

**PYQ 22**

Following details are related to a manufacturing concern:

|                                                  |                |
|--------------------------------------------------|----------------|
| Re-order Level                                   | 1,60,000 units |
| Economic Order Quantity                          | 90,000 units   |
| Minimum Stock Level                              | 1,00,000 units |
| Maximum Stock Level                              | 1,90,000 units |
| Average Lead Time                                | 6 days         |
| Difference between minimum and maximum lead time | 4 days         |

**Calculate:**

- (1) Maximum consumption per day  
 (2) Minimum consumption per day

**[(5 Marks) Nov 2014]**

**Answer****(1) Maximum consumption per day:**

$$\begin{aligned}
 \text{Re-order level} &= \text{Maximum re-order period} \times \text{Max consumption per day} \\
 1,60,000 \text{ units} &= 8 \text{ days} \times \text{Maximum consumption per day} \\
 \text{Max consumption per day} &= \frac{1,60,000 \text{ units}}{8 \text{ days}} = \mathbf{20,000 \text{ units}}
 \end{aligned}$$

**(2) Minimum consumption per day:**

$$\begin{aligned}
 \text{Maximum stock level} &= \text{Re-order level} + \text{Re-order quantity} - (\text{Min lead time} \times \text{Minimum consumption per day}) \\
 1,90,000 \text{ units} &= 1,60,000 \text{ units} + 90,000 \text{ units} - (4 \text{ days} \times \text{Minimum consumption per day}) \\
 2,50,000 - 1,90,000 &= 4 \text{ days} \times \text{Minimum consumption per day} \\
 \text{Minimum consumption} &= \mathbf{15,000 \text{ units per day}}
 \end{aligned}$$

**Working notes:****Calculation of Minimum Lead Time:**

$$\begin{aligned}
 \text{Maximum lead time} - \text{Minimum lead time} &= 4 \text{ days} \\
 \text{Or Maximum lead time} &= \text{Minimum lead time} + 4 \text{ days} \quad (\text{i}) \\
 \text{Average lead time} &= 6 \text{ days} \\
 \frac{\text{Max lead time} + \text{Min lead time}}{2} &= \frac{\text{Min lead time} + 4 \text{ days} + \text{Min lead time}}{2} \\
 2 \text{ Minimum lead time} + 4 \text{ Days} &= 6 \text{ days} \times 2 = 12 \text{ days} \\
 \text{Minimum lead time} &= (12 \text{ days} - 4 \text{ days}) \div 2 = \mathbf{4 \text{ days}}
 \end{aligned}$$

**PYQ 23**

Supreme Limited is a manufacturer of energy saving bulbs. To manufacture the finished product one unit of component 'LED' is required. Annual requirement of component 'LED' is 72,000 units, the cost being ₹300 per unit. Other relevant details for the year 2015-2016 are:

|                            |   |               |
|----------------------------|---|---------------|
| Cost of placing an order   | : | ₹2,250        |
| Carrying cost of inventory | : | 12% per annum |

**Lead time:**

|         |   |         |
|---------|---|---------|
| Maximum | : | 20 days |
|---------|---|---------|

**MATERIAL COST 1.47**

|                    |   |         |
|--------------------|---|---------|
| Minimum            | : | 8 days  |
| Average            | : | 14 days |
| Emergency purchase | : | 5 days  |

**Consumption:**

|         |   |                   |
|---------|---|-------------------|
| Maximum | : | 400 units per day |
| Minimum | : | 200 units per day |
| Average | : | 300 units per day |

**You are required to calculate:**

- (a) Re-order quantity
- (b) Re-ordering level
- (c) Minimum stock level
- (d) Maximum stock level
- (e) Danger level

**[(5 Marks) Nov 2016]****Answer**

$$(a) \text{ ROQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 72,000 \times 2,250}{12\% \text{ of } 300}} = 3,000 \text{ units}$$

$$(b) \text{ Re-ordering Level} = \text{Maximum consumption} \times \text{Maximum lead time} \\ = 400 \text{ units} \times 20 \text{ days} = 8,000 \text{ units}$$

$$(c) \text{ Minimum Level} = \text{ROL} - (\text{Average consumption} \times \text{Average lead time}) \\ = 8,000 \text{ units} - (300 \text{ units} \times 14 \text{ days}) = 3,800 \text{ units}$$

$$(d) \text{ Maximum Level} = \text{ROL} + \text{ROQ} - (\text{Minimum consumption} \times \text{Minimum lead time}) \\ = 8,000 \text{ units} + 3,000 \text{ units} - (200 \text{ units} \times 8 \text{ days}) = 9,400 \text{ units}$$

$$(e) \text{ Danger Level} = \text{Average consumption} \times \text{Emergency delivery time} \\ = 300 \text{ units} \times 5 \text{ days} = 1,500 \text{ units}$$

**Or**

$$= \text{Minimum consumption} \times \text{Emergency delivery time} \\ = 200 \text{ units} \times 5 \text{ days} = 1,000 \text{ units}$$

**PYQ 24**

ASJ manufacturer produces a product which requires a component costing ₹1,000 per unit. Other information related to the component are as under:

|                    |                       |
|--------------------|-----------------------|
| Usage of component | 1,500 units per month |
| Ordering cost      | ₹75 per order         |
| Storage cost rate  | 2% per annum          |
| Obsolescence rate  | 1% per annum          |
| Maximum usage      | 400 units per week    |
| Lead time          | 6 - 8 weeks           |

The firm has been offered a quantity discount of 5% by the supplier on the purchase of component, if the order size 6,000 units at a time.

**You are required to compute:**

- (1) Economic order quantity.
- (2) Re-order level and advise whether the discount offer be accepted by the firm or not.

**[(5 Marks) May 2018]****Answer**

$$(1) \text{ EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 1,500 \times 12 \times 75}{1,000 \times 3\%}} = 300 \text{ units}$$

$$(2) \text{ Re-order Level} = \text{Maximum Re-order period} \times \text{Maximum Usage} = 8 \text{ weeks} \times 400 \text{ units} = 3,200 \text{ units}$$

**Evaluation of 5% discount offer**

| Particulars                                                                     | At EOQ (order size 300 units) | At order size 6,000 units |
|---------------------------------------------------------------------------------|-------------------------------|---------------------------|
| Purchase cost 18,000 units @ ₹1,000/₹950 per unit                               | 1,80,00,000                   | 1,71,00,000               |
| Ordering cost ( $A/ROQ \times ₹75$ )                                            | 4,500                         | 225                       |
| Carrying cost ( $ROQ \times \frac{1}{2} \times C$ ) ( $C = 3\%$ of ₹1,000/₹950) | 4,500                         | 85,500                    |
| <b>Total cost</b>                                                               | <b>1,80,09,000</b>            | <b>1,71,85,725</b>        |

**Advise: Accept the discount offer.**

**PYQ 25**

M/S X private Limited is manufacturing a special product which requires a component "SKY BLUE" the following particulars are available for the year ended 31<sup>st</sup> march, 2018:

|                             |              |
|-----------------------------|--------------|
| Annual demand of "SKY BLUE" | 12,000 units |
| Cost of placing an order    | ₹1,800       |
| Cost per unit of "SKY BLUE" | ₹640         |
| Carrying cost per unit      | 18.75%       |

The company has been offered a quantity discount of 5% on purchase of "SKY BLUE" provided order size is 3,000 components a time.

**You are required to compute:**

- (1) Economic order quantity.
- (2) Advise whether the discount offer be accepted by the firm or not.

**[(5 Marks) May 2018]**

**Answer**

$$(1) \text{ EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 12,000 \times 1,800}{640 \times 18.75\%}} = 600 \text{ units}$$

**(2) Evaluation of 5% discount offer**

| Particulars                                                                       | At EOQ (order size 600 units) | At order size 3,000 units |
|-----------------------------------------------------------------------------------|-------------------------------|---------------------------|
| Purchase cost 12,000 units @ ₹640/₹608 per unit                                   | 76,80,000                     | 72,96,000                 |
| Ordering cost ( $A/ROQ \times ₹1,800$ )                                           | 36,000                        | 7,200                     |
| Carrying cost ( $\frac{1}{2} \times ROQ \times C$ ) ( $C = 18.75\%$ of ₹640/₹608) | 36,000                        | 1,71,000                  |
| <b>Total cost</b>                                                                 | <b>77,52,000</b>              | <b>74,74,200</b>          |

**Advise: Accept the discount offer.**

**PYQ 26**

M/S SJ Private Limited manufactures 20,000 units of a product per month. The cost of placing an order is ₹1,500. The purchase price of the raw material is ₹100 per kg. The re-order period is 5 to 7 weeks. The consumption of raw materials varies from 200 kg to 300 kg per week, the average consumption being 250 kg. The carrying cost of inventory is 9.75% per annum.

**You are required to calculate:**

1. Re-order quantity
2. Re-order level
3. Maximum level
4. Minimum level
5. Average stock level.

**[(5 Marks) Nov 2018]**

**Answer**

**MATERIAL COST 1.49**

1. **Re-order quantity** =  $\sqrt{\frac{2AO}{C}}$  =  $\sqrt{\frac{2 \times 13,000 \times 1,500}{100 \times 9.75\%}}$  = **2,000 kgs**
- A** = Normal usage per week × 52 weeks  
= 250 kgs × 52 weeks = **13,000 kgs**
2. **Re-order level (ROL)** = Maximum usage × Maximum re-order period  
= 300 kgs × 7 weeks = **2,100 kgs**
3. **Maximum level** = ROL + ROQ – (Minimum usage × Minimum re-order period)  
= 2,100 kgs + 2,000 kgs – (200 kgs × 5 weeks) = **3,100 kgs**
4. **Minimum level** = ROL – (Normal usage × Normal re-order period)  
= 2,100 kgs. – (250 kgs × 6 weeks) = **600 kgs**
5. **Average stock level** =  $\frac{1}{2}$  (Minimum level + Maximum level)  
=  $\frac{1}{2}$  (600 kgs + 3,100 kgs) = **1,850 kgs**
- Or**
- = (Minimum level +  $\frac{1}{2}$  × ROQ)  
= (600 kgs +  $\frac{1}{2}$  × 2,000 kgs) = **1,600 kgs**

**PYQ 27**

The following are the details of receipt and issue of material 'CXE' in a manufacturing company during the month of April 2019:

| <b>Date</b> | <b>Particulars</b>                                       | <b>Quantity (kg)</b> | <b>Rate per kg</b> |
|-------------|----------------------------------------------------------|----------------------|--------------------|
| April 4     | Purchase                                                 | 3000                 | ₹16                |
| April 8     | Issue                                                    | 1000                 |                    |
| April 15    | Purchase                                                 | 1500                 | ₹18                |
| April 20    | Issue                                                    | 1200                 |                    |
| April 25    | Return to supplier<br>(out of purchase made on April 15) | 300                  |                    |
| April 26    | Issue                                                    | 1000                 |                    |
| April 28    | Purchase                                                 | 500                  | ₹17                |

Opening stock as on 01-04-2019 is 1000 kg @ `15 per kg. On 30th April, 2019 it was found that 50 kg of material 'CXE' was fraudulently misappropriated by the store assistant and never recovered by the company.

**Required:**

- (1) Prepare a store ledger account under each of the following method of pricing the issue:  
(A) Weighted Average Method, (B) LIFO
- (2) What would be the value of material consumed and value of closing stock as on 30-04-2019 as per these two methods?

**[(10 Marks) May 2019]**

**Answer**

**(1) (A) Stores Ledger of Material CXE (Weighted Average Method)**

| <b>Date</b> | <b>Receipts</b> |             |              | <b>Issues</b> |             |              | <b>Balance</b> |             |              |
|-------------|-----------------|-------------|--------------|---------------|-------------|--------------|----------------|-------------|--------------|
|             | <b>Units</b>    | <b>Rate</b> | <b>Value</b> | <b>Units</b>  | <b>Rate</b> | <b>Value</b> | <b>Units</b>   | <b>Rate</b> | <b>Value</b> |
| 1           | -               | -           | -            | -             | -           | -            | 1000           | 15          | 15,000       |
| 4           | 3000            | 16          | 48,000       | -             | -           | -            | 4000           | 15.75       | 63,000       |
| 8           | -               | -           | -            | 1000          | 15.75       | 15,750       | 3000           | 15.75       | 47,250       |
| 15          | 1500            | 18          | 27,000       | -             | -           | -            | 4500           | 16.50       | 74,250       |
| 20          | -               | -           | -            | 1200          | 16.50       | 19,800       | 3300           | 16.50       | 54,450       |
| 25          | -               | -           | Return       | 300           | 18          | 5400         | 3000           | 16.35       | 49,050       |
| 26          | -               | -           | -            | 1000          | 16.35       | 16,350       | 2000           | 16.35       | 32,700       |

**MATERIAL COST 1.50**

|    |     |    |          |    |       |     |      |       |        |
|----|-----|----|----------|----|-------|-----|------|-------|--------|
| 28 | 500 | 17 | 8,500    | -  | -     | -   | 2500 | 16.48 | 41,200 |
| 30 | -   | -  | Shortage | 50 | 16.48 | 824 | 2450 | 16.48 | 40,376 |

**(B) Stores Ledger of Material CXE (LIFO Method)**

| Date<br>April | Receipts |      |          | Issues |      |        | Balance |      |        |
|---------------|----------|------|----------|--------|------|--------|---------|------|--------|
|               | Units    | Rate | Value    | Units  | Rate | Value  | Units   | Rate | Value  |
| 1             | -        | -    | -        | -      | -    | -      | 1000    | 15   | 15,000 |
| 4             | 3000     | 16   | 48,000   | -      | -    | -      | 1000    | 15   | 15,000 |
|               |          |      |          |        |      |        | 3000    | 16   | 48,000 |
| 8             | -        | -    | -        | 1000   | 16   | 16,000 | 1000    | 15   | 15,000 |
|               |          |      |          |        |      |        | 2000    | 16   | 32,000 |
| 15            | 1500     | 18   | 27,000   | -      | -    | -      | 1000    | 15   | 15,000 |
|               |          |      |          |        |      |        | 2000    | 16   | 32,000 |
|               |          |      |          |        |      |        | 1500    | 18   | 27,000 |
| 20            | -        | -    | -        | 1200   | 18   | 21,600 | 1000    | 15   | 15,000 |
|               |          |      |          |        |      |        | 2000    | 16   | 32,000 |
|               |          |      |          |        |      |        | 300     | 18   | 5,400  |
| 25            | -        | -    | Return   | 300    | 18   | 5400   | 1000    | 15   | 15,000 |
|               |          |      |          |        |      |        | 2000    | 16   | 32,000 |
| 26            | -        | -    | -        | 1000   | 16   | 16,000 | 1000    | 15   | 15,000 |
|               |          |      |          |        |      |        | 1000    | 16   | 16,000 |
| 28            | 500      | 17   | 8,500    | -      | -    | -      | 1000    | 15   | 15,000 |
|               |          |      |          |        |      |        | 1000    | 16   | 16,000 |
|               |          |      |          |        |      |        | 500     | 17   | 8,500  |
| 30            | -        | -    | Shortage | 50     | 17   | 850    | 1000    | 15   | 15,000 |
|               |          |      |          |        |      |        | 1000    | 16   | 16,000 |
|               |          |      |          |        |      |        | 450     | 17   | 7,650  |

**(2) Value of material consumed and closing stock:**

|                        | <b>Material Consumed</b> | <b>Closing Stock</b> |
|------------------------|--------------------------|----------------------|
| Under Weighted Average | 51,900                   | 40,376               |
| Under LIFO             | 53,600                   | 38,650               |

**PYQ 28**

Surekha limited produces 4,000 litres of paints on quarterly basis. Each litre requires 2 kg of raw material. The cost of placing one order for raw material is ₹40 and the purchasing price of raw material is ₹50 per kg. The storage cost and interest cost is 2% and 6% per annum respectively. The lead time for procurement of raw material is 15 days.

**Calculate Economic Order Quantity and Total Annual Inventory Cost in respect of the above raw material.**

**[(5 Marks) Nov 2019]**

**Answer**

$$(1) \text{ EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 32,000 \times 40}{50 \times 8\%(2\% + 6\%)}} = \sqrt{\frac{25,60,000}{4}} = \mathbf{800 \text{ Kgs}}$$

$$A = 4,000 \text{ litres} \times 4 \text{ Quarters} \times 2 \text{ kg of raw material} = 32,000 \text{ Kgs}$$

**(2) Total Annual Inventory Cost including purchase**

$$\begin{aligned} \text{Annual inventory cost} &= \text{Purchase cost} + \text{Carrying cost} + \text{Ordering cost} \\ &= \text{Purchase quantity} \times \text{Purchase price} + \frac{1}{2} \times \text{EOQ} \times C + \frac{A}{\text{EOQ}} \times O \\ &= 32,000 \text{ kgs} \times ₹50 + \frac{1}{2} \times 800 \times 4 + \frac{32,000}{800} \times 40 \end{aligned}$$

$$= ₹16,00,000 + ₹1,600 + ₹1,600$$

**MATERIAL COST 1.51**

$$= ₹16,03,200$$

### PYQ 29

An automobile company purchases 27,000 spare parts for its annual requirements. The cost per order is ₹240 and the annual carrying cost of average inventory is 12.5%. Each spare part costs ₹50. At present, the order size is 3,000 spare parts. (Assume that number of days in a year = 360 days)

**Find out:**

- (1) How much the company's cost would be saved by EOQ model?
- (2) The re-order point under EOQ model if lead time is 12 days?
- (3) How frequently should orders for procurement be placed under EOQ model?

**[(10 Marks) Nov 2020]**

**Answer**

**1. Calculation of saving in cost by using EOQ:**

**(a) Total ordering and carrying cost under existing policy:**

|               |   |                                   |   |                                         |   |        |
|---------------|---|-----------------------------------|---|-----------------------------------------|---|--------|
| Ordering cost | = | $\frac{A}{ROQ} \times O$          | = | $\frac{27,000}{3,000} \times ₹240$      | = | ₹2,160 |
| Carrying cost | = | $\frac{1}{2} \times ROQ \times C$ | = | $\frac{1}{2} \times 3,000 \times ₹6.25$ | = | ₹9,375 |
| Total         | = | ₹2,160 + ₹9,375                   | = | <b>₹11,535</b>                          |   |        |

**(b) Total ordering and carrying cost under EOQ policy:**

|               |   |                                   |   |                                                                      |   |        |
|---------------|---|-----------------------------------|---|----------------------------------------------------------------------|---|--------|
| Ordering cost | = | $\frac{A}{ROQ} \times O$          | = | $\left(\frac{27,000}{1,440}\right) 18.75 \text{ or } 19 \times ₹240$ | = | ₹4,560 |
| Carrying cost | = | $\frac{1}{2} \times ROQ \times C$ | = | $\frac{1}{2} \times 1,440 \times ₹6.25$                              | = | ₹4,500 |
| Total         | = | ₹4,560 + ₹4,500                   | = | <b>₹9,060</b>                                                        |   |        |

**Saving in cost (a) - (b) = ₹11,535 - ₹9,060 = ₹2,475**

**Working Note:**

EOQ =  $\sqrt{\frac{2AO}{C}}$  =  $\sqrt{\frac{2 \times 27,000 \times 240}{12.5\% \times 50}}$  = **1,440 Units**

**2. Re-order Point** = Normal Consumption × Normal Lead Time  
 =  $\frac{27,000}{360} \times 12$  = **900 units**

**3. Frequency of placing order:**

=  $\frac{360 \text{ days}}{\text{*No. of orders}}$  =  $\frac{360}{19 \text{ orders}}$   
 = **18.95 or 19 days**

**\*No. of orders** =  $\frac{27,000}{1,440}$  = **18.75 or 19 orders**

### PYQ 30

MM Ltd. has provided the following information about the items in its inventory.

| Item Code Number | Units | Unit Cost (₹) |
|------------------|-------|---------------|
| 101              | 25    | 50            |
| 102              | 300   | 1             |



**MATERIAL COST 1.52**

|     |     |    |
|-----|-----|----|
| 103 | 50  | 80 |
| 104 | 75  | 8  |
| 105 | 225 | 2  |
| 106 | 75  | 12 |

MM Ltd. has adopted the policy of classifying the items constituting 15% or above of Total Inventory Cost as 'A' category, items constituting 6% or less of Total Inventory Cost as 'C' category and the remaining items as 'B' category.

**You are required to:**

- (1) Rank the items on the basis of % of Total Inventory Cost.
- (2) Classify the items into A, B, and C, categories as per ABC Analysis of Inventory Control adopted by MM Ltd.

**[(5 Marks) July 2021]**

**Answer**

**(1) Statement Showing % of Total Inventory Cost and Rank**

| Item Code Number | Units      | Unit Cost (₹) | Total Cost (₹) | % of Total Inventory Cost | Rank |
|------------------|------------|---------------|----------------|---------------------------|------|
| 101              | 25         | 50            | 1,250          | 16.67                     | 2    |
| 102              | 300        | 1             | 300            | 4                         | 6    |
| 103              | 50         | 80            | 4,000          | 53.33                     | 1    |
| 104              | 75         | 8             | 600            | 8                         | 4    |
| 105              | 225        | 2             | 450            | 6                         | 5    |
| 106              | 75         | 12            | 900            | 12                        | 3    |
| -                | <b>750</b> | -             | <b>7,500</b>   | <b>100</b>                | -    |

**(2) Classifying items as per ABC Analysis of Inventory Control**

Basis for ABC Classification as % of Total Inventory Cost

|             |   |           |
|-------------|---|-----------|
| 15% & above | : | 'A' items |
| 7% to 14%   | : | 'B' items |
| 6% and less | : | 'C' items |

| Rank               | Item Code Number | Total Cost (₹) | % of Total Inventory Cost | Category |
|--------------------|------------------|----------------|---------------------------|----------|
| 1                  | 103              | 4,000          | 53.33                     |          |
| 2                  | 101              | 1,250          | 16.67                     |          |
| <b>Total</b>       | <b>2</b>         | <b>5,250</b>   | <b>70.00</b>              | <b>A</b> |
| 3                  | 106              | 900            | 12                        |          |
| 4                  | 104              | 600            | 8                         |          |
| <b>Total</b>       | <b>2</b>         | <b>1,500</b>   | <b>20.00</b>              | <b>B</b> |
| 5                  | 105              | 450            | 6                         |          |
| 6                  | 102              | 300            | 4                         |          |
| <b>Total</b>       | <b>2</b>         | <b>750</b>     | <b>10.00</b>              | <b>C</b> |
| <b>Grand Total</b> | <b>6</b>         | <b>7,500</b>   | <b>100</b>                |          |

**PYQ 31**

XYZ Ltd uses two types of raw materials – 'Material A' and 'Material B' in the production process and has provided the following data year ended on 31<sup>st</sup> March, 2021:

| Particulars                    | Material A (₹) | Material B (₹) |
|--------------------------------|----------------|----------------|
| Opening stock as on 01.04.2020 | 30,000         | 32,000         |
| Purchase during the year       | 90,000         | 51,000         |
| Closing stock as on 31.03.2021 | 20,000         | 14,000         |

**1. You are required to calculate:**

- a. The inventory turnover ratio of 'Material A' and 'Material B'.

- b.** The number of days for which the average inventory is held for both materials 'A' and 'B'.  
**2.** Based on above calculations, give your comments.  
 (Assume 360 days in a year.)

**[(5 Marks) Dec 2021]**

**Answer**

**1. Statement Showing Inventory Turnover Ratio**

| Particulars                                                                 | Material A     | Material B      |
|-----------------------------------------------------------------------------|----------------|-----------------|
| Opening stock                                                               | 30,000         | 32,000          |
| Add: Purchases                                                              | 90,000         | 51,000          |
| Less: Closing stock                                                         | (20,000)       | (14,000)        |
| Materials consumed                                                          | 1,00,000       | 69,000          |
| Average inventory (Opening stock + Closing stock) ÷ 2                       | 25,000         | 23,000          |
| <b>a. Inventory turnover ratio (Materials consumed ÷ Average inventory)</b> | <b>4 times</b> | <b>3 times</b>  |
| <b>b. Inventory holding period (360 ÷ IT Ratio)</b>                         | <b>90 days</b> | <b>120 days</b> |

- 2. Comment:** The material turnover ratio of material A is higher than material B. Hence, A is the fast moving material. Inventory Turnover Ratio indicates that how much time a particular inventory is rotated during the year. Since, inventory turnover ratio of A is higher than that of B; it indicates that A is fast moving. This can be further verified by average inventory holding as it is lesser for A in comparison to B. Attempt should be therefore made to reduce the amount of capital locked up in B.

**PYQ 32**

A Limited a toy company purchases its requirement of raw material from S Limited at ₹120 per kg. The company incurs a handling cost of ₹400 plus freight of ₹350 per order. The incremental carrying cost of inventory of raw material is ₹0.25 per kg per month. In addition the cost of working capital finance on the investment in inventory of raw material is ₹15 per kg per annum. The annual production of the toys is 60,000 units and 5 units of toys are obtained from one kg. of raw material.

**Required:**

- (a)** Calculate the Economic Order Quantity (EOQ) of raw materials.  
**(b)** Advise, how frequently company should order to minimize its procurement cost. Assume 360 days in a year.  
**(c)** Calculate the total ordering cost and total inventory carrying cost per annum as per EOQ.

**[(5 Marks) May 2022]**

**Answer**

**(a) EOQ** =  $\sqrt{\frac{2AO}{C}}$  =  $\sqrt{\frac{2 \times 12,000 \times 750}{18}}$  = **1,000 kgs**

**A** = Annual usage of raw Material (1 unit of raw material gives 5 units of Finished Goods. Therefore, for 60,000 units of finished goods, material required)  
 =  $60,000 \div 5$  = **12,000 Kgs**

**O** = Ordering cost per order  
 = handling cost per order + freight per order  
 = ₹400 + ₹350 = **₹750**

**C** = Carrying cost or holding cost of inventory per unit p.a.  
 = Carrying cost per unit p.a. + interest cost of investment in inventory per unit p.a.  
 = (₹0.25 per unit per month × 12 months) + ₹15 per kg p.a.  
 = ₹3 + ₹15 = **₹18 per kg p.a.**

**(b) Frequency of placing order:**

=  $\frac{360 \text{ days}}{\text{* No. of orders}}$  =  $\frac{360 \text{ days}}{12 \text{ orders}}$  = **30 days**

**MATERIAL COST 1.54**

$$\text{*No. of orders} = \frac{\text{Annual requirement}}{\text{EOQ}} = \frac{12,000 \text{ kgs}}{1,000 \text{ kgs}} = \text{12 orders}$$

**(c) Total Ordering and Carrying cost per annum at EOQ:**

|                        |   |                                   |   |               |
|------------------------|---|-----------------------------------|---|---------------|
| Total cost of ordering | = | Number of orders × Cost per order | = |               |
|                        | = | 12 × ₹750                         | = | <b>₹9,000</b> |
| Total cost of carrying | = | $\frac{1}{2}$ EOQ × C             | = |               |
|                        | = | $\frac{1}{2}$ × 1,000 Kg. × ₹18   | = | <b>₹9,000</b> |
| Total Cost             | = | <b>₹18,000</b>                    |   |               |

**PYQ 33**

MM Ltd. uses 7,500 valves per month which is purchased at a price of ₹1.50 per unit, the carrying cost is estimated to be 20% of average inventory investment on an annual basis. The cost to place an order and getting the delivery is ₹15. It takes a period of 1.5 months to receive a delivery from the date of placing and order and a safety stock of 3,200 valves is desired.

**You are required to determine:**

- (a)** The Economics Order Quantity (EOQ) and the frequency of orders
- (b)** The re-order point.
- (c)** The Economics Order Quantity (EOQ) if the valve costs ₹4.50 each instead of ₹1.50 each.  
(Assume a year consists of 360 days)

**[(5 Marks) Nov 2022]****Answer**

$$\text{(a) EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 7,500 \times 12 \times 15}{1.50 \times 20\%}} = \text{3,000 valves}$$

$$\text{Number of orders} = (7,500 \times 12) \div 3,000 = 30 \text{ orders}$$

$$\text{Frequency of orders} = 360 \text{ days} \div 30 \text{ orders} = \text{12 days}$$

$$\begin{aligned} \text{(b) Re-order point} &= \text{Average consumption} \times \text{Average lead time} + \text{Safety stock} \\ &= \frac{7,500 \times 12}{360} \times 45 \text{ days (1.5 months} \times 30 \text{ days)} + 3,200 \\ &= \text{14,450 valves} \end{aligned}$$

$$\text{(c) EOQ} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 7,500 \times 12 \times 15}{4.50 \times 20\%}} = \text{1,732.05 valves}$$

# SUGGESTED REVISION

| Ques. No.                                                                                          | Observations or KEY Points<br>(Note down during revisions) | Page No. of<br>Practical<br>Register | 1 <sup>st</sup> & 2 <sup>nd</sup><br>Revision | 3 <sup>rd</sup> , 4 <sup>th</sup> &<br>5 <sup>th</sup><br>Revision | Revision<br>during<br>Exams |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------|-----------------------------------------------|--------------------------------------------------------------------|-----------------------------|
| <b>BQ (Book Questions covering Study Module of ICAI, PM, RTP's, MTP's and Important Questions)</b> |                                                            |                                      |                                               |                                                                    |                             |
| 1                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 2                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 3                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 4                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 5                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 6                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 7                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 8                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 9                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 10                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 11                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 12                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 13                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 14                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 15                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 16                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 17                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 18                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 19                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 20                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 21                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 22                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 23                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 24                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 25                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 26                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 27                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 28                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 29                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 30                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 31                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 32                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 33                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 34                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 35                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 36                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 37                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 38                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 39                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| <b>PYQ (Past Year Questions)</b>                                                                   |                                                            |                                      |                                               |                                                                    |                             |
| 1                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 2                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 3                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 4                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 5                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 6                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 7                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |

**MATERIAL COST 1.56**

|           |  |  |          |          |          |
|-----------|--|--|----------|----------|----------|
| <b>8</b>  |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>9</b>  |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>10</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>11</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>12</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>13</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>14</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>15</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>16</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>17</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>18</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>19</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>20</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>21</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>22</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>23</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>24</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>25</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>26</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>27</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>28</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>29</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>30</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>31</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>32</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>33</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |

# ***CHAPTER - 2***

## ***EMPLOYEE COST***

### ***LEARNING OUTCOMES***

***After studying this chapter you will be able to***

- ***State the meaning and importance of employee (labour) cost in an organisation.***
- ***Discuss the attendance and payroll procedures.***
- ***State the meaning and treatment of idle time and overtime cost.***
- ***Compute employee (labour) turnover discuss its meaning, reasons, methods of measurement and cost impacts.***
- ***Discuss and apply the various methods of remuneration and incentive system in calculation of wages, bonus etc.***
- ***Discuss the efficiency rating procedures.***

## WAGE PAYMENT AND INCENTIVES PLANS

### BQ 1

Calculate the earnings of the workers A, B and C under Straight Piece Rate System and Time Rate System from the following particulars:

|                        |          |
|------------------------|----------|
| Normal rate per hour   | ₹54      |
| Standard time per unit | 1 Minute |

**Output per day is as follows:**

|                       |           |
|-----------------------|-----------|
| Worker A              | 390 Units |
| Worker B              | 450 Units |
| Worker C              | 600 Units |
| Working hours per day | 8 hours   |

### Answer

#### 1. Calculation of earnings under Straight Piece Rate System:

|          |   |                   |   |                |
|----------|---|-------------------|---|----------------|
| Worker A | = | 390 units × ₹0.90 | = | <b>₹351.00</b> |
| Worker B | = | 450 units × ₹0.90 | = | <b>₹405.00</b> |
| Worker C | = | 600 units × ₹0.90 | = | <b>₹540.00</b> |

#### 2. Calculation of earnings under Time Rate System:

|          |   |               |   |             |
|----------|---|---------------|---|-------------|
| Worker A | = | 8 Hours × ₹54 | = | <b>₹432</b> |
| Worker B | = | 8 Hours × ₹54 | = | <b>₹432</b> |
| Worker C | = | 8 Hours × ₹54 | = | <b>₹432</b> |

### Working Notes:

#### Computation of Normal wage rate per unit:

|                           |                        |
|---------------------------|------------------------|
| Normal rate per hour      | ₹54                    |
| Standard Output per hour  | 60 units               |
| Normal wage rate per unit | ₹0.90 (₹54 ÷ 60 units) |

### BQ 2

Calculate the earnings of a worker under Halsey System and under Rowan System. The relevant data is as below:

|                      |         |
|----------------------|---------|
| Time Rate (per hour) | ₹60     |
| Time allowed         | 8 hours |
| Time taken           | 6 hours |
| Time saved           | 2 hours |

### Answer

#### Earning under Halsey System:

|         |   |                                                 |                  |
|---------|---|-------------------------------------------------|------------------|
| Earning | = | (AH × R) + 50% (SH - AH) × R                    |                  |
|         | = | (6 hours × ₹60) + 50% (8 hours - 6 hours) × ₹60 | = <b>₹420.00</b> |

#### Earning under Rowan System:

|         |   |                                                                                       |                  |
|---------|---|---------------------------------------------------------------------------------------|------------------|
| Earning | = | (AH × R) + $\frac{AH}{SH} \times (SH - AH) \times R$                                  |                  |
|         | = | (6 hours × ₹60) + $\frac{6}{8} \times (8 \text{ hours} - 6 \text{ hours}) \times ₹60$ | = <b>₹450.00</b> |

### BQ 3

From the following particulars you are required to work out the earnings of a worker for a week under:

1. Straight piece rate,
2. Time rate,



3. Halsey premium scheme (50% sharing) and  
4. Rowan premium scheme

|                      |          |                             |            |
|----------------------|----------|-----------------------------|------------|
| Weekly working hours | 48 hours | Normal time taken per piece | 20 minutes |
| Hourly wage rate     | ₹7.50    | Normal output per week      | 144 pieces |
| Piece rate per unit  | ₹3.00    | Actual output for the week  | 150 Pieces |

**Answer****Calculation of earnings under various System:**

(a) **Straight piece rate** = Number of units produced × Piece rate  
= 150 units × ₹3.00 = **₹450.00**

(b) **Time rate** = Number of hours × Wage rate per hour  
= 48 Hours × ₹7.50 = **₹360.00**

(c) **Halsey System** =  $(AH \times R) + 50\% (SH - AH) \times R$   
=  $(48 \text{ hours} \times ₹7.50) + 50\% (50 - 48) \times ₹7.50$  = **₹367.50**

(d) **Rowan System** =  $(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$   
=  $(48 \text{ hours} \times ₹7.50) + \frac{48}{50} \times (50 - 48) \times ₹7.50$  = **₹374.40**

\*Standard Hours (SH) = 150 units × 20/60 = 50 hours

**BQ 4**

During first week of April, 2022 the workman Mr. Kalyan manufactures 300 articles. He receives wage for a guaranteed 48 hours week at the rate of ₹4 per hour. The estimated time to produce one article is 10 minutes and under incentive schemes (Halsey and Rowan) the time allowed is increased by 20%.

**Calculate his gross wages according to:**

- (a) Piece work with a guaranteed weekly wage,  
(b) Halsey premium bonus 50% to workman, and  
(c) Rowan premium bonus.

**Answer****Calculation of earnings under various System:****(a) Piece work with guarantee weekly wages:**

**Piece work wages** = Number of units produced × Piece rate  
= 300 units × ₹0.6666 = **₹200**

**Guaranteed weekly wages** = Number of hours × Wage rate per hour  
= 48 Hours × ₹4.00 = **₹192**

**Final wages** = ₹200 or ₹192 whichever is higher = **₹200**

(b) **Halsey System** =  $(AH \times R) + 50\% (SH - AH) \times R$   
=  $(48 \text{ hours} \times ₹4) + 50\% (60 - 48) \times ₹4$  = **₹216**

(c) **Rowan System** =  $(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$   
=  $(48 \text{ hours} \times ₹4) + \frac{48}{60} \times (60 - 48) \times ₹4$  = **₹230.40**

**Working note:**

**Standard Hours (SH)** = Standard time to produced 300 articles + 20%  
=  $300 \text{ units} \times 10/60 + 20\%$  = 60 hours

**BQ 5**

From the under mentioned information work out the total amount payable and the rate earned per hour by three workmen under the Halsey Premium Bonus System (the bonus being calculated at 50% of the time saved):

|                                   |   |          |
|-----------------------------------|---|----------|
| Standard time for given operation | : | 10 hours |
| Hourly rate of wages              | : | ₹1.00    |
| <b>Actual time taken:</b>         |   |          |
| <b>B</b>                          | : | 8 hours  |
| <b>C</b>                          | : | 6 hours  |
| <b>D</b>                          | : | 5 hours  |

**Answer****Earning under Halsey premium bonus system and rate earned per hour**

$$\begin{aligned} \text{Earning} &= (\text{AH} \times \text{R}) + 50\% (\text{SH} - \text{AH}) \times \text{R} \\ \text{Rate earned per hour} &= \text{Earning} \div \text{AH} \end{aligned}$$

**For B**

$$\begin{aligned} \text{Earning} &= (8 \text{ hours} \times ₹1) + 50\% (10 - 8) \times ₹1 = 8 + 1 = ₹9 \\ \text{Rate per hour} &= 9 \div 8 \text{ hours} = ₹1.25 \end{aligned}$$

**For C**

$$\begin{aligned} \text{Earning} &= (6 \text{ hours} \times ₹1) + 50\% (10 - 6) \times ₹1 = 6 + 2 = ₹8 \\ \text{Rate per hour} &= 8 \div 6 \text{ hours} = ₹1.33 \end{aligned}$$

**For D**

$$\begin{aligned} \text{Earning} &= (5 \text{ hours} \times ₹1) + 50\% (10 - 5) \times ₹1 = 5 + 2.50 = ₹7.50 \\ \text{Rate per hour} &= 7.50 \div 5 \text{ hours} = ₹1.50 \end{aligned}$$

**BQ 6**

(a) Bonus paid under the Halsey Plan with bonus at 50% for the time saved equals the bonus paid under the Rowan System. When will this statement hold good? (Your answer should contain the proof).

(b) The time allowed for a job is 8 hours. The hourly rate is ₹8. Prepare a statement showing:

- (i) The bonus earned,
- (ii) The total earnings of labour and
- (iii) Hourly earnings.

Under the Halsey system with 50% bonus for time saved and Rowan system for each hour saved progressively.

**BQ 7**

A workman whose basic rate of pay is ₹3 per hour is covered under Rowan system of premium bonus. In addition he gets a cost of living allowance (Dearness Allowance/ D.A.) of ₹50 per week of 48 hours.

**Calculate the total earnings of the worker if during a week he worked on the following jobs:**

- (i) Job X for 30 hours for which standard time allowed is 40 hours.
- (ii) Job Y for 15 hours for which standard time allowed is 20 hours, for 3 hours he was not provided with any job.

**[₹239.41]**

**BQ 8**

Two workmen, '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 the rowan system, while B is paid bonus according to the Halsey System. The time allowed to make the product is 50 hours.

A takes 30 hours while B takes 40 hours to complete the product. The factory overhead rate is ₹5 per man hour actually worked. The factory cost for the product for A is ₹3,490 and for B it is ₹3,600.

**You are required:**

- (a) To find the normal rate of wages,  
 (b) To find the cost of material,  
 (c) To prepare a statement comparing the factory cost of the products as made by the two workmen.

[(a) ₹20 per hour (b) ₹2,500 (c) A: ₹3,490; B: ₹3,600]

### BQ 9

Mr. A is working by employing 10 skilled workers. He is considering the introduction of some incentive scheme either Halsey scheme (with 50% bonus) or Rowan scheme of wage payment for increasing the labour productivity to cope with the increased demand for the product by 25%. He feels that if the proposed incentive scheme could bring about an average 20% increase over the present earnings of the workers, it could act as sufficient incentive for them to produce more and he has accordingly given this assurance to the workers.

*As a result of the assurance, the increase in productivity has been observed as revealed by the following figures for the current month:*

|                                                                                         |             |
|-----------------------------------------------------------------------------------------|-------------|
| Hourly rate of wages (guaranteed)                                                       | ₹40.00      |
| Average time for producing 1 piece by one worker<br>(This may be taken as time allowed) | 2 hours     |
| No. of working days in the month                                                        | 25 days     |
| No. of working hours per day for each worker                                            | 8 hours     |
| Actual production during the month                                                      | 1,250 units |

### Required:

1. Calculate effective rate of earnings per hour under Halsey scheme and Rowan scheme.
2. Calculate the savings to Mr. A in terms of direct labour cost per piece under the schemes.
3. Advise Mr. A about the selection of the scheme to fulfill his assurance.

### Answer

#### 1. Computation of effective rate of earnings under the Halsey and Rowan schemes:

|                                    |   |                                                                              |                       |
|------------------------------------|---|------------------------------------------------------------------------------|-----------------------|
| Total earnings under Halsey scheme | = | $(AH \times R) + 50\% (SH - AH) \times R$                                    |                       |
|                                    | = | $(2,000 \times ₹40) + 50\% (2,500 - 2,000) \times ₹40$                       |                       |
|                                    | = | <b>₹90,000</b>                                                               |                       |
| Total earnings under Rowan scheme  | = | $(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$                    |                       |
|                                    | = | $(2,000 \times ₹40) + \frac{2,000}{2,500} \times (2,500 - 2,000) \times ₹40$ |                       |
|                                    | = | <b>₹96,000</b>                                                               |                       |
| Effective rate under Halsey Plan   | = | $₹90,000 \div 2,000 \text{ hours}$                                           | = <b>₹45 per hour</b> |
| Effective rate under Rowan Plan    | = | $₹96,000 \div 2,000 \text{ hours}$                                           | = <b>₹48 per hour</b> |
| Actual hours (AH)                  | = | 10 workers $\times$ 25 days $\times$ 8 hours per day                         |                       |
|                                    | = | 2,000 hours                                                                  |                       |
| Standard hours (SH)                | = | 1,250 units $\times$ 2 hours per unit                                        | = 2,500 hours         |

#### 2. Savings to Mr. A in terms of direct labour cost per piece:

##### Direct labour cost per unit:

|                   |   |                                    |   |                |
|-------------------|---|------------------------------------|---|----------------|
| Under time wages  | = | 2 hours $\times$ ₹40 per hour      | = | ₹80 per unit   |
| Under Halsey Plan | = | $₹90,000 \div 1,250 \text{ units}$ | = | ₹72 per unit   |
| Under Rowan Plan  | = | $₹96,000 \div 1,250 \text{ units}$ | = | ₹76.8 per unit |

##### Savings of direct labour cost per unit under:

|                    |   |              |   |                       |
|--------------------|---|--------------|---|-----------------------|
| <b>Halsey Plan</b> | = | ₹80 - ₹72    | = | <b>₹8.00 per unit</b> |
| <b>Rowan Plan</b>  | = | ₹80 - ₹76.80 | = | <b>₹3.20 per unit</b> |

**3. Advise to Mr. A about the selection of the scheme to fulfill assurance:**

Halsey scheme brings more savings to Mr. A but the other scheme viz. Rowan fulfils the promise of 20% increase over the present earnings of ₹40 per hour by paying effectively ₹48 per hour. Hence, Rowan Plan should be adopted.

**BQ 10**

A skilled worker in XYZ Ltd. is paid a guaranteed wage rate of ₹30 per hour. The standard time per unit for a particular product is 4 hours. Mr. P, a machine man, has been paid wages under the Rowan Incentive Plan and he had earned an effective hourly rate of ₹37.50 on the manufacture of that particular product.

**What could have been his total earnings and effective hourly rate, had he been put on Halsey Incentive Scheme (50%)?**

**Answer**

**The following equation can be made:**

$$\begin{array}{rcl}
 \text{Effective Earnings per hour} & = & [(AH \times R) + AH/SH (SH - AH) \times R] \div AH \\
 37.50 & = & [30 AH + AH/4 (4 - AH) \times 30] \div AH \\
 37.50 AH & = & 30 AH + AH/4 (4 - AH) \times 30 \\
 7.50 AH & = & AH/4 (4 - AH) \times 30 \\
 7.50 AH & = & AH (4 - AH) \times 7.50 \\
 1 & = & 4 - AH \\
 AH & = & 3 \text{ hours}
 \end{array}$$

**Total earnings and effective hourly rate of skilled worker under Halsey Incentive Scheme:**

$$\begin{array}{rcl}
 \text{Total earnings} & = & (AH \times R) + 50\% (SH - AH) \times R \\
 & = & (3 \times 30) + 50\% (4 - 3) \times 30 = \text{₹105} \\
 \text{Effective hourly rate} & = & \text{Total earning} \div \text{hours worked} \\
 & = & ₹105 \div 3 \text{ hours} = \text{₹35}
 \end{array}$$

**BQ 11**

JBL Sisters operates a boutique which works for various fashion houses and retail stores. It has employed 26 workers and pays them on time rate basis. On an average an employee is allowed 8 hours for boutique work on a piece of garment. In the month of December 2021, two workers M and J were given 15 pieces and 21 pieces of garments respectively for boutique work. The following are the details of their work:

|               | <b>M</b>  | <b>J</b>  |
|---------------|-----------|-----------|
| Work assigned | 15 pcs.   | 21 pcs.   |
| Time taken    | 100 hours | 140 hours |

Workers are paid bonus as per Halsey System. The existing rate of wages is ₹60 per hour. As per the new wages agreement the workers will be paid ₹72 per hour w.e.f. 1<sup>st</sup> January 2022. At the end of the month December 2021, the accountant of the company has wrongly calculated wages to these two workers taking ₹72 per hour.

**Required:**

1. Calculate the loss incurred due to incorrect rate selection.
2. Calculate the loss incurred due to incorrect rate selection, had Rowan scheme of bonus payment followed.
3. Calculate the loss/ savings if Rowan scheme of bonus payment had followed.
4. Discuss the suitability of Rowan scheme of bonus payment for JBL Sisters?

**Answer****1. Calculation of loss incurred due to incorrect rate selection:**

$$\begin{array}{rcl}
 \text{Worker M} & = & (100 \times ₹12) + 50\% (15 \times 8 - 100) \times ₹12 = \text{₹1,320} \\
 \text{Worker J} & = & (140 \times ₹12) + 50\% (21 \times 8 - 140) \times ₹12 = \text{₹1,848} \\
 \text{Total} & = & ₹1,320 + ₹1,848 = \text{₹3,168}
 \end{array}$$

**2. Calculation of loss incurred due to incorrect rate selection under Rowan scheme:**

|          |   |                                                     |   |               |
|----------|---|-----------------------------------------------------|---|---------------|
| Worker M | = | $(100 \times ₹12) + 100/120 (120 - 100) \times ₹12$ | = | <b>₹1,400</b> |
| Worker J | = | $(140 \times ₹12) + 140/168 (168 - 140) \times ₹12$ | = | <b>₹1,960</b> |
| Total    | = | $₹1,400 + ₹1,960$                                   | = | <b>₹3,360</b> |

**3. Calculation of loss/savings if Rowan scheme of bonus payment had followed:**

|                |   |                                      |                 |
|----------------|---|--------------------------------------|-----------------|
| (Loss)/savings | = | Loss under Halsey – Loss under Rowan |                 |
| Worker M       | = | $₹1,320 - ₹1,400$                    | = <b>(₹80)</b>  |
| Worker J       | = | $₹1,848 - ₹1,960$                    | = <b>(₹112)</b> |
| Total loss     | = | $₹80 + ₹112$                         | = <b>₹192</b>   |

**4. Suitability of Rowan scheme of bonus payment for JBL Sisters:** Rowan Scheme of incentive payment has the following benefits, which is suitable with the nature of business in which JBL Sisters operates:

- (a) Under Rowan Scheme of bonus payment, workers cannot increase their earnings or bonus by merely increasing its work speed. Bonus under Rowan Scheme is maximum when the time taken by a worker on a job is half of the time allowed. As this fact is known to the workers, therefore, they work at such a speed which helps them to maintain the quality of output too.
- (b) If the rate setting department commits any mistake in setting standards for time to be taken to complete the works, the loss incurred will be relatively low.

**BQ 12**

The standard hours of Job X is 100 hours. The Job has been completed by Amar in 60 hours, Akbar in 70 hours and Anthony in 95 hours. The bonus system applicable to the job is as follows:

| <b>% of time saved to time allowed</b> | <b>Bonus</b>      |
|----------------------------------------|-------------------|
| Saving upto 10%                        | 10% of time saved |
| From 11% to 20%                        | 15% of time saved |
| From 21% to 40%                        | 20% of time saved |
| From 41% to 100%                       | 25% of time Saved |

The rate of pay is ₹1 per hour. Calculate the total earnings of each worker and also the rate of earnings per hour.

**[Amar ₹66.50, ₹1.108; Akbar ₹74.50, ₹1.064; Anthony ₹95.50, ₹1.005]**

**BQ 13**

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 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, the employee cost per 100 pieces and also calculate under the above schemes the average cost of labour for the company to produce 100 pieces.under:**

- |                  |                         |
|------------------|-------------------------|
| (i) Day wages,   | (iii) Halsey scheme and |
| (ii) Piece rate, | (iv) The Rowan scheme.  |

**Answer**

**Computation of earnings of each worker and labour cost per 100 pieces and the average cost of labour for the company to produce 100 pieces under various schemes:**

**(i) Day Wages:**

| <b>Worker</b> | <b>Day wages</b> | <b>Actual output</b> | <b>Labour cost per 100 pieces</b> |
|---------------|------------------|----------------------|-----------------------------------|
| A             | 600              | 180                  | 333.33                            |
| B             | 600              | 120                  | 500.00                            |

**EMPLOYEE COST 2.7**

|       |       |     |        |
|-------|-------|-----|--------|
| C     | 600   | 100 | 600.00 |
| Total | 1,800 | 400 |        |

$$\text{Average labour cost to produce 100 pieces} = \frac{\text{Total wages paid}}{\text{Total output}} \times 100 = \frac{1,800}{400} \times 100 = \text{₹450}$$

**(ii) Piece Rate:**

| Worker | Actual output | Piece rate | Wages earned | Labour cost per 100 pieces |
|--------|---------------|------------|--------------|----------------------------|
| A      | 180           | *7.50      | 1,350        | 750.00                     |
| B      | 120           | 7.50       | 900          | 750.00                     |
| C      | 100           | 7.50       | 750          | 750.00                     |
| Total  | 400           | -          | 3,000        | -                          |

$$\text{Average labour cost to produce 100 pieces} = \frac{\text{Total wages paid}}{\text{Total output}} \times 100 = \frac{3,000}{400} \times 100 = \text{₹750}$$

$$\text{*Piece rate} = \text{₹75 per hour} \div 10 \text{ units in one hour} = \text{₹7.50 per unit}$$

**(iii) Halsey Scheme:**

| Worker | Actual output | SH | AH | Wages earned<br>(AH × R) + 50%(SH - AH) × R | Labour cost per 100 pieces |
|--------|---------------|----|----|---------------------------------------------|----------------------------|
| A      | 180           | 18 | 8  | 975                                         | 541.67                     |
| B      | 120           | 12 | 8  | 750                                         | 625.00                     |
| C      | 100           | 10 | 8  | 675                                         | 675.00                     |
| Total  | 400           | -  | -  | 2,400                                       | -                          |

$$\text{Average labour cost to produce 100 pieces} = \frac{\text{Total wages paid}}{\text{Total output}} \times 100 = \frac{2,400}{400} \times 100 = \text{₹600}$$

**(iv) Rowan Scheme:**

| Worker | Actual output | SH | AH | Wages earned<br>(AH × R) + AH/SH × (SH - AH) × R | Labour cost per 100 pieces |
|--------|---------------|----|----|--------------------------------------------------|----------------------------|
| A      | 180           | 18 | 8  | 933                                              | 518.33                     |
| B      | 120           | 12 | 8  | 800                                              | 666.67                     |
| C      | 100           | 10 | 8  | 720                                              | 720.00                     |
| Total  | 400           | -  | -  | 2,453                                            | -                          |

$$\text{Average labour cost to produce 100 pieces} = \frac{\text{Total wages paid}}{\text{Total output}} \times 100 = \frac{2,453}{400} \times 100 = \text{₹613.25}$$

**BQ 14**

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

- (a) The entire gains of improved production should not go to the workers.
- (b) In the name of speed, quality should not suffer.
- (c) The rate setting department being newly established are liable to commit mistakes.

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

**Answer**

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

Another feature of this scheme is that a worker cannot increase his earnings or bonus by merely increasing its work speed. The reason for this is that the bonus under Rowan Scheme is maximum when the

time taken by a worker on a job is half of the time allowed. As this fact is known to the workers, therefore, they work at such a speed which helps them to maintain the quality of output too.

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

(a) Time allowed = 4 hours  
 Time taken = 3 hours  
 Rate = ₹5 per hour  
 Bonus =  $\frac{AH}{SH} (SH - AH) \times R$   
 =  $\frac{3}{4} \times (4 - 3) \times ₹5$  = **₹3.75**

In the above illustration time saved is 1 hour and, therefore, total gain is ₹5. Out of ₹5 according to Rowan Plan only ₹3.75 is given to the worker in the form of bonus and the remaining ₹1.25 remains with the management. In other words, a worker is entitled for 75 percent of the time saved in the form of bonus.

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

Bonus =  $\frac{2}{4} \times (4 - 2) \times ₹5$  = **₹5.00**  
 Bonus =  $\frac{1}{4} \times (4 - 1) \times ₹5$  = **₹3.75**

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

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

Bonus =  $\frac{3}{10} \times (10 - 3) \times ₹5$  = **₹10.50**

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

## OVERTIME

### BQ 15

A company's basic wage rate is ₹100 per hour and its overtime rates are:

|                                                           |                         |
|-----------------------------------------------------------|-------------------------|
| Before and after normal working hours                     | 175% of basic wage rate |
| Sunday 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 time                             | 1,000 hours |
| Overtime before and after working hours | 100 hours   |
| Overtime on Sundays and holidays        | 25 hours    |
| Total                                   | 1,125 hours |



*You are required to calculate the labour cost chargeable to job 'Z' and overheads in each of the following circumstances:*

- (a) Where overtime is worked regularly throughout the year as a policy due to 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.

**[(a) ₹1,31,625 and Nil (b) ₹1,12,500 and ₹10,625 (c) ₹1,23,125 and Nil]**

### BQ 16

It is seen from the job card for repair of the customer's equipment that a total of 154 hours have been put in as detailed below:

| <i>Day</i>        | <i>Worker A paid @ ₹200 per day for 8 hours</i> | <i>Worker B paid @ ₹100 per day for 8 hours</i> | <i>Worker C paid @ ₹300 per day for 8 hours</i> |
|-------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| Monday (Hours)    | 10 - ½ hours                                    | 8 hours                                         | 10 - ½ hours                                    |
| Tuesday (Hours)   | 8 hours                                         | 8 hours                                         | 8 hours                                         |
| Wednesday (Hours) | 10 - ½ hours                                    | 8 hours                                         | 10 - ½ hours                                    |
| Thursday (Hours)  | 9 - ½ hours                                     | 8 hours                                         | 9 - ½ hours                                     |
| Friday (Hours)    | 10 - ½ hours                                    | 8 hours                                         | 10 - ½ hours                                    |
| Saturday (Hours)  | -                                               | 8 hours                                         | 8 hours                                         |
| <b>Total</b>      | <b>49 hours</b>                                 | <b>48 hours</b>                                 | <b>57 hours</b>                                 |

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 @ ₹968 for the relevant month. The dearness allowance is payable to all workers ir-respective of wage rate if they are present or are on leave with wages on all working days.

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).

Overtime is paid twice of ordinary wage rate if a worker works more than nine hours in a day of forty eight hours in a week. 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.**

### Answer

#### (1) Calculation of hours to be paid to worker A:

| <i>Days</i>  | <i>Normal hours</i> | <i>Extra hours</i> | <i>Overtime hours</i> | <i>Equivalent normal hours for overtime worked</i> | <i>Total normal hours</i> |
|--------------|---------------------|--------------------|-----------------------|----------------------------------------------------|---------------------------|
| Monday       | 8                   | 1                  | 1.5                   | 3                                                  | 12                        |
| Tuesday      | 8                   | -                  | -                     | -                                                  | 8                         |
| Wednesday    | 8                   | 1                  | 1.5                   | 3                                                  | 12                        |
| Thursday     | 8                   | 1                  | .5                    | 1                                                  | 10                        |
| Friday       | 8                   | 1                  | 1.5                   | 3                                                  | 12                        |
| Saturday     | -                   | -                  | -                     | -                                                  | -                         |
| <b>Total</b> | <b>40</b>           | <b>4</b>           | <b>5</b>              | <b>10</b>                                          | <b>54</b>                 |

#### (2) Calculation of hours to be paid to worker B:

| <i>Days</i>  | <i>Normal hours</i> | <i>Extra hours</i> | <i>Overtime hours</i> | <i>Equivalent normal hours for overtime worked</i> | <i>Total normal hours</i> |
|--------------|---------------------|--------------------|-----------------------|----------------------------------------------------|---------------------------|
| Monday       | 8                   | -                  | -                     | -                                                  | 8                         |
| Tuesday      | 8                   | -                  | -                     | -                                                  | 8                         |
| Wednesday    | 8                   | -                  | -                     | -                                                  | 8                         |
| Thursday     | 8                   | -                  | -                     | -                                                  | 8                         |
| Friday       | 8                   | -                  | -                     | -                                                  | 8                         |
| Saturday     | 4                   | *4                 | -                     | -                                                  | 8                         |
| <b>Total</b> | <b>44</b>           | <b>4</b>           | <b>-</b>              | <b>-</b>                                           | <b>48</b>                 |



**EMPLOYEE COST 2.10**

\*Worker-B has neither worked more than 9 hours in any day nor more than 48 hours in the week.

**(3) Calculation of hours to be paid to worker C:**

| Days         | Normal hours | Extra hours | Overtime hours | Equivalent normal hours for overtime worked | Total normal hours |
|--------------|--------------|-------------|----------------|---------------------------------------------|--------------------|
| Monday       | 8            | 1           | 1.5            | 3                                           | 12                 |
| Tuesday      | 8            | -           | -              | -                                           | 8                  |
| Wednesday    | 8            | 1           | 1.5            | 3                                           | 12                 |
| Thursday     | 8            | 1           | .5             | 1                                           | 10                 |
| Friday       | 8            | 1           | 1.5            | 3                                           | 12                 |
| Saturday     | 4            | *4          | -              | -                                           | 8                  |
| <b>Total</b> | <b>44</b>    | <b>8</b>    | <b>5</b>       | <b>10</b>                                   | <b>62</b>          |

\*Worker-C will be paid for equivalent 8 hours, though 4 hours of working is required on Saturday. Further, no overtime will be paid for working beyond 4 hours since it is paid for working beyond 9 hours.

**Now,**

Worker C worked 9 hours (57 - 48) above 48 hours in a week and eligible for 18 equivalent normal hours for overtime worked. Thus total normal hours for worker C is **66 hours** (48 + 18).

**Statement Showing Wages Payable**

| Particulars                                       | A                 | B                 | C                 |
|---------------------------------------------------|-------------------|-------------------|-------------------|
| Basic wages per hour                              | ₹200 ÷ 8 = ₹25.00 | ₹100 ÷ 8 = ₹12.50 | ₹300 ÷ 8 = ₹37.50 |
| Dearness allowance per hour<br>(₹968 ÷ 176 hours) | ₹5.50             | ₹5.50             | ₹5.50             |
| Hourly rate                                       | ₹30.50            | ₹18.00            | ₹43.00            |
| Total normal hours                                | 54                | 48                | 66                |
| <b>Total wages payable</b>                        | <b>₹1,647.00</b>  | <b>₹864.00</b>    | <b>₹2,838.00</b>  |

**GROSS WAGES, NET WAGES AND LABOUR COST PER HOUR****BQ 17**

'X' an employee of ABC Company gets the following emoluments and benefits:

|                                 |   |                        |
|---------------------------------|---|------------------------|
| Basic pay                       | : | ₹10,000 p.m.           |
| Dearness allowance              | : | ₹2,000 p.m.            |
| Bonus                           | : | 20% of Salary and D.A. |
| Other allowances                | : | ₹2,500 p.m.            |
| Employee'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'.**

**Answer**

**Statement of Effective Hourly Cost of Employee X**

| Particulars                                                | Amount          |
|------------------------------------------------------------|-----------------|
| Basic pay (10,000 × 12)                                    | 1,20,000        |
| Dearness Allowance (2,000 × 12)                            | 24,000          |
| Bonus @ 20% of 1,44,000 (1,20,000 + 24,000)                | 28,800          |
| Other allowance (2,500 × 12)                               | 30,000          |
| Employer's contribution to provided fund @ 10% of 1,44,000 | 14,400          |
| <b>Labour cost per annum</b>                               | <b>2,17,200</b> |
| ÷ Effective labour hours (2,400 - 400)                     | ÷ 2,000         |
| <b>Effective hourly cost</b>                               | <b>108.60</b>   |

**BQ 18**

Calculate the Employee hour rate of a worker X from the following data:

|                 |              |
|-----------------|--------------|
| Basic pay       | ₹10,000 p.m. |
| D.A.            | ₹3,000 p.m.  |
| Fringe benefits | ₹1,000 p.m.  |

Number of working days in a year 300. 20 days are availed off as holidays on full pay in a year. Assume a day of 8 hours.

**Answer****Statement of Employee Hour Rate**

| Particulars                              | Amount          |
|------------------------------------------|-----------------|
| Basic Wages annually (10,000 × 12)       | 1,20,000        |
| Dearness Allowance (3,000 × 12)          | 36,000          |
| Fringe Benefits (1,000 × 12)             | 12,000          |
| <b>Total Annual Labour Cost</b>          | <b>1,68,000</b> |
| ÷ Effective Hours {(300 – 20) × 8 hours} | ÷ 2,240         |
| <b>Wage rate per hour</b>                | <b>₹75.00</b>   |

**BQ 19**

In a factory working six days in a week and eight hours each day, a worker is paid at the rate of ₹100 per day basic plus D.A. @ 120% of basic. He is allowed to take 30 minutes off during his 8 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 hours |
| Job Y | 12 hours |
| Job Z | 13 hours |

The time not booked was wasted while waiting for a job.

**In cost accounting, how would you allocate the wages of the worker for the week?**

**Answer****Statement of Allocation of Wages in Cost Accounting**

| Particulars                                                                      | Amount       |
|----------------------------------------------------------------------------------|--------------|
| Allocated to Job X (15 hours × ₹30)                                              | 450          |
| Allocated to Job Y (12 hours × ₹30)                                              | 360          |
| Allocated to Job Z (13 hours × ₹30)                                              | 390          |
| Charged to Costing Profit & Loss A/c (4 hours × ₹30)(assumed abnormal idle time) | 120          |
| <b>Total</b>                                                                     | <b>1,320</b> |

**Working:**

|                                                        |   |                                        |   |                     |
|--------------------------------------------------------|---|----------------------------------------|---|---------------------|
| Total available hours in one week                      | = | 6 days × 8 hrs per day                 | = | <b>48 hours</b>     |
| Normal Idle time                                       | = | 6 days × 40 minutes per day            |   |                     |
|                                                        | = | <b>240 minutes or 4 hours per week</b> |   |                     |
| Effective hours per week                               | = | 48 hours – 4 hours                     | = | <b>44 hours</b>     |
| Total wages for a week                                 | = | (₹100+120%) × 6 days                   | = | ₹1,320              |
| Wage rate per hour                                     | = | ₹1,320 ÷ 44 hours                      | = | <b>₹30 per hour</b> |
| Time wasted in waiting for job<br>(Abnormal idle time) | = | 44 hrs – (15 + 12 + 13)                | = | <b>4 hours</b>      |

**BQ 20**

A worker is paid ₹10,000 per month and a dearness allowance of ₹2,000 p.m. Worker contribution to provident fund is @10% and employer also contributes the same amount as the employee. The Employees State

**EMPLOYEE COST 2.12**

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**

**Statement of Wage Rate per Hour**

| <b>Particulars</b>                                | <b>Amount</b>   |
|---------------------------------------------------|-----------------|
| Basic Wages annually (10,000 × 12)                | 1,20,000        |
| Dearness Allowance (2,000 × 12)                   | 24,000          |
| Basic plus D.A.                                   | 1,44,000        |
| Bonus at two month's wages (12,000 × 2)           | 24,000          |
| Add: Employer contribution to:                    |                 |
| Provident Fund @ 10% of 1,44,000                  | 14,400          |
| E.S.I. Premium @ 4.75% (6.5% - 1.75%) of 1,44,000 | 6,840           |
| <b>Total Annual Labour Cost</b>                   | <b>1,89,240</b> |
| ÷ Effective Hours {(300 - 15) × 8 hours}          | ÷ 2,280         |
| <b>Wage rate per hour</b>                         | <b>₹83.00</b>   |

**BQ 21**

Following are the particulars for April, 2017 relating to four employees working in department M of a factory exclusively for Job No 120:

| <b>Name</b> | <b>Designation</b> | <b>Wages</b>   |
|-------------|--------------------|----------------|
| A           | Foreman            | ₹800 per month |
| B           | Mechanic           | ₹15 per day    |
| C           | Machine operator   | ₹12 per day    |
| D           | Workman            | ₹10 per day    |

The normal working hours per week of six days are 48 or 8 hours per day. Sundays are paid holidays. There were no other holidays during the month. Provident Fund contribution was 8% of monthly wages by employee and employer each. Employee State Insurance contribution was 3% of monthly wages by employee and 5% of monthly wages by employer.

**From the foregoing data, calculate:**

- Net wages payable by the employer for the month;
- The total amount of Provident Fund contribution to be deposited by employer;
- Employee State Insurance contribution to be deposited by the employer and
- Total labour cost to the employer for the month of April, chargeable to the job.

**Answer**

**(a) Statement of Net Wages Payable**

| <b>Particulars</b>                                   | <b>Amount</b>   |
|------------------------------------------------------|-----------------|
| Foreman @ ₹800 per month                             | 800.00          |
| Machenic @ ₹15 per day (15 × 30 days)                | 450.00          |
| Machine operator @ ₹12 per day (12 × 30 days)        | 360.00          |
| Workman @ ₹10 per day (10 × 30 days)                 | 300.00          |
| Gross wages payable                                  | 1,910.00        |
| Less: Contribution to PF by employee @ 8% of ₹1,910  | (152.80)        |
| Less: Contribution to ESI by employee @ 3% of ₹1,910 | (57.30)         |
| <b>Net wages Payable</b>                             | <b>1,699.90</b> |

- |                                                              |               |
|--------------------------------------------------------------|---------------|
| <b>(b)</b> Employer's share of Provident Fund (8% of ₹1,910) | 152.80        |
| Employee's share of Provident Fund (8% of ₹1,910)            | 152.80        |
| Total amount of PF contribution to be deposited by employer  | <b>305.60</b> |

**EMPLOYEE COST 2.13**

|                                              |                 |
|----------------------------------------------|-----------------|
| (c) Employer's share of ESI (5% of ₹1,910)   | 95.50           |
| Employer's share of ESI (3% of ₹1,910)       | 57.30           |
| ESI contribution to be deposited by employer | <b>152.80</b>   |
| (d) Total Gross Wages                        | 1,910.00        |
| Add: Employer's contribution towards P.F.    | 152.80          |
| Add: Employer's contribution towards ESI     | 95.50           |
| Total Labour cost to employer                | <b>2,158.30</b> |

**BQ 22**

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:

|                                                           | <b>A</b> | <b>B</b> |
|-----------------------------------------------------------|----------|----------|
| Basic wages                                               | ₹10,000  | ₹16,000  |
| Dearness Allowance                                        | 50%      | 50%      |
| Contribution to Provident Fund (on basic wages)           | 8%       | 8%       |
| Contribution to Employee State Insurance (on basic wages) | 2%       | 2%       |
| Overtime hours                                            | 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 contributions to state insurance and provident fund are at equal rates with employee's contribution. The two workers were employed on jobs X, Y and Z in the following proportions:

| <b>Jobs</b> | <b>X</b> | <b>Y</b> | <b>Z</b> |
|-------------|----------|----------|----------|
| Workers A   | 40%      | 30%      | 30%      |
| Workers B   | 50%      | 20%      | 30%      |

**Overtime was done on job Y.**

**Answer****Statement Showing Earnings of Worker A and B**

| <b>Particulars</b>                                            | <b>A</b>       | <b>B</b>       |
|---------------------------------------------------------------|----------------|----------------|
| Basic Wages                                                   | ₹10,000        | ₹16,000        |
| Dearness Allowance (50% of Basic)                             | ₹5,000         | ₹8,000         |
| Overtime Wages (W.N.)                                         | ₹1,500         | -              |
| <b>Gross Wages Earned</b>                                     | <b>₹16,500</b> | <b>₹24,000</b> |
| Less: Employee's Contribution to Provident Fund (8% of basic) | (₹800)         | (₹1,280)       |
| Less: Employee's Contribution ESI (2% of basic)               | (₹200)         | (₹320)         |
| <b>Net Wages Earned</b>                                       | <b>₹15,500</b> | <b>₹22,400</b> |

**Statement Showing Labour Cost Chargeable to Jobs**

| <b>Particulars</b>                  | <b>Job X</b>   | <b>Job Y</b>   | <b>Job Z</b>   |
|-------------------------------------|----------------|----------------|----------------|
| Worker A:                           |                |                |                |
| Ordinary Wages ₹16,000 in 4 : 3 : 3 | ₹6,400         | ₹4,800         | ₹4,800         |
| Overtime ₹1,500 for Job Y           | -              | ₹1,500         | -              |
| Worker B:                           |                |                |                |
| Ordinary Wages ₹25,600 in 5 : 2 : 3 | ₹12,800        | ₹5,120         | ₹7,680         |
| <b>Labour Cost chargeable</b>       | <b>₹19,200</b> | <b>₹11,420</b> | <b>₹12,480</b> |

**Working Note:****1. Statement Showing Employee Cost Excluding Overtime**

| <b>Particulars</b>                                           | <b>A</b>       | <b>B</b>       |
|--------------------------------------------------------------|----------------|----------------|
| Basic Wages                                                  | ₹10,000        | ₹16,000        |
| Dearness Allowance (50% of Basic)                            | ₹5,000         | ₹8,000         |
| Add: Employer's Contribution to Provident Fund (8% of basic) | ₹800           | ₹1,280         |
| Add: Employer's Contribution ESI (2% of basic)               | ₹200           | ₹320           |
| <b>Employee Cost (Excluding overtime)</b>                    | <b>₹16,000</b> | <b>₹25,600</b> |

2. **Overtime wages of worker A** =  $(₹15,000 \div 200 \text{ hours}) \times 2 \times 10 \text{ hours} = ₹1,500$

**BQ 23**

Mr. A an employee of XYZ Company gets the following emoluments and benefits:

|                                   |                        |
|-----------------------------------|------------------------|
| Salary                            | ₹250 per month         |
| Dearness Allowance:               |                        |
| on first ₹100 of salary           | ₹400                   |
| on next ₹100 of salary            | ₹100                   |
| on balance every ₹100             | ₹50 or part thereof    |
| Employer's contribution to P.F.   | 8% of salary and D.A.  |
| Employer's contribution to E.S.I. | 4% of salary and D.A.  |
| Bonus                             | 20% of salary and D.A. |
| Other Allowances                  | ₹2,724 per annum       |

A works for 2,400 hours per annum, out of which 400 hours are non-productive but treated as normal idle time. A worked for 18 effective hours on Job No 13, where the cost of direct materials equal A's earnings (labour cost) and the overhead applied is 100% of prime cost. The sale value of the job is quoted to earn a profit of 10% on such value.

**You are requested to find out:**

- (a) Effective hourly cost of 'A', and  
 (b) The expected sale value of Job No 13.

**Answer****(a) Statement showing Effective Hourly Cost of 'A'**

| Particulars                                                | Amount        |
|------------------------------------------------------------|---------------|
| Basic wages                                                | 250           |
| Dearness allowance:                                        |               |
| On first ₹100 of salary                                    | 400           |
| On next ₹100 of salary                                     | 100           |
| On balance ₹50                                             | 25            |
| Basic and DA per month                                     | 775           |
| Basic and DA per annum (775 × 12)                          | 9,300         |
| Bonus [20% of ₹9,300]                                      | 1,860         |
| Other allowance                                            | 2,724         |
| Add: Employer's contribution towards PF (8% of ₹9,300)     | 744           |
| Add: Employer's contribution towards E.S.I. (4% of ₹9,300) | 372           |
| <b>Total Labour cost</b>                                   | <b>15,000</b> |
| ÷ Labour hours (2,400 hours – 400 hours)                   | ÷ 2,000       |
| <b>Labour cost per hour</b>                                | <b>₹7.50</b>  |

**(b) Statement of Expected Sales Value of Job No 13**

| Particulars                                                | Amount     |
|------------------------------------------------------------|------------|
| Direct materials (equal to A's wages)                      | 135        |
| Direct labour (18 hours @ ₹7.50 per hour)                  | 135        |
| <b>Prime cost</b>                                          | <b>270</b> |
| Overheads @ 100% of Prime cost                             | 270        |
| Total cost                                                 | 540        |
| Profit @ 10% on Sales value or $\frac{1}{9}$ of total cost | 60         |
| <b>Sales Value</b>                                         | <b>600</b> |

**BQ 24**

GZ Ltd. pays the following to a skilled worker engaged in production works. The following are the employee benefits paid to the employee:

|     |                         |                     |
|-----|-------------------------|---------------------|
| (a) | Basic salary per day    | ₹1,000              |
| (b) | Dearness allowance (DA) | 20% of basic salary |

**EMPLOYEE COST 2.15**

|     |                                           |                                                                                                                                                                                                          |
|-----|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (c) | House rent allowance                      | 16% of basic salary                                                                                                                                                                                      |
| (d) | Transport allowance                       | ₹50 per day of actual work                                                                                                                                                                               |
| (e) | Overtime                                  | Twice the hourly rate (considers basic and DA), only if works more than 9 hours a day otherwise no overtime allowance. If works for more than 9 hours a day then overtime is considered after 8th hours. |
| (f) | Work of holiday and Sunday                | Double of per day basic rate provided works atleast 4 hours. The holiday and Sunday basic is eligible for all allowances and statutory deductions.                                                       |
| (g) | Earned leave & Casual leave               | These are paid leave.                                                                                                                                                                                    |
| (h) | Employer's contribution to Provident fund | 12% of basic and DA                                                                                                                                                                                      |
| (i) | Employer's contribution to Pension fund   | 7% of basic and DA                                                                                                                                                                                       |

The company normally works 8 hours a day and 26 days in a month. The company provides 30 minutes lunch break in between. During the month of August 2020, Mr. Z works for 23 days including 15<sup>th</sup> August and a Sunday and applied for 3 days of casual leave. On 15<sup>th</sup> August and Sunday he worked for 5 and 6 hours respectively without lunch break. On 5<sup>th</sup> and 13<sup>th</sup> August he worked for 10 and 9 hours respectively.

During the month Mr. Z worked for 100 hours on Job no. HT200.

**You are required to calculate:**

- (i) Earnings (ordinary wages) per day
- (ii) Effective wages rate per hour of Mr. Z.
- (iii) Wages to be charged to Job no. HT200.

**Answer**

**(i) Statement of Earnings per day**

| <b>Particulars</b>                                        | <b>Amount</b> |
|-----------------------------------------------------------|---------------|
| Basic salary (₹1,000 × 26 days)                           | 26,000        |
| Dearness allowance (20% of basic salary)                  | 5,200         |
| Basic plus D.A.                                           | 31,200        |
| House rent allowance (16% of basic salary)                | 4,160         |
| Transport Allowance (50 × 26)                             | 1,300         |
| Employer's contribution to Provident fund (12% × ₹31,200) | 3,744         |
| Employer's contribution to Pension fund (7% × ₹31,200)    | 2,184         |
| <b>Earning (Ordinary Wages) Per Month</b>                 | <b>42,588</b> |
| ÷ No. of working days in a month (days)                   | ÷ 26          |
| <b>Earning (Ordinary Wages) per day</b>                   | <b>1,638</b>  |

**(ii) Statement of Effective Wage Rate per Hour of Mr. Z**

| <b>Particulars</b>                                        | <b>Amount</b>  |
|-----------------------------------------------------------|----------------|
| Basic salary:                                             |                |
| For Actual working days (₹1,000 × 23 days)                | 23,000         |
| For Casual leaves (₹1,000 × 3 days)                       | 3,000          |
| Additional for Holidays and Sunday (₹1,000 × 2 days)      | 2,000          |
|                                                           | 28,000         |
| Dearness allowance @20% of basic salary                   | 5,600          |
| Basic plus D.A.                                           | 33,600         |
| Overtime payment (W.N. 1)                                 | 640            |
| House rent allowance @16% of basic salary                 | 4,480          |
| Transport allowance (₹50 × 23 days)                       | 1,150          |
| Employer's contribution to Provident fund (12% × ₹33,600) | 4,032          |
| Employer's contribution to Pension fund (7% × ₹33,600)    | 2,352          |
| <b>Total Labour Cost for the month</b>                    | <b>46,254</b>  |
| ÷ Effective Hours (W.N. 2)                                | ÷ 171.50       |
| <b>Labour Cost per hour</b>                               | <b>₹269.70</b> |

(iii) Wages to be charged to Job no. HT200 = ₹269.70 × 100 hours = **₹26,970**

**Working Notes:**

1. Overtime payment =  $\frac{1,000 + 20\%}{7.5 \text{ Hours}} \times 2 \times 2 \text{ hours}$  = **₹640**

2. Hours worked by Mr. Z = (19 days × 7.5 hours) + (9.5 hours + 8.5 hours) + (5 hours + 6 hours)  
= 142.5 + 18 + 11 = **171.50 hours**

\*for 2 hours in excess of 8 hours on 5 august.

**LABOUR TURNOVER**

**BQ 25**

The extracts from the payroll of M/S Maheshwari Bros. is as follows:

|                                                                  |             |
|------------------------------------------------------------------|-------------|
| Number of employees at the beginning of 2022                     | 150 workers |
| Number of employees at the end of 2022                           | 200 workers |
| Number of employees resigned                                     | 20 workers  |
| Number of employees discharged                                   | 5 workers   |
| Numbers of employees replaced due to resignations and discharges | 20 workers  |

**Calculate the labour turnover rate for the factory by different methods.**

**[11.43%, 14.29%, 31.43%, 42.85%, 25.71% & 57.14%]**

**BQ 26**

The Accountant of Y Ltd. has computed rates for the quarter ending 31<sup>st</sup> March, 2020 as 10%, 5% and 3% respectively under 'Flux Method', 'Replacement Method', and 'Separation Method'.

**If the number of workers replaced during that quarter is 30, find out the number of workers for the quarter:**

- (a) Recruited and joined;
- (b) Left and discharged and
- (c) Equivalent employee turnover rates for the year.

**Answer**

**(a) Calculation of workers recruited and joined (No. of accessions):**

$$\begin{aligned} \text{Flux Rate} &= \frac{\text{No. of separations} + \text{No. of accessions}}{\text{Average number of workers}} \times 100 \\ &= \frac{18 + \text{No. of accessions}}{600} \times 100 = 10\% \end{aligned}$$

$$\text{No. of accessions} = 10\% \text{ of } 600 - 18 = \mathbf{42 \text{ workers}}$$

**(b) Calculation of workers left and discharged (No. of separations):**

$$\begin{aligned} \text{Number of separation} &= 3\% \text{ of average workers} \\ &= 3\% \text{ of } 600 = \mathbf{18 \text{ workers}} \end{aligned}$$

**(c) Calculation of Equivalent employee turnover rates for the year:**

|                                   |   |                                   |              |
|-----------------------------------|---|-----------------------------------|--------------|
| Equivalent employee turnover rate | = | Turnover rate for the quarter × 4 |              |
| Using Flux method                 | = | 10% × 4                           | = <b>40%</b> |
| Using Replacement method          | = | 5% × 4                            | = <b>20%</b> |
| Using Separation method           | = | 3% × 4                            | = <b>12%</b> |



**Working:**

**Calculation of Average no of workers:**

$$\begin{array}{lclclcl} \text{Number of replacements} & = & 5\% \text{ of average workers} & = & 30 \\ \therefore \text{Average workers} & = & 30 \div 5\% & = & \mathbf{600 \text{ workers}} \end{array}$$

**BQ 27**

**No of workers on the payroll:**

|                               |               |
|-------------------------------|---------------|
| At the beginning of the month | 900 workers   |
| At the end of the month       | 1,100 workers |

During the month 10 workers left, 40 persons were discharged and 150 workers were recruited. Of these 25 workers are recruited in the vacancies of those leaving, while the rest were engaged for an expansion scheme.

**Calculate the various labour turnover rates.**

**Answer**

$$\text{Separation method} = \frac{\text{No. of separation}}{\text{Average no. of workers}} \times 100 = \frac{10 + 40}{1,000} \times 100 = \mathbf{5\%}$$

$$\text{Replacement method} = \frac{\text{No. of workers replaced}}{\text{Average no. of workers}} \times 100 = \frac{25}{1,000} \times 100 = \mathbf{2.5\%}$$

$$\begin{aligned} \text{Flux method (Alt 1)} &= \frac{\text{No. of separation} + \text{No. of replaced}}{\text{Average no. of workers}} \times 100 \\ &= \frac{50 + 25}{1,000} \times 100 = \mathbf{7.5\%} \end{aligned}$$

$$\text{New Accession method} = \frac{\text{No. of new accessions}}{\text{Average no. of workers}} \times 100 = \frac{125}{1,000} \times 100 = \mathbf{12.5\%}$$

$$\text{Accession method} = \frac{\text{No. of accessions}}{\text{Average no. of workers}} \times 100 = \frac{150}{1,000} \times 100 = \mathbf{15\%}$$

$$\begin{aligned} \text{Flux method (Alt 2)} &= \frac{\text{No. of accessions} + \text{No. of separation}}{\text{Average no. of workers}} \times 100 \\ &= \frac{150 + 50}{1,000} \times 100 = \mathbf{20\%} \end{aligned}$$

$$\text{*Average no of workers} = \frac{900 + 1,100}{2} = \mathbf{1,000 \text{ workers}}$$

**BQ 28**

The management of Moonshine Ltd wants to have an idea of the profit foregone as a result of labour turnover last year.

Last year sales accounted to ₹33,00,000 and the P/V ratio was 20%. The total number of actual hours worked by the direct labour force was 2,40,000. As a result of the delays by the personnel department in filling vacancies due to labour turnover 25,000 potentially productive hours (excluding unproductive training hours) were lost. The actual direct labour hours included 40,000 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 | ₹25,000 |
| Recruitment costs              | ₹20,000 |
| Selection costs                | ₹12,000 |
| Training costs                 | ₹18,000 |



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

**Answer**

**Statement Showing Profit Foregone on Account of Labour Turnover**

| Particulars                                                       | Amount          |
|-------------------------------------------------------------------|-----------------|
| Contribution Foregone (25,000 hours + 20,000 hours) × ₹3 per hour | 1,35,000        |
| Settlement Cost due to leaving                                    | 25,000          |
| Recruitment Costs                                                 | 20,000          |
| Selection Costs                                                   | 12,000          |
| Training Costs                                                    | 18,000          |
| <b>Profit Foregone</b>                                            | <b>2,10,000</b> |

**Working Notes:**

**1. Calculation of productive hours:**

|                                                       |                 |
|-------------------------------------------------------|-----------------|
| Actual hours worked                                   | 2,40,000        |
| Less: Unproductive training hours (½ of 40,000 hours) | (20,000)        |
| Actual productive hours                               | <b>2,20,000</b> |

**2. Contribution earned per productive hours:**

|                                                         |              |
|---------------------------------------------------------|--------------|
| Sales value                                             | ₹33,00,000   |
| Contribution (20% of ₹33,00,000)                        | ₹6,60,000    |
| Contribution per productive hour (₹6,60,000 ÷ 2,20,000) | <b>₹3.00</b> |

**BQ 29**

Jyoti Ltd. wants to ascertain the profit lost during the year 2022-23 due to increased labour turnover. For this purpose, it has given you the following information:

- (a) Training period of the new recruits is 50,000 hours. During this period their productivity is 60% of the experienced workers. Time required by an experienced worker is 10 hours per unit.
- (b) 20% of the output during training period was defective. Cost of rectification of a defective unit was ₹25.
- (c) Potential productive hours lost due to delay in recruitment were 1,00,000 hours.
- (d) Selling price per unit is ₹180 and P/V ratio is 20%.
- (e) Settlement cost of the workers leaving the organization was ₹1,83,480.
- (f) Recruitment cost was ₹1,56,340
- (g) Training cost was ₹1,13,180.

**Calculate the profit lost by the company due to increased labour turnover during the year 2022-23.**

**Answer**

**Statement Showing Profit Foregone Due to Labour Turnover**

| Particulars                                                         | Amount          |
|---------------------------------------------------------------------|-----------------|
| Loss of contribution                                                | 4,32,000        |
| Cost of rectification of defective units (20% of 3,000 units × ₹25) | 15,000          |
| Settlement cost of the workers leaving                              | 1,83,480        |
| Recruitment cost                                                    | 1,56,340        |
| Training cost                                                       | 1,13,180        |
| <b>Profit Foregone</b>                                              | <b>9,00,000</b> |

**Working Notes:**

**1. Calculation of loss of contribution:**

|                                                  |   |                |   |                  |
|--------------------------------------------------|---|----------------|---|------------------|
| Output by experienced workers in 50,000 hours    | = | 50,000 ÷ 10    | = | 5,000 units      |
| Loss of output by new recruits                   | = | 5,000 × 40%    | = | 2,000 units      |
| Loss of output due to delay in recruitment       | = | 1,00,000 ÷ 10  | = | 10,000 units     |
| Total loss of output                             | = | 10,000 + 2,000 | = | 12,000 units     |
| Loss of contribution (12,000 units × ₹180 × 20%) | = |                | = | <b>₹4,32,000</b> |

## MISCELLANEOUS

**BQ 30**

A, B, and C were engaged on a group task for which a payment of ₹72,500 was to be made. A's time basis wages are ₹800 per day, B's ₹600 per day and C's ₹500 per day. A worked for 25 days; B worked for 30 days and C for 40 days.

*Distribute the amount of ₹72,500 among the three workers.*

**[A ₹25,000; B ₹22,500; C ₹25,000]**

**BQ 31**

Both direct and indirect employees 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 tons per month (of 28 days) a general incentive of ₹1,500 per ton 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 employee, @ 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 employees also get a special bonus @ ₹500 per ton for all production in excess of 120% of standard.
- (c) Inspection staff are penalized @ ₹2,000 per ton for rejection by customer in excess of 2% of production.
- (d) Maintenance staff are also penalized @ ₹2,000 per hour for breakdown.

*From the following particulars for a month, compute production bonus earned by each group:*

|                       |   |             |
|-----------------------|---|-------------|
| Actual working days   | : | 25          |
| Production            | : | 21,000 tons |
| Rejection by customer | : | 500 tons    |
| Machine breakdown     | : | 40 hours    |

**Answer****Statement of production bonus earned by each group**

| Particulars                 | Direct Employee (₹) | Inspection staff (₹) | Maintenance staff (₹) | Supervisory staff (₹) | Total (₹)          |
|-----------------------------|---------------------|----------------------|-----------------------|-----------------------|--------------------|
| Aggregate general incentive | 58,50,000           | 13,50,000            | 10,80,000             | 7,20,000              | 90,00,000          |
| Special bonus               | 15,00,000           | -                    | -                     | -                     | 15,00,000          |
| Penalty                     | -                   | (1,60,000)           | (80,000)              | -                     | (2,40,000)         |
| <b>Production bonus</b>     | <b>73,50,000</b>    | <b>11,90,000</b>     | <b>10,00,000</b>      | <b>7,20,000</b>       | <b>1,02,60,000</b> |

**Working Notes:**

1. Standard output per day =  $\frac{\text{Standard output per month}}{\text{Budgeted number of days in a month}}$   
 $= \frac{16,800 \text{ tons}}{28 \text{ days}} = 600 \text{ tons}$
2. Standard output for 25 days = 600 tons × 25 days = 15,000 tons
3. **General Incentive:**
  - (i) Standard output = 15,000 tons
  - (ii) Actual output = 21,000 tons
  - (iii) Excess output over standard = 21,000 – 15,000 = 6,000 tons
  - (iv) Percentage of excess production =  $\frac{\text{Excess production}}{\text{Standard production}} \times 100 = \frac{6,000 \text{ tons}}{15,000 \text{ tons}} \times 100$

**EMPLOYEE COST 2.20**

|                                       |   |                        |   |            |
|---------------------------------------|---|------------------------|---|------------|
|                                       | = | 40%                    |   |            |
| (v) Aggregate general incentive       | = | Excess output × ₹1,500 |   |            |
|                                       | = | 6,000 tons × ₹1,500    | = | ₹90,00,000 |
| (vi) Allocation of general incentive: |   |                        |   |            |
| Direct Employee                       | = | 65% of ₹90,00,000      | = | ₹58,50,000 |
| Inspection staff                      | = | 15% of ₹90,00,000      | = | ₹13,50,000 |
| Maintenance staff                     | = | 12% of ₹90,00,000      | = | ₹10,80,000 |
| Supervisory staff                     | = | 8% of ₹90,00,000       | = | ₹7,20,000  |
| Total                                 |   |                        | = | ₹90,00,000 |

**4. Special bonus to direct workers:**

- (i) 20% is the excess output over 120% of standard output or 3,000 tons (15,000 tons × 20%)  
(ii) Special incentive = 3,000 tons × ₹500 = ₹15,00,000

**5. Penalty imposed on inspection staff:**

- (i) Normal rejection = 2% of production  
= 2% of 21,000 tons = 420 tons  
(ii) Actual rejection = 500 tons  
(iii) Excess rejection = 500 – 420 = 80 tons  
(iv) Penalty = 80 tons × ₹2,000 per ton = ₹1,60,000

**6. Penalty imposed on maintenance staff:**

- (i) Breakdown hours = 40 hours  
(ii) Penalty = 40 hours × ₹2,000 per hour = ₹80,000

**BQ 32**

An article passes through five hand operations as follows:

| Operation | Time per article | Grade of worker | Wage rate per hour |
|-----------|------------------|-----------------|--------------------|
| 1         | 15 Minutes       | A               | ₹0.65              |
| 2         | 25 Minutes       | B               | ₹0.50              |
| 3         | 10 Minutes       | C               | ₹0.40              |
| 4         | 30 Minutes       | D               | ₹0.35              |
| 5         | 20 Minutes       | E               | ₹0.30              |

The factory works 40 hours per week and the production target is 600 dozens per week.

**Prepare a statement showing for each operation and in total:**

- (a) The number of operators required,  
(b) The labour cost per dozen and  
(c) The total labour cost per week to produce the total targeted output.

**Answer****Statement Showing Operators, Labour Cost per Dozen and Labour Cost per week**

| Operations   | Time required to produce 7,200 units  | Number of Operators                             | Labour cost per dozen                   | Labour cost per week                         |
|--------------|---------------------------------------|-------------------------------------------------|-----------------------------------------|----------------------------------------------|
| 1            | $7,200 \times 15/60$<br>= 1,800 Hours | $1,800 \text{ hours} \div 40$<br>= 45 Operators | $0.65 \times 15/60 \times 12$<br>= 1.95 | $1,800 \text{ hours} \times 0.65$<br>= 1,170 |
| 2            | $7,200 \times 25/60$<br>= 3,000 Hours | $3,000 \text{ hours} \div 40$<br>= 75 Operators | $0.50 \times 25/60 \times 12$<br>= 2.50 | $3,000 \text{ hours} \times 0.50$<br>= 1,500 |
| 3            | $7,200 \times 10/60$<br>= 1,200 Hours | $1,200 \text{ hours} \div 40$<br>= 30 Operators | $0.40 \times 10/60 \times 12$<br>= 0.80 | $1,200 \text{ hours} \times 0.40$<br>= 480   |
| 4            | $7,200 \times 30/60$<br>= 3,600 Hours | $3,600 \text{ hours} \div 40$<br>= 90 Operators | $0.35 \times 30/60 \times 12$<br>= 2.10 | $3,600 \text{ hours} \times 0.35$<br>= 1,260 |
| 5            | $7,200 \times 20/60$<br>= 2,400 Hours | $2,400 \text{ hours} \div 40$<br>= 60 Operators | $0.30 \times 20/60 \times 12$<br>= 1.20 | $2,400 \text{ hours} \times 0.30$<br>= 720   |
| <b>Total</b> | <b>-</b>                              | <b>300</b>                                      | <b>₹8.55</b>                            | <b>₹5,130</b>                                |

Number of units = 600 dozens × 12 units in one dozen = 7,200 units

**BQ 33**

P Ltd. manufactures two products by using one grade of employees. The following estimates are available:

|                                    | <b>Product A</b> | <b>Product B</b> |
|------------------------------------|------------------|------------------|
| Budgeted production units          | 3,480            | 4,000            |
| Standard hours allowed per product | 5                | 4                |

It is further worked out that the efficiency rating (efficiency ratio) for productive hours worked by direct workers in actually manufacturing the production is 80%.

***You are required to find out the exact standard employee hours requirement.***

**Answer**

Standard hours allowed for budgeted production = 3,480 units × 5 hours + 4,000 units × 4 hours  
= 33,400 hours

Exact standard employee hours required = 33,400 hours ÷ 80% = ***41,750 hours***

# PAST YEAR QUESTIONS

## PYQ 1

The management of Sunshine Ltd. wants to have an idea of the profit foregone as a result of labour turnover last year. Last year sales accounted to ₹66,00,000 and the P/V ratio was 20%.

The total number of actual hours worked by the direct labour force was 3,45,000. As a result of the delays by the personnel department in filling vacancies due to labour turnover 75,000 potentially productive hours (excluding unproductive training 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 last year on account of labour turnover.**

**[(5 marks) May 1998]**

## Answer

**Calculation of profit foregone as a result of labour turnover:**

|                                                                                                                       |                  |
|-----------------------------------------------------------------------------------------------------------------------|------------------|
| Contribution foregone $\frac{13,20,000}{3,30,000 \text{ hours}} \times (75,000 \text{ hours} + 15,000 \text{ hours})$ | ₹3,60,000        |
| Settlement cost due to leaving                                                                                        | ₹27,420          |
| Recruitment cost                                                                                                      | ₹18,725          |
| Selection cost                                                                                                        | ₹12,750          |
| Training cost                                                                                                         | ₹16,105          |
| <b>Total profit foregone</b>                                                                                          | <b>₹4,35,000</b> |

## Working:

|                                                                    |          |
|--------------------------------------------------------------------|----------|
| Calculation of productive hours:                                   |          |
| Total actual hours worked (including training new recruits)        | 3,45,000 |
| Less: Unproductive hours $30,000 \text{ hours} \times \frac{1}{2}$ | (15,000) |
| Total productive hours                                             | 3,30,000 |

## PYQ 2

**Calculate the earnings of a worker under Halsey Plan and Rowan Plan from the following particulars:**

- (1) Hourly rate of wages guaranteed 50 paise per hour.
- (2) Standard time for producing one dozen articles 3 hours.
- (3) Actual time taken by the worker to produce 20 dozen articles 48 hours.

**[(5 Marks) Nov 1998]**

## Answer

**Computation of earnings of a worker under Halsey Plan:**

$$\begin{aligned} \text{Earnings} &= (\text{AH} \times \text{R}) + 50\% (\text{SH} - \text{AH}) \times \text{R} = (48 \times 0.50) + 50\% (60 - 48) \times 0.50 \\ &= \text{₹27.00} \end{aligned}$$

**Computation of earnings of a worker under Rowan Plan:**

$$\begin{aligned} \text{Earning} &= (\text{AH} \times \text{R}) + \frac{\text{AH}}{\text{SH}} \times (\text{SH} - \text{AH}) \times \text{R} = (48 \times 0.50) + \frac{48}{60} \times (60 - 48) \times 0.50 \\ &= \text{₹28.80} \end{aligned}$$

$$\begin{aligned} *SH &= \text{Time allowed by the management for 20 dozen articles} \\ &= 3 \text{ hours} \times 20 \text{ dozen} = \mathbf{60 \text{ hours}} \end{aligned}$$

**PYQ 3**

A skilled worker in XYZ Ltd. is paid a guaranteed wage rate of ₹30 per hour. The standard time per unit for a particular product is 4 hours. Mr. P, a machine man, has been paid wages under the Rowan Incentive Plan and he had earned an effective hourly rate of ₹37.50 on the manufacture of that particular product.

**What could have been his total earnings and effective hourly rate, had he been put on Halsey Incentive Scheme (50%)?**

**[(5 Marks) Nov 1999]**

**Answer**

**The following equation can be made:**

$$\begin{aligned} \text{Effective Earnings per hour} &= [(AH \times R) + AH/SH (SH - AH) \times R] \div AH \\ 37.50 &= [30 AH + AH/4 (4 - AH) \times 30] \div AH \\ 37.50 AH &= 30 AH + AH/4 (4 - AH) \times 30 \\ 7.50 AH &= AH/4 (4 - AH) \times 30 \\ 7.50 AH &= AH (4 - AH) \times 7.50 \\ 1 &= 4 - AH \\ AH &= 3 \text{ hours} \end{aligned}$$

**Total earnings and effective hourly rate of skilled worker under Halsey Incentive Scheme:**

$$\begin{aligned} \text{Total earnings} &= (AH \times R) + 50\% (SH - AH) \times R \\ &= (3 \times 30) + 50\% (4 - 3) \times 30 = \mathbf{₹105} \\ \text{Effective hourly rate} &= \text{Total earning} \div \text{hours worked} \\ &= ₹105 \div 3 \text{ hours} = \mathbf{₹35} \end{aligned}$$

**PYQ 4**

**The present output details of a manufacturing department are as follows:**

|                          |                                 |
|--------------------------|---------------------------------|
| Average output per week  | 48,000 units from 160 employees |
| Saleable value of output | ₹6,00,000                       |
| Contribution             | ₹2,40,000                       |

The Board of Directors plans to introduce more mechanization into department at a capital cost of ₹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 ₹1 per units 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 and evaluate for the Board's information, the desirability of introducing the change.**

**[(10 Marks) Nov 2000]**

**Answer**

**Calculation of original selling price per unit and materials cost:**

|                                                 | <b>Total Amount</b> | <b>Per Unit</b> |
|-------------------------------------------------|---------------------|-----------------|
| Sale value of 48,000 units                      | 6,00,000            | 12.5            |
| Less: Contribution                              | 2,40,000            | 5.00            |
| Total variable cost                             | 3,60,000            | 7.50            |
| Less: labour cost @ ₹1 per unit on 48,000 units | 48,000              | 1.00            |
| <b>Variable cost other than Labour Cost</b>     | <b>3,12,000</b>     | <b>6.50</b>     |

**Calculation of proposed output:**

|                              |   |                                                      |             |
|------------------------------|---|------------------------------------------------------|-------------|
| Output of 160 employees      | = | 48,000                                               |             |
| ∴ Output per employee        | = | $\frac{48,000 \text{ units}}{160 \text{ employees}}$ | = 300 units |
| Proposed output per employee | = | 300 units + 60%                                      | = 480 units |
| Proposed number of employees | = | 120 units                                            |             |
| ∴ Proposed output            | = | 480 units × 120 employees                            |             |
|                              | = | <b>57,600 units</b>                                  |             |

**Calculation of proposed piece work rate:**

|                                          |   |                                         |                         |
|------------------------------------------|---|-----------------------------------------|-------------------------|
| Proposed increase in piece work rate     | = | 1% per 2% increase in individual output |                         |
| % increase in individual output          | = | 60%                                     |                         |
| ∴ Proposed % increase in piece work rate | = | $\frac{60\%}{2}$                        | = 30%                   |
| ∴ Proposed piece work rate               | = | ₹1 per unit + 30%                       | = <b>₹1.30 per unit</b> |

**Calculation of proposed selling price per unit:**

|                                 |   |             |                |
|---------------------------------|---|-------------|----------------|
| Existing selling price per unit | = | ₹12.50      |                |
| Proposed selling price per unit | = | ₹12.50 – 4% | = ₹12 per unit |

**Statement of Extra Weekly Contribution from Proposed Charge**

| Particulars                                            | Amount   | Amount       |
|--------------------------------------------------------|----------|--------------|
| Proposed sales value (57,600 units × ₹12)              |          | 6,91,200     |
| Less: Total variable cost:                             |          |              |
| Other than Labour cost @ ₹6.5 per unit on 57,600 units | 3,74,400 |              |
| Labour cost @ ₹1.30 per unit on 57,600 units           | 74,880   | (4,49,280)   |
| Proposed contribution                                  |          | 2,41,920     |
| Less: Existing contribution                            |          | (2,40,000)   |
| <b>Extra contribution</b>                              |          | <b>1,920</b> |

**PYQ 5**

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

|                                 |   |               |
|---------------------------------|---|---------------|
| No. of workers as on 01.01.2000 | = | 7,600 workers |
| No. of workers as on 31.12.2000 | = | 8,400 workers |

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

[(5 Marks) May 2001]

**Answer**

**Separation method** =  $\frac{\text{No. of separation}}{\text{Average no. of workers}} \times 100$  =  $\frac{80 + 320}{8,000} \times 100$

= **5%**

**Replacement method** =  $\frac{\text{No. of workers replaced}}{\text{Average no. of workers}} \times 100$  =  $\frac{300}{8,000} \times 100$

= **3.75%**

**Flux method (Alt 1)** =  $\frac{\text{No. of separation} + \text{No. of replaced}}{\text{Average no. of workers}} \times 100$  =  $\frac{400 + 300}{8,000} \times 100$

= **8.75%**

**New Accession method** =  $\frac{\text{No. of new accessions}}{\text{Average no. of workers}} \times 100$  =  $\frac{1,500 - 300}{8,000} \times 100$

= **15%**



**EMPLOYEE COST 2.25**

$$\begin{aligned} \text{Accession method} &= \frac{\text{No. of accessions}}{\text{Average no. of workers}} \times 100 = \frac{1,500}{8,000} \times 100 \\ &= \mathbf{18.75\%} \end{aligned}$$

$$\begin{aligned} \text{Flux method (Alt 2)} &= \frac{\text{No. of accessions} + \text{No. of separation}}{\text{Average no. of workers}} \times 100 = \frac{1,500 + 400}{8,000} \times 100 \\ &= \mathbf{23.75\%} \end{aligned}$$

$$\begin{aligned} \text{*Average no of workers} &= \frac{7,600 + 8,400}{2} = \mathbf{8,000 \text{ workers}} \end{aligned}$$

**PYQ 6**

The management of Company are worried about their increasing labour turnover in the factory and before analyzing the causes and taking remedial steps, they want to have an idea of the profit foregone as a result of labour turnover in the last year.

Last year sales amounted to ₹83,03,300 and P/V ratio was 20 per cent. The total number of actual hours worked by the direct labour force was 4,45,000. As a result of the delays by the personnel department in filling vacancies due to labour turnover 1,00,000 potentially productive hours (excluding unproductive training hours) were lost. The actual direct labour hours included 30,000 hours attributable to training on 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 | ₹43,820 | Recruitment Costs | ₹26,740 |
| Selecting costs                | ₹12,750 | Training costs    | ₹30,490 |

**Assuming that the potential production lost as a consequence of labour turnover could have been sold at prevailing prices, find the profit foregone last year on account of labour turnover.**

**[(5 Marks) Nov 2001]**

**Answer****Statement Showing Profit Foregone on Account of Labour Turnover**

| <b>Particulars</b>                                                      | <b>Amount</b>   |
|-------------------------------------------------------------------------|-----------------|
| Contribution Foregone (1,00,000 hours + 15,000 hours) × ₹3.862 per hour | 4,44,130        |
| Settlement Cost due to leaving                                          | 43,820          |
| Recruitment Costs                                                       | 26,740          |
| Selection Costs                                                         | 12,750          |
| Training Costs                                                          | 30,490          |
| <b>Profit Foregone</b>                                                  | <b>5,57,930</b> |

**Working Notes:****1. Calculation of productive hours:**

|                                                       |                 |
|-------------------------------------------------------|-----------------|
| Actual hours worked                                   | 4,45,000        |
| Less: Unproductive training hours (½ of 30,000 hours) | (15,000)        |
| Actual productive hours                               | <b>4,30,000</b> |

**2. Contribution earned per productive hours:**

|                                                         |               |
|---------------------------------------------------------|---------------|
| Sales value                                             | 83,03,300     |
| Contribution (20% of 83,03,300)                         | 16,60,660     |
| Contribution per productive hour (16,60,660 ÷ 4,30,000) | <b>₹3.862</b> |

**PYQ 7**

The finishing shop of a company employs 60 direct workers. Each worker is paid ₹400 as wages per week of 40 hours. When necessary, overtime is worked upto a maximum of 15 hours per week per worker at time rate plus one-half as premium. The current output on an average is 6 units per man hour which may be regarded as standard output.



**EMPLOYEE COST 2.26**

If bonus scheme is introduced, it is expected that the output will increase to 8 units per man hour. The workers will, if necessary, continue to work overtime upto the specified limit although no overtime premium will be paid.

The company is considering introduction of either Halsey Scheme or Rowan Scheme of wage incentive system. The budgeted weekly output is 19,200 units. The selling price is ₹11 per unit and the direct material cost is ₹8 per unit. The variable overheads amount to ₹0.50 per direct labour hour and the fixed overhead is ₹9,000 per week.

**Prepare a statement to show the effect on the Company's weekly profit of the proposal to introduce (a) Halsey Scheme, and (b) Rowan Scheme.**

**[(10 Marks) May 2002]**

**Answer****Statement Showing Effect on Profit**

| <b>Particulars</b>                               | <b>Present</b> | <b>Halsey</b> | <b>Rowan</b>  |
|--------------------------------------------------|----------------|---------------|---------------|
| Sales Value (₹11 × 19,200)                       | 2,11,200       | 2,11,200      | 2,11,200      |
| Less: Direct Materials Consumed (₹8 × 19,200)    | (1,53,600)     | (1,53,600)    | (1,53,600)    |
| Direct Labour Cost (refer above workings)        | (36,000)       | (28,000)      | (30,000)      |
| Variable OH @ ₹0.50 per direct labour hour       | (1,600)        | (1,200)       | (1,200)       |
| Contribution                                     | 20,000         | 28,400        | 26,400        |
| Less: Fixed Overheads                            | (9,000)        | (9,000)       | (9,000)       |
| Weekly Profit                                    | 11,000         | 19,400        | 17,400        |
| <b>Effect on Profit (Under scheme – Present)</b> | <b>-</b>       | <b>+8,400</b> | <b>+6,400</b> |

**Working Notes:****Calculation of total wages under the present scheme:**

|                                        |   |                                                         |   |              |
|----------------------------------------|---|---------------------------------------------------------|---|--------------|
| Wage rate per hour per worker          | = | $\frac{400}{40 \text{ hours}}$                          | = | ₹10 per hour |
| Overtime rate per hour                 | = | Normal rate per hour + 50% premium                      |   |              |
|                                        | = | ₹10 + 50% of ₹10                                        | = | ₹15 per hour |
| Average current output per hour        | = | 6 units                                                 |   |              |
| Hours to be worked                     | = | $\frac{19,200 \text{ units}}{6 \text{ units per hour}}$ | = | 3,200 hours  |
| Total normal hours available in a week | = | No. of workers × Hours per week                         |   |              |
|                                        | = | 60 workers × 40 hours                                   | = | 2,400 hours  |
| Overtime hour required to be worked    | = | Hours worked – Normal hours available                   |   |              |
|                                        | = | 3,200 – 2,400                                           | = | 800 hours    |

|                                           |   |                                         |
|-------------------------------------------|---|-----------------------------------------|
| <b>Total wages (under present scheme)</b> | = | Normal wages + Overtime wages           |
|                                           | = | (2,400 hours × ₹10) + (800 hours × ₹15) |
|                                           | = | <b>36,000</b>                           |

**Total wages under the proposed scheme:**

|                                 |   |                                                         |   |             |
|---------------------------------|---|---------------------------------------------------------|---|-------------|
| Standard hours for 19,200 units | = | $\frac{19,200 \text{ units}}{6 \text{ units per hour}}$ | = | 3,200 hours |
| Actual hours for 19,200 units   | = | $\frac{19,200 \text{ units}}{8 \text{ units per hour}}$ | = | 2,400 hours |

**Under Halsey:**

|             |   |                                         |   |                |
|-------------|---|-----------------------------------------|---|----------------|
| Total wages | = | (AH × R) + 50% (SH – AH) × R            |   |                |
|             | = | (2,400 × 10) + 50% (3,200 – 2,400) × 10 | = | <b>₹28,000</b> |

**Under Rowan:**

$$\begin{aligned}
 \text{Total wages} &= (\text{AH} \times \text{R}) + \frac{\text{AH}}{\text{SH}} \times (\text{SH} - \text{AH}) \times \text{R} \\
 &= (2,400 \times 10) + \frac{2,400}{3,200} \times (3,200 - 2,400) \times 10 = \text{₹}30,000
 \end{aligned}$$

**PYQ 8**

A Company is undecided as to what kind of wage scheme should be introduced. The following particulars have been compiled in respect of three systems, which are under consideration of the management:

| Workers                       | A  | B  | C     |
|-------------------------------|----|----|-------|
| Actual hours worked in a week | 38 | 40 | 34    |
| Hourly rate of wages          | ₹6 | ₹5 | ₹7.20 |

**Production in units:**

|           |    |    |     |
|-----------|----|----|-----|
| Product P | 21 | -  | 60  |
| Product Q | 36 | -  | 135 |
| Product R | 46 | 25 | -   |

**Standard time allowed per unit of each product is:**

|         |    |    |    |
|---------|----|----|----|
|         | P  | Q  | R  |
| Minutes | 12 | 18 | 30 |

**For the purpose of piece rate, each minute is valued at ₹0.10. You are required to calculate the wages of each worker under:**

- Guaranteed hourly rates basis.
- Piece work earnings basis but guaranteed at 75% of basic pay (guaranteed hourly rate) if his earnings are less than 50% of basic pay.
- Premium bonus basis where the worker receives bonus based on Rowan scheme.

**[(9 Marks) Nov 2002]**

**Answer****(i) Computation of wages of each worker under guaranteed hourly rate basis**

| Workers | Actual hours worked in a week | Hourly rate | Wages (AH × R) |
|---------|-------------------------------|-------------|----------------|
| A       | 38                            | ₹6.00       | ₹228.00        |
| B       | 40                            | ₹5.00       | ₹200.00        |
| C       | 34                            | ₹7.20       | ₹244.80        |

**(ii) Computation of wages of each worker under piece work earnings basis**

| Product            | A                 | B                            | C                 |
|--------------------|-------------------|------------------------------|-------------------|
| P                  | 21 × 1.20         | -                            | 60 × 1.20         |
| Q                  | 36 × 1.80         | -                            | 135 × 1.80        |
| R                  | 46 × 3.00         | 25 × 3.00                    | -                 |
| Total Wages        | ₹228.00           | ₹75.00                       | ₹315.00           |
| 50% of Basic Pay   | ₹114.00           | ₹100.00                      | ₹122.40           |
| Applicable Wages   | As Per Piece Rate | 75% of Basic                 | As Per Piece Rate |
| <b>Final Wages</b> | <b>₹228.00</b>    | <b>₹150.00 (75% of ₹200)</b> | <b>₹315.00</b>    |

**Working Notes:.****1. Calculation of piece rate (Standard time per unit × ₹0.10):**

|   |   |                            |
|---|---|----------------------------|
| P | = | ₹1.20 (12 minutes × ₹0.10) |
| Q | = | ₹1.80 (18 minutes × ₹0.10) |
| R | = | ₹3.00 (30 minutes × ₹0.10) |

**2. Calculation of time allowed to each worker:**

**EMPLOYEE COST 2.28**

|          |   |                                                    |   |                                 |
|----------|---|----------------------------------------------------|---|---------------------------------|
| Worker A | = | $(21 \times 12) + (36 \times 18) + (46 \times 30)$ | = | 2,280 minutes (i.e. 38 hours)   |
| Worker B | = | 25 units $\times$ 30 minutes                       | = | 750 minutes (i.e. 12.5 hours)   |
| Worker C | = | $(60 \times 12) + (135 \times 18)$                 | = | 3,150 minutes (i.e. 52.5 hours) |

**(iii) Computation of wages of each worker under Premium bonus basis**

| Workers | SH          | AH       | Wage Rate | Total Wages<br>$(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$           |
|---------|-------------|----------|-----------|------------------------------------------------------------------------------------|
| A       | 38 hours    | 38 hours | ₹6.00     | $(38 \times 6) + \frac{38}{38} \times (38 - 38) \times 6 = \text{₹}228$            |
| B       | 12.50 hours | 40 hours | ₹5.00     | $(40 \times 5) + \text{Nil} = \text{₹}200.00$                                      |
| C       | 52.50 hours | 34 hours | ₹7.20     | $(34 \times 7.2) + \frac{34}{52.5} \times (52.5 - 34) \times 7.2 = \text{₹}331.06$ |

**\*Bonus can never be negative.****PYQ 9**

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)                                                                                 | ₹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 days     |
| Number of working hours per day of each worker                                                                    | 8 hours     |
| Actual production during the month                                                                                | 6,120 units |

**Required:**

- (1) Calculate the effective rate of earnings under the Halsey scheme and the Rowan scheme.
- (2) Calculate the savings to the ZED Limited in terms of direct labour cost per piece.
- (3) Advise ZED Limited about the selection of the scheme to fulfill his assurance.

**[(4+2+2 = 8 Marks) May 2004]****Answer****(1) Computation of effective rate of earnings under the Halsey and Rowan schemes:**

|                                    |   |                                                                                |
|------------------------------------|---|--------------------------------------------------------------------------------|
| Total earnings under Halsey scheme | = | $(AH \times R) + 50\% (SH - AH) \times R$                                      |
|                                    | = | $(9,600 \times ₹30) + 50\% (12,087 - 9,600) \times ₹30$                        |
|                                    | = | <b>₹3,25,305</b>                                                               |
| Total earnings under Rowan scheme  | = | $(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$                      |
|                                    | = | $(9,600 \times ₹30) + \frac{9,600}{12,087} \times (12,087 - 9,600) \times ₹30$ |
|                                    | = | <b>₹3,47,258.38</b>                                                            |
| Effective rate under Halsey Plan   | = | <b>₹33.89 per hour</b> ( $₹3,25,305 \div 9,600$ hours)                         |
| Effective rate under Rowan Plan    | = | <b>₹36.17 per hour</b> ( $₹3,47,258.38 \div 9,600$ hours)                      |
| Actual hours (AH)                  | = | 50 workers $\times$ 24 days $\times$ 8 hours per day                           |
|                                    | = | 9,600 hours                                                                    |
| Standard hours (SH)                | = | 6,120 units $\times$ 1.975 hours per unit                                      |
|                                    | = | 12,087 hours                                                                   |

**(2) Savings to the ZED Ltd. in terms of direct labour cost per piece:**

|                                               |   |                                           |
|-----------------------------------------------|---|-------------------------------------------|
| Direct labour cost per unit under time wages  | = | 1.975 hours × ₹30 per hour                |
|                                               | = | ₹59.25 per unit                           |
| Direct labour cost per unit under Halsey Plan | = | ₹53.15 per unit (₹3,25,305 ÷ 6,120 units) |
| Direct labour cost per unit under Rowan Plan  | = | ₹56.74 (3,47,258.38 ÷ 6,120 units)        |
| Savings of direct labour cost per unit under: |   |                                           |

**Halsey Plan** = **₹6.10** (₹59.25 – ₹53.15)

**Rowan Plan** = **₹2.51** (₹59.25 – ₹56.74)

**(3) Advise to ZED Ltd about the selection of the scheme to fulfill assurance:** Halsey scheme brings more savings to the management of ZED Ltd, over the present earnings of ₹2,88,000 but the other scheme viz. Rowan fulfils the promise of 20% increase over the present earnings of ₹2,88,000 by paying 20.58% in the form of bonus. Hence, Rowan Plan should be adopted.

**PYQ 10**

**The existing incentive system of Alpha Limited is as under:**

|                             |   |                                                           |
|-----------------------------|---|-----------------------------------------------------------|
| Normal working week         | : | 5 days of 8 hours each plus 3 late shifts of 3 hours each |
| Rate of Payment:            |   |                                                           |
| Day work                    | : | ₹160 per hour                                             |
| Late shift                  | : | ₹225 per hour                                             |
| Average output per operator | : | 120 articles (49-hours week including 3 late shifts)      |

**In order to increase output and eliminate overtime, it was decided to switch on to a system of payment by results. The following information is obtained:**

|                      |   |                             |
|----------------------|---|-----------------------------|
| Time-rate (as usual) | : | ₹160 per hour               |
| Basic time allowed   | : | 5 hours for 15 articles     |
| Piece-work rate      | : | Add 20% to basic piece-rate |
| Premium Bonus        | : | Add 50% to time             |

**Prepare a statement showing hours worked, weekly earnings, number of articles produced and labour cost per article for one operator under the following systems:**

- (a)** Existing time rate,
- (b)** Straight piece work,
- (c)** Rowan system,
- (d)** Halsey premium system.

Assume that 135 articles are produced in a 40 hours week under straight piece work, Rowan premium system, and Halsey premium system above and worker earns half the time saved under Halsey premium system.

**[(8 Marks) Nov 2005]**

**Answer**

**Statement showing hours worked, weekly earnings, number of articles produced and labour cost per article under various wage system**

| <b>Scheme</b>       | <b>Hours Worked</b> | <b>Weekly Earning</b> | <b>Articles Produced</b> | <b>Labour Cost per Article</b> |
|---------------------|---------------------|-----------------------|--------------------------|--------------------------------|
| Existing time rate  | 49                  | ₹8,425                | 120                      | 70.21                          |
| Straight piece work | 40                  | ₹8,640                | 135                      | 64.00                          |
| Rowan system        | 40                  | ₹9,007.41             | 135                      | 66.72                          |
| Halsey system       | 40                  | ₹8,600                | 135                      | 63.70                          |

**Working Notes:**

**Calculation of weekly earning under:**

**EMPLOYEE COST 2.30**

|                              |   |                                                                        |                    |
|------------------------------|---|------------------------------------------------------------------------|--------------------|
| <b>Existing time rate</b>    | = | <b>₹8,425</b> (40 hours × ₹160) + (9 hours × ₹225)                     |                    |
| <b>Piece rate system</b>     | = | <b>₹8,640</b> (135 articles × ₹64 per article)                         |                    |
| *Basic rate per article      | = | ₹53.33 (160 per hour ÷ 3 articles per hour)                            |                    |
| Applicable piece rate        | = | ₹64 (₹53.33 + 20%)                                                     |                    |
| <b>Rowan premium system</b>  | = | $(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$              |                    |
|                              | = | $(40 \times ₹160) + \frac{40}{67.50} \times (*67.50 - 40) \times ₹160$ | <b>= ₹9,007.41</b> |
| *Standard hours (SH)         | = | Basic time + 50%                                                       |                    |
| Basic time                   | = | 15 articles in 5 hours                                                 |                    |
|                              | = | 3 articles in 1 hour or 60 minutes                                     |                    |
| Standard time                | = | 1 article in 20 minutes + 50%                                          |                    |
|                              | = | 30 minutes for 1 article                                               |                    |
|                              | = | 67.50 hours for 135 articles                                           |                    |
| <b>Halsey premium system</b> | = | $(AH \times R) + 50\% (SH - AH) \times R$                              |                    |
|                              | = | $(40 \times ₹160) + 50\% (67.50 - 40) \times ₹160$                     | <b>= ₹8,600</b>    |

**PYQ 11**

Two workmen, A and B produce the same product using the same material. A is paid bonus according to Halsey plan, while B is paid bonus according to Rowan plan. The time allowed to manufacture the product is 100 hours. A has taken 60 hours and B has taken 80 hours to complete the product. The normal hourly rate of wages of workman A is ₹24 per hour. The total earnings of both the workers are same.

**Calculate normal hourly rate of wages of workman B.**

**[(5 Marks) May 2009]**

**Answer**

|                      | <b>A</b>  | <b>B</b>  |
|----------------------|-----------|-----------|
| Time Allowed (Hours) | 100       | 100       |
| Time Taken(Hours)    | 60        | 80        |
| Time Saved (Hours)   | <b>40</b> | <b>20</b> |

**Let the rate of wages of the worker B is ₹ R Per hour**

|                                     |                  |                               |
|-------------------------------------|------------------|-------------------------------|
| Normal Wages                        | 1440             | 80                            |
| (Time taken × Hourly rate of wages) | (60 × 24)        | (80 × R)                      |
| Bonus                               | 480              | 16X                           |
|                                     | (50% × 40 × ₹24) | $(\frac{20}{100} \times 80R)$ |
| <b>Total</b>                        | <b>1,920</b>     | <b>96R</b>                    |

According to the problem,

|                    |   |                     |       |
|--------------------|---|---------------------|-------|
| Total earning of A | = | Total earnings of B |       |
| 1920               | = | 96R                 |       |
| R                  | = | $\frac{1,920}{96}$  | = ₹20 |

**Therefore, hourly rate of wages of the worker is ₹20 per hour**

\*Bonus = Time saved × 50% × Wage Rate

\*\*Bonus =  $\frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time saved} \times \text{Wage Rate}$

**PYQ 12**

Standard time for a job is 90 hours. The hourly rate of guaranteed wages is ₹50. Because of the saving in time a worker A gets an effective hourly rate of wages of ₹60 under Rowan premium bonus system. For the same saving in time.

*Calculate the hourly rate of wages a worker B will get under Halsey premium bonus system assuring 40% to worker.*

*[(3 Marks) Nov 2009]*

**Answer**

*The following equation can be made:*

$$\begin{array}{rcl}
 \text{Effective Earnings per hour} & = & [(AH \times R) + AH/SH (SH - AH) \times R] \div AH \\
 60 & = & [50 AH + AH/90 (90 - AH) \times 50] \div AH \\
 60 AH & = & 50 AH + AH/90 (90 - AH) \times 50 \\
 10 AH & = & AH/90 (90 - AH) \times 50 \\
 18 AH & = & AH (90 - AH) \\
 18 & = & 90 - AH \\
 AH & = & 72 \text{ hours}
 \end{array}$$

*Total earnings and effective hourly rate of skilled worker under Halsey Incentive Scheme:*

$$\begin{array}{rcl}
 \text{Total earnings} & = & (AH \times R) + 40\% (SH - AH) \times R \\
 & = & (72 \times 50) + 40\% (90 - 72) \times 50 = \text{₹3,960} \\
 \\ 
 \text{Effective hourly rate} & = & \text{Total earning} \div \text{hours worked} \\
 & = & ₹3,960 \div 72 \text{ hours} = \text{₹55}
 \end{array}$$

**PYQ 13**

You are given the following information of a worker:

|                        |   |                           |
|------------------------|---|---------------------------|
| Name of worker         | : | X                         |
| Ticket No.             | : | 002                       |
| Work started           | : | 01.04.11 at 8 am          |
| Work finished          | : | 05.04.11 at 12 noon       |
| Work allotted          | : | Production of 2,160 units |
| Work done and approved | : | 2,000 units               |
| Time and units allowed | : | 40 units per hour         |
| Wage rate              | : | ₹25 per hour              |
| Bonus                  | : | 40% of time saved         |
| Worker X worked        | : | 9 hours a day             |

*Calculate the remuneration of the worker on the following basis:*

- (a) Halsey plan and  
(b) Rowan plan

*[(5 Marks) May 2011]*

**Answer**

$$\begin{array}{rcl}
 \text{Time allowed} & = & \frac{2,000 \text{ units}}{40 \text{ units per hour}} = 50 \text{ hours} \\
 \\ 
 \text{Time worked:} & & \\
 01.04.11 \text{ to } 04.04.11 & = & 9 \text{ hours per day} \\
 05.04.11 & = & 4 \text{ hours} \\
 \text{Total hours} & = & 9 \text{ hours} \times 4 \text{ days} + 4 \text{ hours} \times 1 \text{ day} = \text{40 hours}
 \end{array}$$

*Remuneration of worker X under:*

$$\begin{array}{rcl}
 \text{(a) Halsey plan} & = & (AH \times R) + 40\% (SH - AH) \times R \\
 & = & (40 \times 25) + 40\% (50 - 40) \times 25 = \text{₹1,100}
 \end{array}$$

$$\begin{aligned}
 (b) \text{ Rowan plan} &= (AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R \\
 &= (40 \times 25) + \frac{40}{50} \times (50 - 40) \times 25 = \text{₹1200}
 \end{aligned}$$

**PYQ 14**

Accountant of your company had computed labour turnover rates for the quarter ended 30<sup>th</sup> September, 2012 as 14%, 8% and 6% under Flux method, Replacement method and Separation method respectively. If the number of workers replaced during 2<sup>nd</sup> quarter of the financial year 2012-13 is 36.

**Find the following:**

- (a) The number of workers recruited and joined; and  
 (b) The number of workers left and discharged.

**[(5 Marks) Nov 2012]**

**Answer**

- (a) No. of workers recruited & joined = **36 workers (Accessions)**  
 (b) No. of workers left & discharged = **27 workers (Separations)**

**Working Notes:****(a) Calculation of average workers:-**

$$\begin{aligned}
 \text{Replacements} &= 8\% \text{ of average workers} = 36 \text{ workers} \\
 \therefore \text{Average workers} &= 36 \div 8\% = \text{450 workers}
 \end{aligned}$$

$$\begin{aligned}
 (b) \text{ Number of worker separated} &= 6\% \text{ of average workers} \\
 &= 6\% \text{ of 450 workers} = \text{27 workers}
 \end{aligned}$$

$$\begin{aligned}
 (c) \text{ Number of Accessions} &= \text{Total Movement} - \text{Workers separated} \\
 &= 14\% \text{ of 450} - 27 = \text{36 workers}
 \end{aligned}$$

**PYQ 15**

A skilled worker is paid a guaranteed wage rate of ₹120 per hour. The standard time allowed for a job is 6 hours. He took 5 hours to complete the job. He is paid wages under Rowan Incentive Plan.

- (a) Calculate his effective hourly rate of earning under Rowan Incentive Plan.  
 (b) If the worker is placed under Halsey Incentive Scheme (50%) and he wants to maintain the same effective hourly rate of earnings, calculate the time in which he should complete the job.

**[(8 Marks) May 2013]**

**Answer**

$$(a) \text{ Effective Hourly Rate} = \frac{\text{Total Earning}}{\text{Actual Hours}} = \frac{700}{5} = \text{₹140 Per Hour}$$

**Working Notes:****Calculation of total earning under Rowan Incentive Plan:**

$$\begin{aligned}
 \text{Earning under Rowan Plan} &= (AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R \\
 &= (5 \times 120) + \frac{5}{6} \times (6 - 5) \times 120 \\
 &= 600 + 100 = \text{₹700}
 \end{aligned}$$

**(b) Actual hours to maintain same effective rate under Halsey Incentive scheme (50%):**

$$\begin{aligned}
 \text{Effective rate under Halsey} &= \frac{[(AH \times R) + 50\% \times (SH - AH) \times R]}{AH} \\
 140 &= \frac{[(AH \times 120) + 50\% \times (6 - AH) \times 120]}{AH}
 \end{aligned}$$



$$\begin{aligned}
 140 \text{ AH} &= 120 \text{ AH} + 360 - 60 \text{ AH} \\
 80 \text{ AH} &= 360 \\
 \therefore \text{AH} &= 360 \div 80 = \mathbf{4.5 \text{ hours}}
 \end{aligned}$$

**PYQ 16**

The rate of change of labour force in a company during the year ending 31<sup>st</sup> march, 2013 was calculated as 13%, 8% and 5% respectively under 'Flux Method', 'Replacement Method', and 'Separation Method'. If the number of workers separated during the year is 40.

*You are required to calculate:*

- (a) Average number of workers on roll.
- (b) Number of workers replaced during the year.
- (c) Number of new accessions i.e. new recruitment.
- (d) Number of workers at the beginning of the year.

**[(8 Marks) Nov 2013]**

**Answer**

**(a) Average number of workers on roll:**

$$\begin{aligned}
 \text{Separations} &= 5\% \text{ of average workers} = 40 \text{ workers} \\
 \therefore \text{Average workers} &= 40 \div 5\% = \mathbf{800 \text{ workers}}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) Number of workers replaced} &= 8\% \text{ of average workers} \\
 &= 8\% \text{ of } 800 = \mathbf{64 \text{ workers}}
 \end{aligned}$$

**(c) Number of new accessions:**

$$\begin{aligned}
 \text{Flux Method} &= \frac{\text{No. of separations} + \text{No. of accessions}}{\text{Average number of workers}} \times 100 \\
 13\% &= \frac{40 + \text{No. of accessions}}{800} \times 100 \\
 \text{No. of accessions} &= 13\% \text{ of } 800 - 40 = \mathbf{64 \text{ workers}} \\
 \text{No. of accessions} &= \text{No. of replacement} + \text{No. of new accessions} \\
 \text{No. of new accessions} &= \text{No. of accessions} - \text{No. of replacement} \\
 &= 64 \text{ workers} - 64 \text{ workers} = \mathbf{Nil}
 \end{aligned}$$

**(d) Number of workers at the beginning:**

*Let opening workers be x*

Now,

$$\begin{aligned}
 \text{Closing workers} &= \text{Opening workers} + \text{Replacement} + \text{New accessions} - \text{Separations} \\
 &= x + 64 + \text{Nil} - 40 = x + 24 \\
 \text{Average no of workers} &= [\text{Opening workers} + \text{Closing workers}] \div 2 \\
 800 &= [x + x + 24] \div 2 \\
 \therefore x \text{ (opening workers)} &= \mathbf{788 \text{ workers}}
 \end{aligned}$$

**PYQ 17**

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

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

**[(5 Marks) Nov 2015]**

**Answer**

**Calculation of labour turnover rate:**



**EMPLOYEE COST 2.34**

|                             |   |                                                                                                                |   |                                                                  |
|-----------------------------|---|----------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------|
| Separation Method           | = | $\frac{\text{Number of separation s}}{\text{Average number of wor ker s}} \times 100$                          | = | $\frac{50 \text{ wor ker s}}{1000 \text{ wor ker s}} \times 100$ |
|                             | = | <b>5%</b>                                                                                                      |   |                                                                  |
| Flux Method (Alternative 1) | = | $\frac{\text{No of separation s} + \text{No of accessions}}{\text{Average number of wor ker s}} \times 100$    |   |                                                                  |
|                             | = | $\frac{50 + 70}{1000} \times 100$                                                                              | = | <b>12%</b>                                                       |
| Flux Method (Alternative 2) | = | $\frac{\text{No of separation s} + \text{No of replacemen ts}}{\text{Average number of wor ker s}} \times 100$ |   |                                                                  |
|                             | = | $\frac{50 + 30}{1000} \times 100$                                                                              | = | <b>8%</b>                                                        |

**Working Notes:**

|                       |   |                                         |   |                   |
|-----------------------|---|-----------------------------------------|---|-------------------|
| Average no of workers | = | (Opening workers + Closing workers) ÷ 2 |   |                   |
|                       | = | (990 + 1,010) ÷ 2                       | = | <b>1000</b>       |
| Number of Separations | = | Opening + Accession - Closing           |   |                   |
|                       | = | 990 + 70 - 1,010                        | = | <b>50 workers</b> |
| Number of Accessions  | = | Replaced + New Joined                   |   |                   |
|                       | = | 3% of 1,000 + 40                        | = | <b>70 workers</b> |

**PYQ 18**

RST Company Ltd. had computed labour turnover rates for the quarter ended 31<sup>st</sup> March, 2017 as 20%, 10% and 5% under Flux method, Replacement method and Separation method respectively. If the number of workers replaced during the quarter is 50, find out **(i)** Workers recruited and joined, **(ii)** Workers left and discharged and **(iii)** Average number of workers on roll.

**[(5 Marks) May 2017]****Answer****(i) Calculation of workers recruited and joined:**

|                      |   |                                   |   |                   |
|----------------------|---|-----------------------------------|---|-------------------|
| Number of accessions | = | Replaced + New Joined             |   |                   |
|                      | = | (10% + 5%) 15% of average workers |   |                   |
|                      | = | 15% of 500                        | = | <b>75 workers</b> |
|                      |   | <b>Or</b>                         |   |                   |
| Number of accessions | = | Flux - Separated                  |   |                   |
|                      | = | (20% - 5%) 15% of average workers |   |                   |
|                      | = | 15% of 500                        | = | <b>75 workers</b> |

**(ii) Calculation of workers left and discharged:**

|                             |   |                       |   |                   |
|-----------------------------|---|-----------------------|---|-------------------|
| Number of workers separated | = | 5% of average workers |   |                   |
|                             | = | 5% of 500             | = | <b>25 workers</b> |

**(iii) Calculation of average number of workers on roll:**

|                            |   |                        |   |                    |
|----------------------------|---|------------------------|---|--------------------|
| Number of workers replaced | = | 10% of average workers | = | 50 workers         |
| Therefore, Average workers | = | 50 ÷ 10%               | = | <b>500 workers</b> |

**PYQ 19**

A skilled worker is paid a guaranteed wage rate of ₹150 per hour. The standard time allowed for a job is 50 hours. He gets an effective rate of wages of ₹180 under Rowan Incentive Plan due to saving in time. For the same saving in time, calculate hourly rate of wages he will get, if he placed under Halsey Premium Scheme (50%).

**[(5 Marks) Nov 2017]**

**Answer**

The following equation can be made:

$$\begin{aligned}
 \text{Effective Earnings per hour} &= [(AH \times R) + AH/SH (SH - AH) \times R] \div AH \\
 180 &= [150 AH + AH/50 (50 - AH) \times 150] \div AH \\
 30 AH &= AH/50 (50 - AH) \times 150 \\
 30 AH &= AH (50 - AH) \times 3 \\
 10 AH &= AH (50 - AH) \\
 \therefore AH &= 40 \text{ Hours}
 \end{aligned}$$

**Total earnings and effective hourly rate of skilled worker under Halsey Incentive Scheme:**

$$\begin{aligned}
 \text{Total earnings} &= (AH \times R) + 50\% (SH - AH) \times R \\
 &= (40 \times 150) + 50\% (50 - 40) \times 150 = \text{₹}6,750 \\
 \text{Effective hourly rate} &= \text{Total earning} \div \text{hours worked} \\
 &= \text{₹}6,750 \div 40 \text{ hours} = \text{₹}168.75
 \end{aligned}$$

**PYQ 20**

A worker takes 15 hours to complete a piece of work for which time allowed is 20 hours. His wage rate is ₹5 per hour. Following additional information are also available:

|                       |               |
|-----------------------|---------------|
| Material cost of work | ₹50           |
| Factory overheads     | 100% of wages |

**Calculate the factory cost of work under the following methods of wage payment:**

- (i) Rowan Plan
- (ii) Halsey Plan

**[(5 Marks) May 2018]**

**Answer**

$$\text{Factory cost} = \text{Materials} + \text{Labour} + \text{Factory Overheads}$$

$$\begin{aligned}
 \text{(i) Under Rowan Plan} &= 50 + 93.75 + 93.75 = \text{₹}237.50 \\
 \text{(ii) Under Halsey Plan} &= 50 + 87.50 + 87.50 = \text{₹}225
 \end{aligned}$$

**Working Notes:**

**Earning of workers under Halsey's and Rowan's premium scheme:**

$$\begin{aligned}
 \text{Wages under Halsey} &= (AH \times R) + 50\% (SH - AH) \times R \\
 &= (15 \text{ hours} \times 5) + 50\% (20 - 15) \times 5 = \text{₹}87.50 \\
 \text{Wages under Rowan} &= (AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R \\
 &= (15 \text{ hours} \times 5) + 15/20 (20 - 15) \times 5 = \text{₹}93.75
 \end{aligned}$$

**PYQ 21**

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

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

You are required to calculate:

- (i) Annual cost of each employee
- (ii) Employee cost per hour
- (iii) Cost of abnormal idle time per employee

[(5 Marks) Nov 2018]

**Answer**

**(i) Statement of Annual Cost of Each Employee**

| Particulars                                          | Amount          |
|------------------------------------------------------|-----------------|
| Salary (30,000 × 12)                                 | 3,60,000        |
| Bonus @ 25% of 3,60,000                              | 90,000          |
| Employer's contribution to PF, ESI @ 15% of 3,60,000 | 54,000          |
| Welfare cost per employee (6,61,500 ÷ 175)           | 3,780           |
| <b>Annual Cost of Each Employee</b>                  | <b>5,07,780</b> |

**(ii) Employee cost per hour** = Annual cost per employee ÷ Labour hours  
 = 5,07,780 ÷ [(310 days – 30 days) × 8 hours – 70 hours]  
 = 5,07,780 ÷ 2,170 hours = **₹234**

**(iii) Cost of abnormal idle time per employee:**  
 = Abnormal idle time per employee × cost per hour  
 = 50 × 234 = **₹11,700**

**PYQ 22**

Zico Ltd. has its factory at two locations viz Nasik and Satara. Rowan plan is used at Nasik factory and Halsey plan at Satara factory. Standard time and basic rate of wages are same for a job which is similar and is carried out on similar machinery. Normal working hours is 8 hour per day in a 5 days week.

Job in Nasik factory is completed in 32 hours while at Satara factory it has taken 30 hours. Conversion cost at Nasik and Satara are ₹5,408 and ₹4,950. Overheads account for ₹25 per hour.

**Required:**

- (1) To find out the normal wage; and
- (2) To compare the respective conversion costs.

[(10 Marks) Nov 2019]

**Answer**

**(1) Calculation of Normal Wage:**

**Nasik:**

**Normal Wage** = AH × R = 32 hours × ₹120 = **₹3,840**

**Satara:**

**Normal Wage** = AH × R = 30 hours × ₹120 = **₹3,600**

**(2) Statement Showing Conversion Cost**

| Particulars                                     | Nasik (₹)    | Satara (₹)   |
|-------------------------------------------------|--------------|--------------|
| Labour Cost                                     | 4,608        | 4,200        |
| Overheads (32 Hours × ₹25) and (30 Hours × ₹25) | 800          | 750          |
| <b>Conversion Cost</b>                          | <b>5,408</b> | <b>4,950</b> |

**Working Note:**

**(a) Calculation of wage rate (R):**

**Using data of Nasik:**

$$\begin{aligned}
 \text{Conversion cost} &= \text{Labour cost} + \text{Overheads} \\
 5,408 &= [\text{AH} \times \text{R} + \frac{\text{AH}}{\text{SH}} (\text{SH} - \text{AH}) \times \text{R}] + \text{Overheads} \\
 5,408 &= [32 \times \text{R} + \frac{32}{40} (40 - 32) \times \text{R}] + (32 \text{ hours} \times 25) \\
 5,408 - 800 &= 38.4 \text{ R} \\
 \text{Wage rate 'R'} &= \text{₹120}
 \end{aligned}$$

**(b) Calculation of Labour Cost:**

$$\begin{aligned}
 \text{Nasik} &= \text{AH} \times \text{R} + \frac{\text{AH}}{\text{SH}} (\text{SH} - \text{AH}) \times \text{R} \\
 &= 32 \times \text{₹120} + \frac{32}{40} (40 - 32) \times \text{₹120} = \text{₹4,608} \\
 \\ 
 \text{Satara} &= \text{AH} \times \text{R} + 50\% (\text{SH} - \text{AH}) \times \text{R} \\
 &= 30 \times \text{₹120} + 50\% (40 - 30) \times \text{₹120} = \text{₹4,200}
 \end{aligned}$$

$$\text{(c) Standard Hours} = 5 \text{ days} \times 8 \text{ hours per day} = 40 \text{ hours}$$

**PYQ 23**

Following are the particulars of two workers 'R' and 'S' for a month:

|                                                           | <b>R</b> | <b>S</b> |
|-----------------------------------------------------------|----------|----------|
| Basic wages                                               | ₹15,000  | ₹30,000  |
| Dearness Allowance                                        | 50%      | 50%      |
| Contribution to Provident Fund (on basic wages)           | 7%       | 7.5%     |
| Contribution to Employee State Insurance (on basic wages) | 2%       | 2%       |
| Overtime hours                                            | 20 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 contributions to state insurance and provident fund are at equal rates with employee's contribution. Both workers were employed on jobs A, B and C in the following proportions:

| <b>Jobs</b> | <b>A</b> | <b>B</b> | <b>C</b> |
|-------------|----------|----------|----------|
| Workers R   | 75%      | 10%      | 15%      |
| Workers S   | 40%      | 20%      | 40%      |

Overtime was done on job 'A'.

**You are required to:**

1. Calculate ordinary wage rate per hour of 'R' and 'S'.
2. Allocate the worker's cost to job 'A', 'B' and 'C'.

[(6 Marks) Nov 2020]

**Answer**

**1. Statement Showing Ordinary Wage Rate per Hour**

| <b>Particulars</b>                                      | <b>R</b>       | <b>S</b>       |
|---------------------------------------------------------|----------------|----------------|
| Basic Wages                                             | ₹15,000        | ₹30,000        |
| Dearness Allowance (50% of Basic)                       | ₹7,500         | ₹15,000        |
| <b>Gross Wages (excluding overtime)</b>                 | <b>₹22,500</b> | <b>₹45,000</b> |
| Add: Employer's Contribution to P.F. (7%/7.5% of basic) | ₹1,050         | ₹2,250         |
| Add: Employer's Contribution ESI (2% of basic)          | ₹300           | ₹600           |
| <b>Ordinary Wages Earned</b>                            | <b>₹23,850</b> | <b>₹47,850</b> |
| ÷ Effective Hours                                       | 200            | 200            |
| <b>Ordinary Wage Rate per Hour</b>                      | <b>₹119.25</b> | <b>₹239.25</b> |

**Working Note:**

$$\text{Overtime wages of worker R} = (\text{₹22,500} \div 200 \text{ hours}) \times 2 \times 20 \text{ hours} = \text{₹4,500}$$

## 2. Statement Showing Allocation of Worker's Cost

| Particulars                            | Job A             | Job B          | Job C             |
|----------------------------------------|-------------------|----------------|-------------------|
| Worker R:                              |                   |                |                   |
| Ordinary Wages ₹23,850 in 75 : 10 : 15 | ₹17,887.50        | ₹2,385         | ₹3,577.50         |
| Overtime for Job A                     | ₹4,500            | -              | -                 |
| Worker S:                              |                   |                |                   |
| Ordinary Wages ₹47,850 in 40 : 20 : 40 | ₹19,140           | ₹9,570         | ₹19,140           |
| <b>Allocation of Labour Cost</b>       | <b>₹41,527.50</b> | <b>₹11,955</b> | <b>₹22,717.50</b> |

**PYQ 24**

Z Ltd 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 and the company has accordingly given assurance to the workers. Because of this assurance, the increase in productivity has been observed as revealed by the figures for the month of April, 2020.

|                                                          |             |
|----------------------------------------------------------|-------------|
| Hourly rate of wages (guaranteed)                        | ₹50         |
| 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 days     |
| Number of working hours per day of each worker           | 8 hours     |
| Actual production during the month                       | 6,120 units |

**Required:**

- (1) Calculate the effective increase in earnings of workers in percentage terms under Halsey scheme and Rowan scheme.
- (2) Calculate the savings to the Z Ltd in terms of direct labour cost per unit under both the schemes.
- (3) Advise Z Ltd about the selection of the scheme that would fulfill its assurance of incentivizing workers and also to adjust with the increase in demand.

[(10 Marks) Jan 2021]

**Answer****(1) Computation of effective increase in earnings:**

|                                       |   |                                                                                    |                 |
|---------------------------------------|---|------------------------------------------------------------------------------------|-----------------|
| Effective increase in earnings (in %) | = | $\frac{\text{Effective Rate} - \text{Normal Rate}}{\text{Normal Rate}} \times 100$ |                 |
| Under Halsey                          | = | $\frac{56.48 - 50}{50} \times 100$                                                 | = <b>12.96%</b> |
| Under Rowan                           | = | $\frac{60.29 - 50}{50} \times 100$                                                 | = <b>20.58%</b> |

**Working Notes:**

|                                    |   |                                                                                |  |
|------------------------------------|---|--------------------------------------------------------------------------------|--|
| Total earnings under Halsey scheme | = | $(AH \times R) + 50\% (SH - AH) \times R$                                      |  |
|                                    | = | $(9,600 \times ₹50) + 50\% (12,087 - 9,600) \times ₹50$                        |  |
|                                    | = | <b>₹5,42,175</b>                                                               |  |
| Total earnings under Rowan scheme  | = | $(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$                      |  |
|                                    | = | $(9,600 \times ₹50) + \frac{9,600}{12,087} \times (12,087 - 9,600) \times ₹50$ |  |
|                                    | = | <b>₹5,78,764</b>                                                               |  |
| Effective rate under Halsey Plan   | = | <b>₹56.48 per hour</b> (₹5,42,175 ÷ 9,600 hours)                               |  |
| Effective rate under Rowan Plan    | = | <b>₹60.29 per hour</b> (₹5,78,764 ÷ 9,600 hours)                               |  |

**EMPLOYEE COST 2.39**

|                     |   |                                        |   |              |
|---------------------|---|----------------------------------------|---|--------------|
| Actual hours (AH)   | = | 50 workers × 24 days × 8 hours per day | = | 9,600 hours  |
| Standard hours (SH) | = | 6,120 units × 1.975 hours per unit     | = | 12,087 hours |

**(2) Savings to the Z Ltd. in terms of direct labour cost per unit:**

|                                               |   |                                           |  |
|-----------------------------------------------|---|-------------------------------------------|--|
| Direct labour cost per unit under time wages  | = | 1.975 hours × ₹50 per hour                |  |
|                                               | = | ₹98.75 per unit                           |  |
| Direct labour cost per unit under Halsey Plan | = | ₹88.59 per unit (₹5,42,175 ÷ 6,120 units) |  |
| Direct labour cost per unit under Rowan Plan  | = | ₹94.57 (₹5,78,764 ÷ 6,120 units)          |  |
| Savings of direct labour cost per unit under: |   |                                           |  |
| <b>Halsey Plan</b>                            | = | <b>₹10.16</b> (₹98.75 – ₹88.59)           |  |
| <b>Rowan Plan</b>                             | = | <b>₹4.18</b> (₹98.75 – ₹94.57)            |  |

**(3) Advise:** Rowan plan fulfils the company's assurance of 20% increase over the present earnings of the workers. This would increase productivity by 25.90% only. It will not adjust with increase in demand by 40%.

**Working Notes:**

|                                 |   |                                          |   |             |
|---------------------------------|---|------------------------------------------|---|-------------|
| Normal production units         | = | 9,600 hours ÷ 1.975 Hour                 | = | 4,861 units |
| Actual Production               | = | 6,120 units                              |   |             |
| Increase in Productivity (in %) | = | $\frac{6,120 - 4,861}{4,861} \times 100$ | = | 25.90%      |

**PYQ 25**

Following information is given of a newly setup organization for the year ended on 31<sup>st</sup> March, 2021:

|                                                         |     |
|---------------------------------------------------------|-----|
| Number of workers replaced during the period            | 50  |
| Number of workers left and discharged during the period | 25  |
| Average number of workers on the roll during the period | 500 |

**You are required to:**

- (1)** Compute the Employee Turnover Rates using Separation method and Flux Method.
- (2)** Equivalent Employee Turnover Rates for **(1)** above, given that the organization was setup on 31<sup>st</sup> January, 2021.

**[(5 Marks) July 2021]****Answer**

$$\text{(1) Separation Rate} = \frac{\text{No. of Separations}}{\text{Average number of workers}} \times 100 = \frac{25}{500} \times 100 = 5\%$$

$$\begin{aligned} \text{Flux Rate} &= \frac{\text{No. of Separations} + \text{No. of Replacements}}{\text{Average number of workers}} \times 100 \\ &= \frac{25 + 50}{500} \times 100 = 15\% \end{aligned}$$

- (2) Equivalent Rates** = Turnover rates × 12/2
- Equivalent Separation Rate = 5% × 12/2 = **30%**
- Equivalent Flux Rate = 15% × 12/2 = **90%**

**PYQ 26**

A skilled worker is paid a guaranteed wage rate of ₹150 per hour. The standard time allowed for a job is 10

hours. He took 8 hours to complete the job. He has been paid wages under the Rowan Incentive Plan.

**You are required to:**

- (a) Calculate the effective hourly rate of earnings under Rowan Incentive Plan.  
 (b) Calculate the time in which he should complete the job, if the worker is placed under Halsey Incentive Scheme (50%) and he wants to maintain the same effective hourly rate of earnings.

**[(5 Marks) Dec 2021]**

**Answer**

$$(a) \text{ Effective Hourly Rate} = \frac{\text{Total Earning}}{\text{Actual Hours}} = \frac{1,440}{8} = \text{₹180 Per Hour}$$

**Calculation of total earning under Rowan Incentive Plan:**

$$\begin{aligned} \text{Earning under Rowan Plan} &= (AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R \\ &= (8 \times 150) + \frac{8}{10} \times (10 - 8) \times 150 = \text{₹1,440} \end{aligned}$$

**(b) Actual hours to maintain same effective rate under Halsey Incentive scheme (50%):**

$$\begin{aligned} \text{Effective rate under Halsey} &= [(AH \times R) + 50\% \times (SH - AH) \times R] \div AH \\ 180 &= [(AH \times 150) + 50\% \times (10 - AH) \times 150] \div AH \\ 180 AH &= 150 AH + 750 - 75 AH \\ 105 AH &= 750 \\ \therefore AH &= 750 \div 105 = \text{7.1428 hours} \end{aligned}$$

### **PYQ 27**

PQR Limited has replaced 72 workers during the quarter ended 31<sup>st</sup> March 2022. The labour rates for the quarter are as follows:

|                    |     |
|--------------------|-----|
| Flux method        | 16% |
| Replacement method | 8%  |
| Separation method  | 5%  |

**You are required to ascertain:**

- (a) Average number of workers on roll (for the quarter),  
 (b) Number of workers left and discharged during the quarter,  
 (c) Number of workers recruited and joined during the quarter,  
 (d) Equivalent employee turnover rates for the year.

**[(5 Marks) May 2022]**

**Answer**

**(a) Average number of workers:**

$$\begin{aligned} \text{Number of workers replaced} &= 8\% \text{ of Average workers} = 72 \text{ workers} \\ \therefore \text{Average workers} &= 72 \div 8\% = \text{900 Workers} \end{aligned}$$

**(b) Number of workers left and discharged:**

$$\begin{aligned} \text{No. of workers left \& discharged} &= 5\% \text{ of Average workers} \\ &= 5\% \text{ of 900} = \text{45 Workers} \end{aligned}$$

**(c) Number of workers recruited and joined:**

$$\begin{aligned} \text{No. of workers recruited \& joined} &= \text{Flux} - \text{Separation} = 16\% - 5\% \\ &= 11\% \text{ of 900} = \text{99 Workers} \end{aligned}$$

**(d) Equivalent turnover rates for the year:**

|                          |   |                                   |              |
|--------------------------|---|-----------------------------------|--------------|
| Equivalent turnover rate | = | Turnover for quarter × 4 quarters |              |
| Using Flux Method        | = | 16% × 4                           | = <b>64%</b> |
| Using Replacement Method | = | 8% × 4                            | = <b>32%</b> |
| Using Separations Method | = | 5% × 4                            | = <b>20%</b> |

**PYQ 28**

A skilled worker, in PK Ltd., is paid a guaranteed wage rate of ₹15.00 per hour in a 48 hour week. The standard time to produce a unit is 18 minutes. During a week, a skilled worker Mr. 'A' has produced 200 units of the product. The company has taken a drive for cost reduction and wants to reduce its labour cost.

**You are required to:**

**(1)** Calculate wages of Mr. 'A' under each of the following methods :

- (a)** Time rate,
- (b)** Piece-rate with a guaranteed weekly wage,
- (c)** Halsey Premium Plan
- (d)** Rowan Premium Plan

**(2)** Suggest which bonus plan i.e. Halsey Premium Plan or Rowan Premium Plan, the company should follow.  
**[(6 Marks) Nov 2022]**

**Answer****(1) Calculation of wages:**

**(a)** Time rate 
$$= \text{Number of hours} \times \text{Wage rate per hour}$$

$$= 48 \text{ Hours} \times ₹15 = ₹720$$

**(b)** Piece rate with guaranteed weekly wages:

Wages as per piece rate 
$$= \text{Number of units produced} \times \text{Piece rate}$$

$$= 200 \text{ units} \times ₹4.50 = ₹900$$

**or**

Guaranteed weekly wages 
$$= \text{Weekly hours} \times \text{Wage rate per hour}$$

$$= 48 \text{ Hours} \times ₹15 = ₹720$$

Worker will get whatever is higher i.e. **₹900**

**(c)** Halsey System 
$$= (\text{AH} \times \text{R}) + 50\% (\text{SH} - \text{AH}) \times \text{R}$$

$$= (48 \text{ hours} \times ₹15) + 50\% (60 - 48) \times ₹15 = ₹810$$

**(d)** Rowan System 
$$= (\text{AH} \times \text{R}) + \frac{\text{AH}}{\text{SH}} \times (\text{SH} - \text{AH}) \times \text{R}$$

$$= (48 \text{ hours} \times ₹15) + \frac{48}{60} \times (60 - 48) \times ₹15 = ₹864$$

**(2)** As the company is planning to reduce labour cost, **Halsey Premium Plan** should be selected having lower cost.

**Working Notes:****1. Computation of Straight piece rate:**

|                        |            |
|------------------------|------------|
| Normal rate per hour   | ₹15        |
| Standard time per unit | 18 minutes |



Straight piece rate

₹4.50 (₹15 × 18/60)

$$2. \quad \text{Standard Hours (SH)} = 200 \text{ units} \times 18/60 = 60 \text{ hours}$$

**PYQ 29**

SMC Company limited is producing a particular design of toys under the following existing incentive system:

|                                  |                 |               |
|----------------------------------|-----------------|---------------|
| Normal working hours in the week | 48 hours        |               |
| Late shift hours in the week     | 12 hours        |               |
| Rate of payment                  | Normal working: | ₹150 per hour |
|                                  | Late shift:     | ₹300 per hour |

Average output per operator for 60 hours per week (including late shift hours): 80 toys.

The company's management has now decided to implement a system of labour cost payment with either the Rowan Premium Plan or the Halsey Premium Plan in order to increase output, eliminate late shift overtime, and reduce the labour cost.

**The following information is obtained:**

The standard time allotted for ten toys is seven and half hours.

Time rate: ₹150 per hour (as usual).

Assuming that the operator works for 48 hours in a week and produces 100 toys, you are required to calculate the weekly earning for one operator under:

- (a) The existing Time Rate,
- (b) Rowan Premium Plan and,
- (c) Halsey Premium Plan (50%)

**[(5 Marks) May 2023]****Answer**

$$(a) \quad \text{Earning under Existing Time Rate} = (48 \text{ hours} \times ₹150) + (12 \text{ hours} \times ₹300) \\ = ₹10,800$$

$$(b) \quad \text{Earning under Rowan Plan} = (AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R \\ = (48 \times ₹150) + \frac{48}{75} \times (75 - 48) \times ₹150 \\ = ₹9,792$$

$$(c) \quad \text{Earning under Halsey Plan} = (AH \times R) + 50\% (SH - AH) \times R \\ = (48 \times ₹150) + 50\% (75 - 48) \times ₹150 \\ = ₹9,225$$

**Working Notes:**

$$\text{Standard hours for 100 units} = \frac{7.5 \text{ hours}}{10 \text{ units}} \times 100 \text{ units} = 75 \text{ hours}$$

# SUGGESTED REVISION

| Ques. No.                                                                                          | Observations or KEY Points<br>(Note down during revisions) | Page No. of<br>Practical<br>Register | 1 <sup>st</sup> & 2 <sup>nd</sup><br>Revision | 3 <sup>rd</sup> , 4 <sup>th</sup> &<br>5 <sup>th</sup><br>Revision | Revision<br>during<br>Exams |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------|-----------------------------------------------|--------------------------------------------------------------------|-----------------------------|
| <b>BQ (Book Questions covering Study Module of ICAI, PM, RTP's, MTP's and Important Questions)</b> |                                                            |                                      |                                               |                                                                    |                             |
| 1                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 2                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 3                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 4                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 5                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 6                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 7                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 8                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 9                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 10                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 11                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 12                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 13                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 14                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 15                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 16                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 17                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 18                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 19                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 20                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 21                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 22                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 23                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 24                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 25                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 26                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 27                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 28                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 29                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 30                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 31                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 32                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 33                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| <b>PYQ (Past Year Questions)</b>                                                                   |                                                            |                                      |                                               |                                                                    |                             |
| 1                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 2                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 3                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 4                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 5                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 6                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 7                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 8                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 9                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 10                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 11                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 12                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 13                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |

**EMPLOYEE COST 2.44**

|           |  |  |          |          |          |
|-----------|--|--|----------|----------|----------|
| <b>14</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>15</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>16</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>17</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>18</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>19</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>20</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>21</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>22</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>23</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>24</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>25</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>26</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>27</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>28</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>29</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |

# ***CHAPTER - 3***

## ***OVERHEADS***

### ***ABSORPTION COSTING***

### ***METHOD***

#### ***LEARNING OUTCOMES***

***After studying this chapter you will be able to:***

- ***Discuss the meaning of Overheads- Production, Administrative and Selling & Distribution.***
- ***Discuss the meaning and methods of allocation, apportionment and absorption of overheads.***
- ***Discuss the meaning and treatment of under-absorption and over-absorption of overheads and apply the same in cost computation.***
- ***State the accounting and control of administrative, selling and distribution overheads.***
- ***Discuss and apply the various methods to calculate overhead rate.***

**PRIMARY AND SECONDARY DISTRIBUTION****BQ 1**

A company's production for the year ending 30.06.2022 is given below:

| Items                   | Production Departments |        |        | Service Departments |        |           | Total    |
|-------------------------|------------------------|--------|--------|---------------------|--------|-----------|----------|
|                         | P1                     | P2     | P3     | Office              | Stores | Work Shop |          |
| Direct wages            | 20,000                 | 25,000 | 30,000 | -                   | -      | -         | 75,000   |
| Direct materials        | 30,000                 | 35,000 | 45,000 | -                   | -      | -         | 1,10,000 |
| Indirect materials      | 2,000                  | 3,000  | 3,000  | 1,000               | 2,000  | 2,000     | 13,000   |
| Indirect wages          | 3,000                  | 3,000  | 4,000  | 10,000              | 10,000 | 5,000     | 35,000   |
| Area (Square Meters)    | 200                    | 250    | 300    | 150                 | 100    | 250       | 1,250    |
| Book value of machinery | 30,000                 | 35,000 | 25,000 | -                   | -      | 15,000    | 1,05,000 |
| Machine capacity (H.P.) | 15                     | 20     | 25     | -                   | -      | 5         | 65       |
| Machine hours worked    | 10,000                 | 20,000 | 15,000 | -                   | -      | 5,000     | 50,000   |

**General Expenses:**

|                     |   |                           |
|---------------------|---|---------------------------|
| Rent                | : | ₹12,500                   |
| Insurance (Machine) | : | ₹1,050                    |
| Depreciation        | : | 15% of value of machinery |
| Power               | : | ₹3,800                    |
| Light               | : | ₹1,250                    |

You are required to prepare an overhead analysis sheet for the departments showing clearly the basis of apportionment when necessary.

**Answer****Overhead Analysis Sheet**

| Items              | Basis of Charge | Production Departments |               |               | Service Departments |               |               |
|--------------------|-----------------|------------------------|---------------|---------------|---------------------|---------------|---------------|
|                    |                 | P1                     | P2            | P3            | Office              | Stores        | Work Shop     |
| Indirect materials | Allocation      | 2,000                  | 3,000         | 3,000         | 1,000               | 2,000         | 2,000         |
| Indirect wages     | Allocation      | 3,000                  | 3,000         | 4,000         | 10,000              | 10,000        | 5,000         |
| Rent               | Area            | 2,000                  | 2,500         | 3,000         | 1,500               | 1,000         | 2,500         |
| Insurance          | Value           | 300                    | 350           | 250           | -                   | -             | 150           |
| Depreciation       | Value           | 4,500                  | 5,250         | 3,750         | -                   | -             | 2,250         |
| Power              | H.P. used       | 600                    | 1,600         | 1,500         | -                   | -             | 100           |
| Light              | Area            | 200                    | 250           | 300           | 150                 | 100           | 250           |
| <b>Total</b>       | <b>-</b>        | <b>12,600</b>          | <b>15,950</b> | <b>15,800</b> | <b>12,650</b>       | <b>13,100</b> | <b>12,250</b> |

**BQ 2**

Modern Machines Ltd. have three production departments (A, B, and C) and two service departments (D and E). From the following figures extracted from the records of the company, calculate the overhead rate per labour hour:

|                           |         |                              |         |
|---------------------------|---------|------------------------------|---------|
| Indirect Materials        | ₹15,000 | Rent, Rates and Taxes        | ₹10,000 |
| Indirect Wages            | ₹10,000 | Electric Power for Machinery | ₹15,000 |
| Depreciation on Machinery | ₹25,000 | Electric Power for Lighting  | ₹500    |
| Depreciation on Buildings | ₹5,000  | General Expenses             | ₹15,000 |

| Items                   | Production Departments |          |        | Service Departments |        | Total    |
|-------------------------|------------------------|----------|--------|---------------------|--------|----------|
|                         | A                      | B        | C      | D                   | E      |          |
| Direct materials        | 20,000                 | 10,000   | 19,000 | 6,000               | 5,000  | 60,000   |
| Direct wages            | 15,000                 | 15,000   | 4,000  | 2,000               | 4,000  | 40,000   |
| Area (Square Meters)    | 15,000                 | 10,000   | 10,000 | 5,000               | 10,000 | 50,000   |
| Book value of machinery | 60,000                 | 1,00,000 | 40,000 | 25,000              | 25,000 | 2,50,000 |
| Machine capacity (H.P.) | 50                     | 60       | 30     | 5                   | 5      | 150      |
| Labour hours worked     | 5,000                  | 5,000    | 2,000  | 1,000               | 2,000  | 15,000   |
| No. of light points     | 15                     | 10       | 10     | 5                   | 10     | 50       |

**OVERHEADS ABSORPTION COSTING METHOD 3.2**

The expenses of service departments D and E are to be apportioned as follows:

|                           | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> | <b>E</b> |
|---------------------------|----------|----------|----------|----------|----------|
| Expenses of department D: | 40       | 20       | 30       | -        | 10       |
| Expenses of department E: | 30       | 30       | 40       | -        | -        |

**Answer**

**Statement Showing Overhead Rate per Labour Hour**

| <b>Items</b>                   | <b>Basis of Charge</b> | <b>Production Departments</b> |                |                 | <b>Service Departments</b> |               |
|--------------------------------|------------------------|-------------------------------|----------------|-----------------|----------------------------|---------------|
|                                |                        | <b>A</b>                      | <b>B</b>       | <b>C</b>        | <b>D</b>                   | <b>E</b>      |
| Direct materials               | Allocation             | -                             | -              | -               | 6,000                      | 5,000         |
| Direct wages                   | Allocation             | -                             | -              | -               | 2,000                      | 4,000         |
| Indirect materials             | Materials              | 5,000                         | 2,500          | 4,750           | 1,500                      | 1,250         |
| Indirect wages                 | Wages                  | 3,750                         | 3,750          | 1,000           | 500                        | 1,000         |
| Depreciation:                  |                        |                               |                |                 |                            |               |
| Machinery                      | Value                  | 6,000                         | 10,000         | 4,000           | 2,500                      | 2,500         |
| Building                       | Area                   | 1,500                         | 1,000          | 1,000           | 500                        | 1,000         |
| Rent, rates, taxes             | Area                   | 3,000                         | 2,000          | 2,000           | 1,000                      | 2,000         |
| Power for machine              | H.P.                   | 5,000                         | 6,000          | 3,000           | 500                        | 500           |
| Power for lighting             | Light points           | 150                           | 100            | 100             | 50                         | 100           |
| General expenses               | Labour hours           | 5,000                         | 5,000          | 2,000           | 1,000                      | 2,000         |
| <b>Total Overheads</b>         | <b>Prim. Dist.</b>     | <b>29,400</b>                 | <b>30,350</b>  | <b>17,850</b>   | <b>15,550</b>              | <b>19,350</b> |
| Department D                   | 4:2:3:1                | 6,220                         | 3,110          | 4,665           | (15,550)                   | 1,555         |
| Department E                   | 3:3:4                  | 6,272                         | 6,271          | 8,362           | -                          | (20,905)      |
| <b>Total OH</b>                | <b>Secon. Dist.</b>    | <b>41,892</b>                 | <b>39,731</b>  | <b>30,877</b>   | <b>-</b>                   | <b>-</b>      |
| ÷ Labour hours                 | -                      | 5,000                         | 5,000          | 2,000           | -                          | -             |
| <b>OH rate per labour hour</b> |                        | <b>₹8.3784</b>                | <b>₹7.9462</b> | <b>₹15.4385</b> | <b>-</b>                   | <b>-</b>      |

**BQ 3**

XL Ltd., has three production departments and four service departments. The expenses for these departments as per Primary Distribution Summary are as follows:

|                                |            |            |
|--------------------------------|------------|------------|
| <b>Production Departments:</b> | <b>(₹)</b> | <b>(₹)</b> |
| A                              | 30,00,000  |            |
| B                              | 26,00,000  |            |
| C                              | 24,00,000  | 80,00,000  |

|                             |            |            |
|-----------------------------|------------|------------|
| <b>Service Departments:</b> | <b>(₹)</b> | <b>(₹)</b> |
| Stores                      | 4,00,000   |            |
| Time-keeping and Accounts   | 3,00,000   |            |
| Power                       | 1,60,000   |            |
| Canteen                     | 1,00,000   | 9,60,000   |

The following information is also available in respect of the production departments:

|                                    | <b>Dept. A</b> | <b>Dept. B</b> | <b>Dept. C</b> |
|------------------------------------|----------------|----------------|----------------|
| Horse power of Machine             | 300            | 300            | 200            |
| Number of workers                  | 20             | 15             | 15             |
| Value of stores requisition in (₹) | 2,50,000       | 1,50,000       | 1,00,000       |

Apportion the costs of service departments over the production departments.

**Answer**

**Statement Showing Secondary Distribution**

| <b>Particulars</b> | <b>Basis</b> | <b>Total</b> | <b>Production Departments</b> |          |          |
|--------------------|--------------|--------------|-------------------------------|----------|----------|
|                    |              |              | <b>A</b>                      | <b>B</b> | <b>C</b> |

**OVERHEADS ABSORPTION COSTING METHOD 3.3**

|                                  |                             |                  |                  |                  |                  |
|----------------------------------|-----------------------------|------------------|------------------|------------------|------------------|
| Cost as per primary distribution | Given                       | 80,00,000        | 30,00,000        | 26,00,000        | 24,00,000        |
| Stores                           | Value of stores requisition | 4,00,000         | 2,00,000         | 1,20,000         | 80,000           |
| Time keeping and Accounts        | No. of workers              | 3,00,000         | 1,20,000         | 90,000           | 90,000           |
| Power                            | H.P. of machine             | 1,60,000         | 60,000           | 60,000           | 40,000           |
| Canteen                          | No. of workers              | 1,00,000         | 40,000           | 30,000           | 30,000           |
| <b>Total OH</b>                  | <b>-</b>                    | <b>89,60,000</b> | <b>34,20,000</b> | <b>29,00,000</b> | <b>26,40,000</b> |

**BQ 4**

Deccan Manufacturing Ltd. have three departments which are regarded as production departments. Service department's 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:

| Departments        | Factory overheads | Direct labour hours | No. of employee | Area in square meters |
|--------------------|-------------------|---------------------|-----------------|-----------------------|
| <b>Production:</b> |                   |                     |                 |                       |
| 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                 |
| <b>Service:</b>    |                   |                     |                 |                       |
| 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**

P  
Q  
R  
S

**Basis**

Number of employees  
Direct labour hours  
Area in square metres  
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 three production department  
[(a) X ₹3,00,000; Y ₹1,35,000; Z ₹1,60,000 (b) X ₹75; Y ₹45; Z ₹40]

**BQ 5**

Suppose the expenses of two production departments A and B and two service departments X and Y are as under:

| Departments | Amount   | Apportionment Basis |     |     |
|-------------|----------|---------------------|-----|-----|
|             |          | Y                   | A   | B   |
| X           | 2,00,000 | 25%                 | 40% | 35% |
| Y           | 1,50,000 | -                   | 40% | 60% |
| A           | 3,00,000 |                     |     |     |
| B           | 3,20,000 |                     |     |     |

**Prepare statement of overhead distribution.**

**Answer****Statement of Overhead Distribution**

| Particulars | Basis | X | Y | A | B |
|-------------|-------|---|---|---|---|
|-------------|-------|---|---|---|---|

**OVERHEADS ABSORPTION COSTING METHOD 3.4**

|                      |          |            |            |                 |                 |
|----------------------|----------|------------|------------|-----------------|-----------------|
| Primary distribution | Given    | 2,00,000   | 1,50,000   | 3,00,000        | 3,20,000        |
| Apportionment:       |          |            |            |                 |                 |
| Expenses of Dept. X  | 25:40:35 | (2,00,000) | 50,000     | 80,000          | 70,000          |
| Expenses of Dept. Y  | 40:60    | -          | (2,00,000) | 80,000          | 1,20,000        |
| <b>Total OH</b>      | <b>-</b> | <b>-</b>   | <b>-</b>   | <b>4,60,000</b> | <b>5,10,000</b> |

**BQ 6**

A company is having three production departments X, Y and Z and two service departments Boiler house and Pump room. The Boiler house has to depend upon the Pump room for supply of water and Pump room in its turn is dependent on the Boiler house for supply of steam power for driving the pump. The expenses incurred by the production departments are X ₹6,00,000, Y ₹5,25,000 and Z ₹3,75,000. The expenses for Boiler house are ₹1,75,500 and Pump room are ₹2,25,000.

**The expenses of the Boiler house and Pump room are apportioned to the production departments on following basis:**

| Departments  | Apportionment of services |     |     |              |           |
|--------------|---------------------------|-----|-----|--------------|-----------|
|              | X                         | Y   | Z   | Boiler house | Pump room |
| Boiler house | 20%                       | 40% | 30% | -            | 10%       |
| Pump room    | 40%                       | 20% | 20% | 20%          | -         |

**Show clearly as to how the expenses of Bolier house and Pump room would be apportioned to X, Y and Z departments?**

**[X ₹7,44,000; Y ₹6,64,500; Z ₹4,92,000]**

**BQ 7**

A factory has two service departments P and Q and three production departments A, B, and C. You are supplied with the following information:

| Particulars               | Production Departments |       |       | Service Departments |       | Total  |
|---------------------------|------------------------|-------|-------|---------------------|-------|--------|
|                           | A                      | B     | C     | P                   | Q     |        |
| Rent                      | 2,400                  | 4,800 | 2,000 | 2,000               | 800   | 12,000 |
| Electricity               | 800                    | 2,000 | 500   | 400                 | 300   | 4,000  |
| Indirect labour           | 1,200                  | 2,000 | 1,000 | 800                 | 1,000 | 6,000  |
| Depreciation of machinery | 2,500                  | 1,600 | 200   | 500                 | 200   | 5,000  |
| Sundries                  | 910                    | 2,143 | 847   | 300                 | 300   | 4,500  |
| Estimated working hours   | 1,000                  | 2,000 | 1,400 | -                   | -     | 4,400  |

**Expenses of service departments P and Q are apportioned as under:**

|          | A   | B   | C   | P   | Q   |
|----------|-----|-----|-----|-----|-----|
| <b>P</b> | 30% | 40% | 20% | -   | 10% |
| <b>Q</b> | 10% | 20% | 50% | 20% | -   |

**You are required to show the apportionment of overheads under different methods of apportioning inter-service departments overheads (Reciprocal Method) and also to work-out the production hour rate recovery of overheads in departments A, B and C.**

**Answer**

**(A) Statement Showing Overhead Rate per Hour  
(Repeated Distribution Method)**

| Items           | Basis of Charge | Production Departments |       |       | Service Departments |       |
|-----------------|-----------------|------------------------|-------|-------|---------------------|-------|
|                 |                 | A                      | B     | C     | P                   | Q     |
| Rent            | Allocation      | 2,400                  | 4,800 | 2,000 | 2,000               | 800   |
| Electricity     | Allocation      | 800                    | 2,000 | 500   | 400                 | 300   |
| Indirect labour | Allocation      | 1,200                  | 2,000 | 1,000 | 800                 | 1,000 |
| Depreciation    | Allocation      | 2,500                  | 1,600 | 200   | 500                 | 200   |
| Sundries        | Allocation      | 910                    | 2,143 | 847   | 300                 | 300   |



**OVERHEADS ABSORPTION COSTING METHOD 3.5**

|                         |         |              |               |              |              |              |
|-------------------------|---------|--------------|---------------|--------------|--------------|--------------|
| <b>Total Overheads</b>  | -       | <b>7,810</b> | <b>12,543</b> | <b>4,547</b> | <b>4,000</b> | <b>2,600</b> |
| Reapportionment:        |         |              |               |              |              |              |
| Department P            | 3:4:2:1 | 1,200        | 1,600         | 800          | (4,000)      | 400          |
| Department Q            | 1:2:5:2 | 300          | 600           | 1,500        | 600          | (3,000)      |
| Department P            | 3:4:2:1 | 180          | 240           | 120          | (600)        | 60           |
| Department Q            | 1:2:5:2 | 6            | 12            | 30           | 12           | (60)         |
| Department P            | 3:4:2   | 4            | 5             | 3            | (12)         |              |
| <b>Total Overheads</b>  | -       | <b>9,500</b> | <b>15,000</b> | <b>7,000</b> | -            | -            |
| ÷ hours                 | -       | 1,000        | 2,000         | 1,400        | -            | -            |
| <b>OH rate per hour</b> |         | <b>₹9.50</b> | <b>₹7.50</b>  | <b>₹5.00</b> | -            | -            |

**(B) Statement Showing Overhead Rate per Hour  
(Equation Method)**

| Items                   | Basis of Charge | Production Departments |               |              | Service Departments |              |
|-------------------------|-----------------|------------------------|---------------|--------------|---------------------|--------------|
|                         |                 | A                      | B             | C            | P                   | Q            |
| Rent                    | Allocation      | 2,400                  | 4,800         | 2,000        | 2,000               | 800          |
| Electricity             | Allocation      | 800                    | 2,000         | 500          | 400                 | 300          |
| Indirect labour         | Allocation      | 1,200                  | 2,000         | 1,000        | 800                 | 1,000        |
| Depreciation            | Allocation      | 2,500                  | 1,600         | 200          | 500                 | 200          |
| Sundries                | Allocation      | 910                    | 2,143         | 847          | 300                 | 300          |
| <b>Total Overheads</b>  | -               | <b>7,810</b>           | <b>12,543</b> | <b>4,547</b> | <b>4,000</b>        | <b>2,600</b> |
| Reapportionment:        |                 |                        |               |              |                     |              |
| Department P            | 3:4:2:1         | 1,384                  | 1,845         | 922          | (4,612)             | 461          |
| Department Q            | 1:2:5:2         | 306                    | 612           | 1,531        | 612                 | (3,061)      |
| <b>Total Overheads</b>  | -               | <b>9,500</b>           | <b>15,000</b> | <b>7,000</b> | -                   | -            |
| ÷ hours                 | -               | 1,000                  | 2,000         | 1,400        | -                   | -            |
| <b>OH rate per hour</b> |                 | <b>₹9.50</b>           | <b>₹7.50</b>  | <b>₹5.00</b> | -                   | -            |

**Working Note:**

**Calculation of expenses by using equation:**

$$\begin{aligned} \text{Expenses of Department P} &= 4,000 + 20\% \text{ of Expenses of Q} \\ \text{Expenses of Department Q} &= 2,600 + 10\% \text{ of Expenses of P} \end{aligned}$$

**Now,**

$$\begin{aligned} \text{Expenses of Department P} &= 4,000 + 20\% (2,600 + 10\% \text{ of P}) \\ \text{Expenses of Department P} &= 4,000 + 520 + 2\% \text{ of P} \end{aligned}$$

$$\text{Expenses of Department P} = \frac{4,520}{98\%} = 4,612$$

$$\text{Expenses of Department Q} = 2,600 + 10\% \text{ of } 4,612 = 3,061$$

**(C) Statement Showing Overhead Rate per Hour  
(Trial and Error Method)**

| Items                   | Basis of Charge | Production Departments |               |              | Service Departments |              |
|-------------------------|-----------------|------------------------|---------------|--------------|---------------------|--------------|
|                         |                 | A                      | B             | C            | P                   | Q            |
| Rent                    | Allocation      | 2,400                  | 4,800         | 2,000        | 2,000               | 800          |
| Electricity             | Allocation      | 800                    | 2,000         | 500          | 400                 | 300          |
| Indirect labour         | Allocation      | 1,200                  | 2,000         | 1,000        | 800                 | 1,000        |
| Depreciation            | Allocation      | 2,500                  | 1,600         | 200          | 500                 | 200          |
| Sundries                | Allocation      | 910                    | 2,143         | 847          | 300                 | 300          |
| <b>Total Overheads</b>  | -               | <b>7,810</b>           | <b>12,543</b> | <b>4,547</b> | <b>4,000</b>        | <b>2,600</b> |
| Reapportionment:        |                 |                        |               |              |                     |              |
| Department P            | 3:4:2:1         | 1,384                  | 1,845         | 922          | (4,612)             | 461          |
| Department Q            | 1:2:5:2         | 306                    | 612           | 1,531        | 612                 | (3,061)      |
| <b>Total Overheads</b>  | -               | <b>9,500</b>           | <b>15,000</b> | <b>7,000</b> | -                   | -            |
| ÷ hours                 | -               | 1,000                  | 2,000         | 1,400        | -                   | -            |
| <b>OH rate per hour</b> |                 | <b>₹9.50</b>           | <b>₹7.50</b>  | <b>₹5.00</b> | -                   | -            |

**Working Note:****Calculation of expenses under Trial and Error Method:**

| Items                    | %        | P            | Q            |
|--------------------------|----------|--------------|--------------|
| <b>Total Overheads</b>   |          | <b>4,000</b> | <b>2,600</b> |
| Reapportionment:         |          |              |              |
| Expenses of Department P | 10%      | -            | 400          |
| Expenses of Department Q | 20%      | 600          | -            |
| Expenses of Department P | 10%      | -            | 60           |
| Expenses of Department Q | 20%      | 12           | -            |
| Expenses of Department P | 10%      | -            | 1            |
| <b>Total Overheads</b>   | <b>-</b> | <b>4,612</b> | <b>3,061</b> |

**BQ 8**

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 2022:

| Items           | Total Amount | Production Department |          |          | Services Departments |          |
|-----------------|--------------|-----------------------|----------|----------|----------------------|----------|
|                 |              | A                     | B        | C        | X                    | Y        |
| Direct material |              | 1,00,000              | 2,00,000 | 4,00,000 | 2,00,000             | 1,00,000 |
| Direct wages    |              | 5,00,000              | 2,00,000 | 8,00,000 | 1,00,000             | 2,00,000 |
| Factory rent    | 4,00,000     |                       |          |          |                      |          |
| Power           | 2,50,000     |                       |          |          |                      |          |
| Depreciation    | 1,00,000     |                       |          |          |                      |          |
| Other overheads | 9,00,000     |                       |          |          |                      |          |

**Additional information:**

| Details                            | Production Department |       |       | Service Departments |       |
|------------------------------------|-----------------------|-------|-------|---------------------|-------|
|                                    | A                     | B     | C     | X                   | Y     |
| Area (Sq. ft)                      | 500                   | 250   | 500   | 250                 | 500   |
| Capital Value of Assets (in Lakhs) | 20                    | 40    | 20    | 10                  | 10    |
| Machine hours                      | 1,000                 | 2,000 | 4,000 | 1,000               | 1,000 |
| Horse power of machines            | 50                    | 40    | 20    | 15                  | 25    |

**A technical assessment of the apportionment of expenses of service departments is as under:**

| Departments      | A  | B  | C  | X | Y  |
|------------------|----|----|----|---|----|
| Department X (%) | 45 | 15 | 30 | - | 10 |
| Department Y (%) | 60 | 35 | -  | 5 | -  |

**Required:**

- (1) A statement showing distribution of overheads to various departments.
- (2) A statement showing re-distribution of service departments expenses to production departments using **Trial and error** method.
- (3) Machine hour rates of the production department A, B and C.

**Answer****(1) Statement Showing Distribution of Overheads**

| Items                  | Basis of Charge | Production Departments |                 |                 | Service Departments |                 |
|------------------------|-----------------|------------------------|-----------------|-----------------|---------------------|-----------------|
|                        |                 | A                      | B               | C               | X                   | Y               |
| Direct material        | Allocation      | -                      | -               | -               | 2,00,000            | 1,00,000        |
| Direct wages           | Allocation      | -                      | -               | -               | 1,00,000            | 2,00,000        |
| Factory rent           | Area            | 1,00,000               | 50,000          | 1,00,000        | 50,000              | 1,00,000        |
| Power                  | H.P. used       | 50,000                 | 80,000          | 80,000          | 15,000              | 25,000          |
| Depreciation           | Capital Value   | 20,000                 | 40,000          | 20,000          | 10,000              | 10,000          |
| Other overheads        | Machine Hours   | 1,00,000               | 2,00,000        | 4,00,000        | 1,00,000            | 1,00,000        |
| <b>Total Overheads</b> | <b>-</b>        | <b>2,70,000</b>        | <b>3,70,000</b> | <b>6,00,000</b> | <b>4,75,000</b>     | <b>5,35,000</b> |

## OVERHEADS ABSORPTION COSTING METHOD 3.7

### (2) Statement Showing Redistribution of Overheads (Trial and Error Method)

| Items                  | Basis of Charge | Production Departments |                 |                 | Service Departments |                 |
|------------------------|-----------------|------------------------|-----------------|-----------------|---------------------|-----------------|
|                        |                 | A                      | B               | C               | X                   | Y               |
| <b>Total Overheads</b> | -               | <b>2,70,000</b>        | <b>3,70,000</b> | <b>6,00,000</b> | <b>4,75,000</b>     | <b>5,35,000</b> |
| Reapportionment:       |                 |                        |                 |                 |                     |                 |
| Department X           | 45:15:30:10     | 2,26,922               | 75,641          | 1,51,281        | (5,04,271)          | 50,428          |
| Department Y           | 60:35:5         | 3,51,256               | 2,04,900        | -               | 29,272              | (5,85,428)      |
| <b>Total Overheads</b> | -               | <b>8,48,178</b>        | <b>6,50,541</b> | <b>7,51,281</b> | -                   | -               |

### (3) Machine Hour Rate:

|                   |   |                                                          |           |
|-------------------|---|----------------------------------------------------------|-----------|
| Machine Hour rate | = | $\frac{\text{Budgeted Overheads}}{\text{Machine Hours}}$ |           |
| Department A      | = | $8,48,178 \div 1,000$                                    | = ₹848.18 |
| Department B      | = | $6,50,541 \div 2,000$                                    | = ₹325.27 |
| Department C      | = | $7,51,281 \div 4,000$                                    | = ₹187.82 |

### Working Note:

#### Calculation of expenses under Trial and Error Method

| Items                    | %   | X               | Y               |
|--------------------------|-----|-----------------|-----------------|
| <b>Total Overheads</b>   |     | <b>4,75,000</b> | <b>5,35,000</b> |
| Reapportionment:         |     |                 |                 |
| Expenses of Department X | 10% | -               | 47,500          |
| Expenses of Department Y | 5%  | 29,125          | -               |
| Expenses of Department X | 10% | -               | 2,913           |
| Expenses of Department Y | 5%  | 146             | -               |
| Expenses of Department X | 10% | -               | 15              |
| Expenses of Department Y | 5%  | 1               | -               |
| <b>Total Overheads</b>   | -   | <b>5,04,272</b> | <b>5,85,428</b> |

### Working Note:

#### Calculation of H.P Used

| Departments                             | A             | B             | C             | X             | Y             |
|-----------------------------------------|---------------|---------------|---------------|---------------|---------------|
| Machine hours                           | 1,000         | 2,000         | 4,000         | 1,000         | 1,000         |
| Horse power of machines                 | 50            | 40            | 20            | 15            | 25            |
| <b>H.P. used (H.P. × Machine hours)</b> | <b>50,000</b> | <b>80,000</b> | <b>80,000</b> | <b>15,000</b> | <b>25,000</b> |

### BQ 9

The ABC Company has the following account balances and distribution of direct charges on 31<sup>st</sup> March, 2022.

| Items                   | Total Amount | Production Department |         | Services Departments |                      |
|-------------------------|--------------|-----------------------|---------|----------------------|----------------------|
|                         |              | Machine Shop          | Packing | General Plant        | Stores & maintenance |
| Allocated overheads:    |              |                       |         |                      |                      |
| Indirect labour         | 14,650       | 4,000                 | 3,000   | 2,000                | 5,650                |
| Maintenance materials   | 5,020        | 1,800                 | 700     | 1,020                | 1,500                |
| Misc. supplies          | 1,750        | 400                   | 1,000   | 150                  | 200                  |
| Superintendent's salary | 4,000        | -                     | -       | 4,000                | -                    |
| Cost & payroll salary   | 10,000       | -                     | -       | 10,000               | -                    |
| OH to be apportioned:   |              |                       |         |                      |                      |
| Power                   | 8,000        |                       |         |                      |                      |
| Rent                    | 12,000       |                       |         |                      |                      |
| Fuel & heat             | 6,000        |                       |         |                      |                      |
| Insurance               | 1,000        |                       |         |                      |                      |
| Taxes                   | 2,000        |                       |         |                      |                      |
| Depreciation            | 1,00,000     |                       |         |                      |                      |

### OVERHEADS ABSORPTION COSTING METHOD 3.8

The following data were compiled by means of the factory survey made in the previous year:

| Details             | Floor space<br>in Sq. ft. | Radiator<br>sections | No. of<br>employees | Investment<br>in ₹ | H.P. hours   |
|---------------------|---------------------------|----------------------|---------------------|--------------------|--------------|
| Machine shop        | 2,000                     | 45                   | 20                  | 6,40,000           | 3,500        |
| Packing             | 800                       | 90                   | 10                  | 2,00,000           | 500          |
| General plant       | 400                       | 30                   | 3                   | 10,000             | -            |
| Store & maintenance | 1,600                     | 60                   | 5                   | 1,50,000           | 1,000        |
| <b>Total</b>        | <b>4,800</b>              | <b>225</b>           | <b>38</b>           | <b>10,00,000</b>   | <b>5,000</b> |

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:

#### Requirements:

- 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.
- Determine the service department distribution by the method of continued distribution. Carry through 3 cycles. Show all calculations to the nearest rupees.

#### Answer

##### (a) Overhead Distribution Statement

| Items                                         | Total<br>Amount | Production Department |               | Services Departments |                      |
|-----------------------------------------------|-----------------|-----------------------|---------------|----------------------|----------------------|
|                                               |                 | Machine Shop          | Packing       | General Plant        | Stores & maintenance |
| Allocated overheads:                          |                 |                       |               |                      |                      |
| Indirect labour                               | 14,650          | 4,000                 | 3,000         | 2,000                | 5,650                |
| Maintenance materials                         | 5,020           | 1,800                 | 700           | 1,020                | 1,500                |
| Misc. supplies                                | 1,750           | 400                   | 1,000         | 150                  | 200                  |
| Superintendent's salary                       | 4,000           | -                     | -             | 4,000                | -                    |
| Cost & payroll salary                         | 10,000          | -                     | -             | 10,000               | -                    |
| Apportioned overheads<br>(see schedule below) | 1,29,000        | 77,720                | 25,800        | 2,830                | 22,650               |
| <b>Total</b>                                  | <b>1,64,420</b> | <b>83,920</b>         | <b>30,500</b> | <b>20,000</b>        | <b>30,000</b>        |

##### Statement of Apportioned Expenses

| Items        | Basis          | Production Department |               | Services Departments |                      |
|--------------|----------------|-----------------------|---------------|----------------------|----------------------|
|              |                | Machine Shop          | Packing       | General Plant        | Stores & maintenance |
| Power        | H.P. hours     | 5,600                 | 800           | -                    | 1,600                |
| Rent         | Floor space    | 5,000                 | 2,000         | 1,000                | 4,000                |
| Fuel & heat  | Radiator secs. | 1,200                 | 2,400         | 800                  | 1,600                |
| Insurance    | Investment     | 640                   | 200           | 10                   | 150                  |
| Taxes        | Investment     | 1,280                 | 400           | 20                   | 300                  |
| Depreciation | Investment     | 64,000                | 20,000        | 1,000                | 15,000               |
| <b>Total</b> | <b>-</b>       | <b>77,720</b>         | <b>25,800</b> | <b>2,830</b>         | <b>22,650</b>        |

##### (b) Distribution of Service Department Expenses

| Items                            | Basis        | Production Department |         | Services Departments |                      |
|----------------------------------|--------------|-----------------------|---------|----------------------|----------------------|
|                                  |              | Machine Shop          | Packing | General Plant        | Stores & maintenance |
| Total Expenses                   | [as per (a)] | 83,920                | 30,500  | 20,000               | 30,000               |
| Re-apportionment:                |              |                       |         |                      |                      |
| Expenses of General plant        | 20 : 10 : 5  | 11,429                | 5,714   | (20,000)             | 2,857                |
| Expenses of Stores & maintenance | 50 : 20 : 30 | 16,429                | 6,571   | 9,857                | (32,857)             |
| Expenses of General plant        | 20 : 10 : 5  | 5,633                 | 2,816   | (9,857)              | 1,408                |

**OVERHEADS ABSORPTION COSTING METHOD 3.9**

|                                  |              |                 |               |          |          |
|----------------------------------|--------------|-----------------|---------------|----------|----------|
| Expenses of Stores & maintenance | 50 : 20 : 30 | 704             | 282           | 422      | (1,408)  |
| Expenses of General plant        | 20 : 10 : 5  | 241             | 121           | (422)    | 60       |
| Expenses of Stores & maintenance | 50 : 20      | 43              | 17            | -        | (60)     |
| <b>Total</b>                     | <b>-</b>     | <b>1,18,399</b> | <b>46,021</b> | <b>-</b> | <b>-</b> |

**BQ 10**

Modern Manufactures Ltd. has three Production Departments P1, P2, P3 and two Service Departments S1 and S2 details pertaining to which are as under:

| Items                 | Production Departments |        |          | Service Departments |       |
|-----------------------|------------------------|--------|----------|---------------------|-------|
|                       | P1                     | P2     | P3       | S1                  | S2    |
| Direct wages          | 3,000                  | 2,000  | 3,000    | 1,500               | 195   |
| Working hours         | 3,070                  | 4,475  | 2,419    | -                   | -     |
| Value of machines (₹) | 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:

|                          |   |         |
|--------------------------|---|---------|
| 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:

| Departments | 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 ₹50 and Direct Labour Cost is ₹30.

**Answer**

**Statement Showing Overhead Rate per Hour**

| Items                    | Basis of Charge      | Production Departments |              |               | Service Departments |            |
|--------------------------|----------------------|------------------------|--------------|---------------|---------------------|------------|
|                          |                      | P1                     | P2           | P3            | S1                  | S2         |
| Direct wages             | Allocation           | -                      | -            | -             | 1,500               | 195        |
| Rent and rates           | Area                 | 1,000                  | 1,250        | 1,500         | 1,000               | 250        |
| General lighting         | Light points         | 100                    | 150          | 200           | 100                 | 50         |
| Indirect wages           | Direct wages         | 600                    | 400          | 600           | 300                 | 39         |
| Power                    | H.P.                 | 600                    | 300          | 500           | 100                 | -          |
| Depreciation on machines | Value of machines    | 2,400                  | 3,200        | 4,000         | 200                 | 200        |
| Sundries                 | Direct wages         | 3,000                  | 2,000        | 3,000         | 1,500               | 195        |
| <b>Total overheads</b>   | <b>Primary Dist.</b> | <b>7,700</b>           | <b>7,300</b> | <b>9,800</b>  | <b>4,700</b>        | <b>929</b> |
| Re-apportionment:        |                      |                        |              |               |                     |            |
| Department S1            | 2 : 3 : 4 : 1        | 940                    | 1,410        | 1,880         | (4,700)             | 470        |
| Department S2            | 4 : 2 : 3 : 1        | 559                    | 280          | 420           | 140                 | (1,399)    |
| Department S1            | 2 : 3 : 4 : 1        | 28                     | 42           | 56            | (140)               | 14         |
| Department S2            | 4 : 2 : 3            | 6                      | 3            | 5             | -                   | (14)       |
| <b>Total OH</b>          | <b>-</b>             | <b>9,233</b>           | <b>9,035</b> | <b>12,161</b> | <b>-</b>            | <b>-</b>   |
| ÷ Working hours          | <b>-</b>             | <b>3,070</b>           | <b>4,475</b> | <b>2,419</b>  | <b>-</b>            | <b>-</b>   |
| <b>OH rate per hour</b>  |                      | <b>₹3.01</b>           | <b>₹2.02</b> | <b>₹5.03</b>  | <b>-</b>            | <b>-</b>   |

**Calculation of cost of product X:**

**OVERHEADS ABSORPTION COSTING METHOD 3.10**

|                                            |                |
|--------------------------------------------|----------------|
| Direct material cost                       | ₹50.00         |
| Direct labour cost                         | ₹30.00         |
| Overheads: Department P1 (4 hours × ₹3.01) | ₹12.04         |
| Department P2 (5 hours × ₹2.02)            | ₹10.10         |
| Department P3 (3 hours × ₹5.03)            | ₹15.09         |
| <b>Cost of product X</b>                   | <b>₹117.23</b> |

**RECOVERY RATE****BQ 11**

The monthly budget of a department is as under:

|                     |   |         |
|---------------------|---|---------|
| Direct material     | : | ₹45,000 |
| Direct wages        | : | ₹60,000 |
| Overheads           | : | ₹90,000 |
| Direct labour hours | : | 15,000  |
| Machine hours       | : | 30,000  |

Find out the overhead recovery rate based on at least five different possible methods of absorption of overheads.

[% of material cost 200%, % of labour cost 150%, % of prime cost 85.71%, Rate per labour hour ₹6.00, Rate per machine hour ₹3.00]

**BQ 12**

Atlas Engineering Ltd. accepts a variety of jobs which require both manual and machine operations. The budgeted profit and Loss Account for the period 2022-23 is as follow:

|                                                   |          |              |
|---------------------------------------------------|----------|--------------|
|                                                   |          | (₹ in lakhs) |
| Sales                                             |          | 75           |
| Cost:                                             |          |              |
| Direct materials                                  | 10       |              |
| Direct labour                                     | <u>5</u> |              |
| Prime Cost                                        | 15       |              |
| Production Overhead                               | 30       |              |
| Production Cost                                   | 45       |              |
| Administrative, Selling and Distribution Overhead | 15       | 60           |
| <b>Profit</b>                                     |          | <b>15</b>    |

Other budgeted data:

|                              |             |
|------------------------------|-------------|
| Labour hours for the period  | 2,500 hours |
| Machine hours for the period | 1,500 hours |
| No. of jobs for the period   | 300 jobs    |

An enquiry has been received recently from a customer and the production department has prepared the following estimate of the prime cost required for the job:

|                        |         |
|------------------------|---------|
| Direct material        | ₹2,500  |
| Direct labour          | ₹2,000  |
| Prime Cost             | ₹4,500  |
| Labour hours required  | 8 hours |
| Machine hours required | 5 hours |

You are required to:

- Calculate by different methods, six overhead absorption rates for absorption of production overhead.
- Calculate the production overhead cost of the order based on each of the above rates.

**Answer**

(a) Computation of overhead absorption rates for absorption of production overheads:

### OVERHEADS ABSORPTION COSTING METHOD 3.11

|                                     |   |                                                                              |   |                                          |   |                       |
|-------------------------------------|---|------------------------------------------------------------------------------|---|------------------------------------------|---|-----------------------|
| 1. <b>Direct labour hour rate</b>   | = | $\frac{\text{Production overheads}}{\text{Direct labour hours}}$             | = | $\frac{30,00,000}{2,500}$                | = | <b>1,200 per hour</b> |
| 2. <b>Machine hour rate</b>         | = | $\frac{\text{Production overheads}}{\text{Machine hours}}$                   | = | $\frac{30,00,000}{1,500}$                | = | <b>2,000 per hour</b> |
| 3. <b>% of direct material cost</b> | = | $\frac{\text{Production overheads}}{\text{Direct material cost}} \times 100$ | = | $\frac{30,00,000}{10,00,000} \times 100$ | = | <b>300%</b>           |
| 4. <b>% of labour cost</b>          | = | $\frac{\text{Production overheads}}{\text{Direct labour cost}} \times 100$   | = | $\frac{30,00,000}{5,00,000} \times 100$  | = | <b>600%</b>           |
| 5. <b>% of prime cost</b>           | = | $\frac{\text{Production overheads}}{\text{Prime cost}} \times 100$           | = | $\frac{30,00,000}{15,00,000} \times 100$ | = | <b>200%</b>           |
| 6. <b>Job rate</b>                  | = | $\frac{\text{Production overheads}}{\text{No. of jobs}}$                     | = | $\frac{30,00,000}{300}$                  | = | <b>10,000 per job</b> |

#### (b) Calculation of production overhead cost to the order on the basis of above rates:

|                                    |   |                                           |   |                 |   |                |
|------------------------------------|---|-------------------------------------------|---|-----------------|---|----------------|
| 1. Under direct labour hour rate   | = | No. of labour hours × Rate per hour       | = | 8 hours × 1,200 | = | <b>₹9,600</b>  |
| 2. Under machine hour rate         | = | No. of machine hours × Rate per hour      | = | 5 hours × 2,000 | = | <b>₹10,000</b> |
| 3. Under % of direct material cost | = | Direct material cost × % of material cost | = | 2,500 × 300%    | = | <b>₹7,500</b>  |
| 4. Under % of direct labour cost   | = | Direct labour cost × % of labour cost     | = | 2,000 × 600%    | = | <b>₹12,000</b> |
| 5. Under % of prime cost           | = | Prime cost × % of prime cost              | = | 4,500 × 200%    | = | <b>₹9,000</b>  |
| 6. Under job rate                  | = | No. of jobs × Rate per job                | = | 1 job × 10,000  | = | <b>₹10,000</b> |

### BQ 13

The preliminary budget for a company with four departments was as under:

| Departments  | Direct overheads allocation | Apportioned overheads (%) | Direct labour hours |
|--------------|-----------------------------|---------------------------|---------------------|
| 1            | ₹14,200                     | 10                        | 60,000              |
| 2            | ₹7,200                      | 30                        | 2,00,000            |
| 3            | ₹16,400                     | 20                        | 1,20,000            |
| 4            | ₹22,600                     | 40                        | 1,50,000            |
| <b>Total</b> | <b>₹60,400</b>              | <b>₹1,76,000</b>          | <b>5,30,000</b>     |

It was decided to establish a new department 5 and to slightly re organize the existing departments. The following alternations were agreed to in making a revised budget:

- (a) A sum of ₹15,000 being additional overhead will be allocated directly to department 5.
- (b) An amount of ₹6,600 being overhead previously allocated directly to department 3 will now be transferred to department 5.
- (c) ₹30,000 additional overhead expected to be incurred due to re organization will be apportioned as follows:

|                       |          |          |          |          |          |
|-----------------------|----------|----------|----------|----------|----------|
| <b>Department</b>     | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> |
| <b>Proportion (%)</b> | 10       | 20       | -        | 10       | 60       |

- (d) Revised direct labour hours are expected to be

|                   |              |
|-------------------|--------------|
| <b>Department</b> | <b>Hours</b> |
| 1                 | 69,600       |
| 2                 | 2,00,000     |
| 3                 | 1,00,000     |



**OVERHEADS ABSORPTION COSTING METHOD 3.12**

|              |                 |
|--------------|-----------------|
| 4            | 1,60,000        |
| 5            | 90,000          |
| <b>Total</b> | <b>6,19,600</b> |

**You are required to calculate:**

- (a) The departmental direct labour hours rates of overhead, based on the preliminary budget.  
 (b) The department direct labour rate of overhead, based on the revised budget.  
 (c) The overhead chargeable at the revised rates to one unit of product X for which the following hours are spent in each department:

|                   |          |          |          |          |
|-------------------|----------|----------|----------|----------|
| <b>Department</b> | <b>1</b> | <b>3</b> | <b>4</b> | <b>5</b> |
| <b>Hours</b>      | <b>6</b> | <b>4</b> | <b>8</b> | <b>3</b> |

**Answer**

**(a) Statement of Departmental Direct Labour Hour Rate of Overheads  
(Based on Preliminary Budget)**

| <b>Items</b>                   | <b>Basis</b> | <b>1</b>      | <b>2</b>      | <b>3</b>      | <b>4</b>      |
|--------------------------------|--------------|---------------|---------------|---------------|---------------|
| Allocated Overheads            | -            | 14,200        | 7,200         | 16,400        | 22,600        |
| Apportioned Overheads          | 10:30:20:40  | 17,600        | 52,800        | 35,200        | 70,400        |
| <b>Total OH</b>                | -            | <b>31,800</b> | <b>60,000</b> | <b>51,600</b> | <b>93,000</b> |
| ÷ Labour Hours                 | -            | 60,000        | 2,00,000      | 1,20,000      | 1,50,000      |
| <b>Direct Labour Hour Rate</b> |              | <b>₹0.53</b>  | <b>₹0.30</b>  | <b>₹0.43</b>  | <b>₹0.62</b>  |

**(b) Statement of Departmental Direct Labour Hour Rate of Overheads  
(Based on Revised Budget)**

| <b>Items</b>                   | <b>Basis</b>       | <b>1</b>      | <b>2</b>      | <b>3</b>      | <b>4</b>      | <b>5</b>      |
|--------------------------------|--------------------|---------------|---------------|---------------|---------------|---------------|
| Total Overheads                | Preliminary Budget | 31,800        | 60,000        | 51,600        | 93,000        | -             |
| Additional Overheads           | Allocation         | -             | -             | -             | -             | 15,000        |
| Transfer of OH                 | 3 to 5             | -             | -             | (6,600)       | -             | 6,600         |
| Additional Overheads           | 10:20:10:60        | 3,000         | 6,000         | -             | 3,000         | 18,000        |
| <b>Total OH</b>                | -                  | <b>34,800</b> | <b>66,000</b> | <b>45,000</b> | <b>96,000</b> | <b>39,600</b> |
| ÷ Labour Hours                 | -                  | 69,600        | 2,00,000      | 1,00,000      | 1,60,000      | 90,000        |
| <b>Direct Labour Hour Rate</b> |                    | <b>₹0.50</b>  | <b>₹0.33</b>  | <b>₹0.45</b>  | <b>₹0.60</b>  | <b>₹0.44</b>  |

**(c) Chargeable overheads on one unit of Product X** = 6 hours × ₹0.50 + 4 hours × ₹0.45 + 8 hours × ₹0.60 + 3 hours × ₹0.44  
 = **₹10.92**

**BQ 14**

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 ₹4,20,000 per annum.

**The expenses regarding the machine are estimated as follows.**

|                            |           |
|----------------------------|-----------|
| 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:**

|                                              | <b>Job A</b> | <b>Job B</b> | <b>Job C</b> |
|----------------------------------------------|--------------|--------------|--------------|
| <b>Number of hours the machine was used:</b> |              |              |              |
| (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:**

- (i) For the firm as a whole for the month when the computer was used and when the computer was not used.



(ii) For the individual jobs A, B and C.

**[(i) ₹27.50 and ₹10.00 per machine hour (ii) Job A: ₹17, Job B: ₹17, Job C: ₹27.50]**

### REVERSE CALCULATION OF OVERHEADS

#### **BQ 15**

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:

|                                    | <b>Job 101</b> | <b>Job 102</b> |
|------------------------------------|----------------|----------------|
| Direct Materials                   | ₹54,000        | ₹37,500        |
| Direct Wages                       | ₹42,000        | ₹30,000        |
| Selling price                      | ₹1,66,650      | ₹1,28,250      |
| Profit as percentage on total cost | 10%            | 20%            |

**You are required to compute:**

- (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                   | ₹24,000 |
| Direct wages                       | ₹20,000 |
| Profit percentage on selling price | 12-½%   |

**[(i) 60% & 25% (ii) ₹25,200, ₹30,300, ₹15,150 and ₹18,000, ₹21,375, ₹21,375 (iii) ₹80,000]**

#### **BQ 16**

In the current quarter, a company has undertaken two jobs. The data relating to these jobs are as under:

|                              | <b>Job 1102</b> | <b>Job 1108</b> |
|------------------------------|-----------------|-----------------|
| Selling price                | ₹1,07,325       | ₹1,57,920       |
| Profit as percentage on cost | 8%              | 12%             |
| Direct Materials             | ₹37,500         | ₹54,000         |
| Direct Wages                 | ₹30,000         | ₹42,000         |

It is the policy of the company to charge factory overheads as percentage on direct wages and selling and administration overheads as percentage on factory cost.

The company has received a new order for manufacturing of a similar job. The estimate of direct materials and direct wages relating to the new order is ₹64,000 and ₹50,000 respectively. A profit of 20% on sales is required.

**You are required to compute:**

- (i) The rates of Factory overheads and Selling and Administration overheads to be charged;
- (ii) The Selling price of the new order.

#### **Answer**

**(i) Computation of rates of factory overheads and selling and administration overheads to be charged:**

Let % of factory overheads to direct wages be F and % of selling and administrative overheads to factory cost be A

#### **Jobs Cost Sheet**

| <b>Particulars</b> | <b>Job 1102</b> | <b>Job 1108</b> |
|--------------------|-----------------|-----------------|
| Direct materials   | 37,500          | 54,000          |
| Direct wages       | 30,000          | 42,000          |
| <b>Prime cost</b>  | <b>67,500</b>   | <b>96,000</b>   |
| Factory overheads  | 30,000F         | 42,000F         |

### OVERHEADS ABSORPTION COSTING METHOD 3.14

|                               |                              |                              |
|-------------------------------|------------------------------|------------------------------|
| <b>Factory cost</b>           | <b>67,500+30,000F</b>        | <b>96,000+42,000F</b>        |
| Selling and Administration OH | (67,500+30,000F)A            | (96,000+42,000F)A            |
| <b>Total cost</b>             | <b>(67,500+30,000F)(1+A)</b> | <b>(96,000+42,000F)(1+A)</b> |

**\* Computation of total cost of jobs:**

$$\text{Total cost of Job 1102 when 8\% is the profit on cost} = \frac{1,07,325}{108\%} \times 100 = \text{₹99,375}$$

$$\text{Total cost of Job 1108 when 12\% is the profit on cost} = \frac{1,57,920}{112\%} \times 100 = \text{₹1,41,000}$$

Since the total cost of jobs 1102 and 1108 are equal to ₹99,375 and ₹1,41,000 respectively, therefore, we have the following equations:

$$(67,500 + 30,000F)(1 + A) = \text{₹99,375} \quad (1)$$

$$(96,000 + 42,000F)(1 + A) = \text{₹1,41,000} \quad (2)$$

Or

$$67,500 + 30,000F + 67,500A + 30,000FA = \text{₹99,375}$$

$$96,000 + 42,000F + 96,000A + 42,000FA = \text{₹1,41,000}$$

Or

$$30,000F + 67,500A + 30,000FA = \text{₹31,875} \quad (3)$$

$$42,000F + 96,000A + 42,000FA = \text{₹45,000} \quad (4)$$

**On solving (3) and (4) we get:**

$$\begin{array}{lcl} A & = & 0.25 \text{ or } 25\% \text{ on factory cost} \\ F & = & 0.40 \text{ or } 40\% \text{ on direct wages} \end{array}$$

#### (ii) Selling price of the new order

| Particulars                                   | Amount          |
|-----------------------------------------------|-----------------|
| Materials                                     | 64,000          |
| Productive Wages                              | 50,000          |
| <b>Prime Cost</b>                             | <b>1,14,000</b> |
| Factory overheads (40% of 50,000)             | 20,000          |
| <b>Factory Cost</b>                           | <b>1,34,000</b> |
| Selling and Admin overheads (25% of 1,34,000) | 33,500          |
| <b>Total Cost</b>                             | <b>1,67,500</b> |
| Profit (20% on sales or 25% on cost)          | 41,875          |
| <b>Sale Price</b>                             | <b>2,09,375</b> |

### UNDER AND OVER ABSORPTION OF OVERHEADS

#### BQ 17

Sweet Dreams Ltd. uses a historical cost system and absorbs overheads the basis of pre determined rate. The following data are available for the year ended 31<sup>st</sup> March 2019:

|                         |   |           |
|-------------------------|---|-----------|
| Overhead actually spent | : | ₹1,70,000 |
| Overhead absorbed       | : | ₹1,50,000 |
| Cost of goods sold      | : | ₹3,36,000 |
| Stock of finished goods | : | ₹96,000   |
| Work-in-progress        | : | ₹48,000   |

**Using three methods of disposal of under absorbed overheads show the implication on the profits of the company under each method.**

**[Under absorbed overheads ₹20,000; Effect on profit: Transfer to P/L method: Profit will decline by ₹20,000; carry forward to next period method: No impact on profit; Supplementary rate method: Profit will decline by ₹14,000]**

**BQ 18**

In factory overheads of a particular department are recovered on the basis of ₹5 per machine hour. The total expenses incurred and the actual machine hours for the department for the month of August were ₹80,000 and 10,000 hours respectively. Of the amount of ₹80,000, ₹15,000 became payable due to an award of the Labour Court and ₹5,000 were in respect of expenses off 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****(a) Computation of under absorption of Production Overheads:**

| Particulars                                              | Amount         |
|----------------------------------------------------------|----------------|
| Total production overheads actually incurred             | 80,000         |
| Less: Amount payable due to an award of the Labour Court | (15,000)       |
| Less: Expenses off the previous year                     | (5,000)        |
| <b>Net production overheads actually incurred</b>        | <b>60,000</b>  |
| Production overheads recovered (10,000 hours × ₹5)       | 50,000         |
| <b>Under Recovery of production overheads</b>            | <b>₹10,000</b> |

**(b) Accounting treatment of under-recovered production overheads:**

1. ₹6,000 (₹10,000 × 60%) of under absorbed overheads were due to defective production planning. This being abnormal should be debited to Costing Profit and Loss Account.
2. The balance of ₹4,000 of under absorbed overheads should be distributed over finished goods and cost of sales by using supplementary rate.

$$\begin{aligned} \text{Supplementary OH Rate} &= \text{Under Recovered OH} \div \text{Equivalent Units} \\ &= ₹4,000 \div 40,000 \text{ units} = \text{₹0.1 per unit} \end{aligned}$$

**Distribution of unabsorbed overheads of ₹4,000:**

$$\begin{aligned} \text{Cost of Sales (30,000} \times \text{₹0.1)} &= ₹3,000 \\ \text{Finished Goods (10,000} \times \text{₹0.1)} &= ₹1,000 \end{aligned}$$

**Journal Entries**

| Entries                                                       | Dr.       | Cr.    |
|---------------------------------------------------------------|-----------|--------|
| Cost of Sales A/c                                             | Dr. 3,000 | -      |
| Finished Goods Control A/c                                    | Dr. 1,000 | -      |
| Costing Profit & Loss A/c                                     | Dr. 6,000 | -      |
| To Overhead Control A/c                                       | -         | 10,000 |
| (Being under recovery of under absorbed oh recovered/charged) |           |        |

**BQ 19**

In a manufacturing unit factory overhead was recovered at predetermined rate of ₹25 per man day. The total factory overhead expenses incurred and the man days actually worked were ₹41.50 lakhs and 1.5 lakhs man days respectively. Out of the 40,000 units produced during a period 30,000 were sold.

On analysing the reasons, it was found that 60% of the unabsorbed overheads were due to defective planning and the rest were attributable to increase in overhead costs.

*How would unabsorbed overheads be treated in Cost Account?*

**Answer****(a) Computation of under absorption of Production Overheads:**

$$\begin{aligned} \text{Recovered Overheads (1,50,000 man days} \times \text{₹25)} & ₹37,50,000 \\ \text{Actual Overheads Incurred} & ₹41,50,000 \end{aligned}$$

**Under absorption**

**₹4,00,000**

**(b) Accounting treatment of under-recovered production overheads:**

1. ₹2,40,000 (₹4,00,000 × 60%) of under absorbed overheads were due to defective planning. This being abnormal should be debited to Costing Profit and Loss Account.
2. The balance of ₹1,60,000 of under absorbed overheads should be distributed over finished goods and cost of sales by using supplementary rate.

$$\begin{aligned} \text{Supplementary OH Rate} &= \text{Under Recovered OH} \div \text{Equivalent Units} \\ &= ₹1,60,000 \div 40,000 \text{ units} = \text{₹4 per unit} \end{aligned}$$

**Distribution of unabsorbed overheads of ₹1,60,000:**

$$\begin{aligned} \text{Cost of Sales (30,000} \times \text{₹4)} &= ₹1,20,000 \\ \text{Finished Goods (10,000} \times \text{₹4)} &= ₹40,000 \end{aligned}$$

**Journal Entries**

| Entries                                                       |     | Dr.      | Cr.      |
|---------------------------------------------------------------|-----|----------|----------|
| Cost of Sales A/c                                             | Dr. | 1,20,000 | -        |
| Finished Goods Control A/c                                    | Dr. | 40,000   | -        |
| Costing Profit & Loss A/c                                     | Dr. | 2,40,000 | -        |
| To Overhead Control A/c                                       |     | -        | 4,00,000 |
| (Being under recovery of under absorbed oh recovered/charged) |     |          |          |

**BQ 20**

**From the following data relating to a production unit work out the over absorbed or under absorbed overhead resulted during the month of review.**

The unit having strength of 20 workmen planned for 290 working days of 8 hours each with half an hour break. Based on the earlier years trend it is forecasted that average absenteeism per workman would be 10 days in addition to the eligibility of 30 days annual leave.

The budgeted overheads related to the unit for the year amounted to ₹75,000 and the unit follows a system of recovering overheads on the basis of direct labour hour.

The actual overheads during the year amounted to ₹71,200 and the following details regarding actual working of the unit are available:

- (i) The factory worked 3 extra days to meet the production targets but one additional paid holiday had to be declared.
- (ii) There was a severe breakdown of major equipment leading to a loss of 350 man hours.
- (iii) Total overtime hours (in addition to 3 extra days worked) amounted to 680 hours.
- (iv) The actual average absenteeism per workman was 12 days.

**[Over absorbed ₹4,460]**

**BQ 21**

A Ltd. manufactures two products A and B. The manufacturing division consists of two production departments P1 and P2 and two services 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.

**For allocating the service department costs to production departments the basis adopted is as follows:**

- (i) Cost of departments S1 to departments P1 and P2 equally and
- (ii) Cost of department S2 to departments P1 and P2 in the ratio of 2:1 respectively.

**The following data relating to factory overheads budgeted for the year is available:**

**OVERHEADS ABSORPTION COSTING METHOD 3.17**

|    |            |    |           |
|----|------------|----|-----------|
| P1 | ₹25,50,000 | S1 | ₹6,00,000 |
| P2 | ₹21,75,000 | S2 | ₹4,50,000 |

**Budgeted output in units:**

|           |        |           |        |
|-----------|--------|-----------|--------|
| Product A | 50,000 | Product B | 30,000 |
|-----------|--------|-----------|--------|

**Budgeted raw material cost per unit:**

|           |      |           |      |
|-----------|------|-----------|------|
| Product A | ₹120 | Product B | ₹150 |
|-----------|------|-----------|------|

**Budgeted time required for production per unit:**

|               |           |                       |           |                       |
|---------------|-----------|-----------------------|-----------|-----------------------|
| Department P1 | Product A | 1.5 Machine hours     | Product B | 1 Machine hour        |
| Department P2 | Product A | 2 Direct labour hours | Product B | 2.5 Direct labour hrs |

**You are required to compute the pre-determined overhead rate for both the production department.**

**Answer****(i) Computation of predetermined overhead rate for each production department**

| Items                  | Basis of Charge | Production Departments |                  | Service Departments |            |
|------------------------|-----------------|------------------------|------------------|---------------------|------------|
|                        |                 | P1                     | P2               | S1                  | S2         |
| Budgeted OH            | Given           | 25,50,000              | 21,75,000        | 6,00,000            | 4,50,000   |
| Apportionment:         |                 |                        |                  |                     |            |
| Expenses of S1         | 1:1             | 3,00,000               | 3,00,000         | (6,00,000)          | -          |
| Expenses of S2         | 2:1             | 3,00,000               | 1,50,000         | -                   | (4,50,000) |
| <b>Total OH</b>        | -               | <b>31,50,000</b>       | <b>26,25,000</b> | -                   | -          |
| ÷ Budget Machine hours | -               | ÷ 1,05,000             | -                | -                   | -          |
| ÷ Budget Labour hours  | -               | -                      | ÷ 1,75,000       | -                   | -          |
| Recovery rate          | -               | ₹30                    | ₹15              | -                   | -          |

**Working Notes:****Calculation of Budgeted and Actual machine hours and labour hours:**

|                                         | Product A                            | Product B                            | Total    |
|-----------------------------------------|--------------------------------------|--------------------------------------|----------|
| Budgeted output (in units)              | 50,000 units                         | 30,000 units                         |          |
| Budgeted machine hours in department P1 | 75,000 hours<br>(50,000 × 1.5 hours) | 30,000 hours<br>(30,000 × 1 hours)   | 1,05,000 |
| Budgeted labour hours in department P2  | 1,00,000 hours<br>(50,000 × 2 hours) | 75,000 hours<br>(30,000 × 2.5 hours) | 1,75,000 |

**MISCELLANEOUS****BQ 22**

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 21<sup>st</sup> August, 20X1 is given below:

| Particulars                                    | ₹   | ₹           |
|------------------------------------------------|-----|-------------|
| Direct materials (all items)                   |     | 780         |
| Direct labour (manual) 20 hours @ ₹15 per hour |     | 300         |
| <b>Machine facilities:</b>                     |     |             |
| Machine No I: 4 hours @ ₹45                    | 180 |             |
| Machine No II: 6 hours @ ₹65                   | 390 | 570         |
| Total                                          |     | 1650        |
| Overheads @ ₹8 per hour on 20 manual hours     |     | 160         |
| <b>Total cost</b>                              |     | <b>1810</b> |

### OVERHEADS ABSORPTION COSTING METHOD 3.18

The overhead rate of ₹8 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 (45 maximum working hours and 40 hours normal working hours per week for both machines).

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, 20X1, the total labour hours worked was 2,400 and Machine Nos. I and II had worked for 30 hours and 32.5 hours respectively.

**Prepare a Cost Sheet for the job for the fabrication of 12 Nos. machine parts duly levying the supplementary rates.**

#### Answer

Fabrication of 12 Nos. machine parts (job No.....) Date of commencement: 16 August, 20X1 Date of Completion.  
Cost sheet for the week ending, August 21, 20X1:

| Particulars                                    | ₹   | ₹            |
|------------------------------------------------|-----|--------------|
| Direct materials (all items)                   |     | 780          |
| Direct labour (manual) 20 hours @ ₹15 per hour |     | 300          |
| <b>Machine facilities:</b>                     |     |              |
| Machine No I: 4 hours @ ₹45                    | 180 |              |
| Machine No II: 6 hours @ ₹65                   | 390 | 570          |
| Total                                          |     | 1650         |
| Overheads @ ₹8 per hour on 20 manual hours     |     | 160          |
| <b>Total cost</b>                              |     | <b>1810</b>  |
| <b>Supplementary Rates</b>                     |     |              |
| Overheads @ ₹2 per hour on 20 manual hours     | 40  |              |
| Machine No I: 4 hours @ ₹15                    | 60  |              |
| Machine No II: 6 hours @ ₹15                   | 90  | 190          |
| <b>Total cost</b>                              |     | <b>2,000</b> |

#### Working notes:

##### Calculation of Supplementary rate:

##### (a) Overheads:

|                      |                       |   |                               |
|----------------------|-----------------------|---|-------------------------------|
| Overheads budgeted   | 3,000 hours × ₹8      | = | ₹24,000                       |
| Actual hours         |                       | = | 2,400                         |
| Actual rate per hour | ₹24,000 ÷ 2,400 hours | = | ₹10                           |
| Supplementary charge |                       | = | <b>₹2 (₹10 - ₹8) per hour</b> |

##### (b) Machine facilities:

###### Machine No I:

|                      |                   |   |                                 |
|----------------------|-------------------|---|---------------------------------|
| Overheads budgeted   | 40 hours × ₹45    | = | ₹1,800                          |
| Actual hours         |                   | = | 30                              |
| Actual rate per hour | ₹1,800 ÷ 30 hours | = | ₹60                             |
| Supplementary charge |                   | = | <b>₹15 (₹60 - ₹45) per hour</b> |

###### Machine No II:

|                      |                     |   |                                 |
|----------------------|---------------------|---|---------------------------------|
| Overheads budgeted   | 40 hours × ₹65      | = | ₹2,600                          |
| Actual hours         |                     | = | 32.5                            |
| Actual rate per hour | ₹2,600 ÷ 32.5 hours | = | ₹80                             |
| Supplementary charge |                     | = | <b>₹15 (₹80 - ₹65) per hour</b> |

#### BQ 23

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:

### OVERHEADS ABSORPTION COSTING METHOD 3.19

| Department | Direct Materials<br>(₹) | Direct Wages<br>(₹) | Factory Overheads<br>(₹) | 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

| Department | Direct Materials<br>(₹) | Direct Wages<br>(₹) | 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:

- (i) Calculate the overhead absorption rate as per the current policy of the company and determine the selling price of the Job No. CW 7083.
- (ii) Suggest any suitable alternative method(s) of absorption of the factory overheads and calculate the overhead recovery rates based on the method(s) so recommended by you.
- (iii) Determine the selling price of Job CW 7083 based on the overhead application rates calculated in (ii) above.
- (iv) Calculate the department-wise and total under or over recovery of overheads based on the company's current policy and the method(s) recommended by you.

#### Answer

##### (i) Calculation of overhead absorption rate as per current policy of the company (blanket rate):

$$\begin{aligned}
 \text{Blanket rate} &= \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Direct Wages}} \times 100 = \frac{3,60,000 + 1,40,000 + 1,25,000}{80,000 + 3,50,000 + 70,000} \times 100 \\
 &= \mathbf{125\% \text{ of Direct Wages}}
 \end{aligned}$$

##### Calculation of Selling Price of the Job No. CW-7083:

| Particulars                             | Amount          |
|-----------------------------------------|-----------------|
| Direct materials (₹1,200 + ₹600 + ₹300) | 2,100           |
| Direct wages (₹240 + ₹360 + ₹60)        | 660             |
| <b>Prime Cost</b>                       | <b>2,760</b>    |
| Overheads (125% × ₹660)                 | 825             |
| <b>Factory Cost</b>                     | <b>3,585</b>    |
| Mark-up (30% × ₹3,585)                  | 10,75.50        |
| <b>Selling Price</b>                    | <b>4,660.50</b> |

##### (ii) Methods available for absorbing factory overheads and their overhead recovery rates in different departments:

###### 1. Machining Department:

In the machining department, the use of machine time is the predominant factor of production. Hence machine hour rate should be used to recover overheads in this department. The overhead recovery rate based on machine hours has been calculated as under:



**OVERHEADS ABSORPTION COSTING METHOD 3.20**

$$\text{Machine hour rate} = \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Machine Hours}} = \frac{3,60,000}{80,000 \text{ hours}} = \text{₹4.50 per hour}$$

**2. Assembly Department:**

In this department direct labour hours is the main factor of production. Hence direct labour hour rate method should be used to recover overheads in this department. The overheads recovery rate in this case is:

$$\text{Direct labour hour rate} = \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Direct Labour Hours}} = \frac{1,40,000}{1,00,000 \text{ hours}} = \text{₹1.40 per hour}$$

**3. Packing Department:**

Labour is the most important factor of production in this department. Hence direct labour hour rate method should be used to recover overheads in this department. The overhead recovery rate in this case comes to:

$$\text{Direct labour hour rate} = \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Direct Labour Hours}} = \frac{1,25,000}{50,000 \text{ hours}} = \text{₹2.50 per hour}$$

**(iii) Selling Price of Job CW-7083 [based on the overhead application rates calculated in (ii) above]**

| Particulars                             | Amount          |
|-----------------------------------------|-----------------|
| Direct materials (₹1,200 + ₹600 + ₹300) | 2,100           |
| Direct wages (₹240 + ₹360 + ₹60)        | 660             |
| <b>Prime Cost</b>                       | <b>2,760</b>    |
| Overheads:                              |                 |
| Machining (180 machine hours × ₹4.50)   | 810             |
| Assembly (120 labour hours × ₹1.40)     | 168             |
| Packing (40 labour hours × ₹2.50)       | 100             |
| <b>Factory Cost</b>                     | <b>3,838</b>    |
| Mark-up (30% × ₹3,838)                  | 1,151.40        |
| <b>Selling Price</b>                    | <b>4,989.40</b> |

**(iv) Department-wise statement of total under or over recovery of overheads:****(a) Under Current Policy (Blanket Rate)**

| Details                                       | Machining (₹)     | Assembly (₹)    | Packing (₹)     | Total (₹)       |
|-----------------------------------------------|-------------------|-----------------|-----------------|-----------------|
| Direct wages (Actual)                         | 96,000            | 2,70,000        | 90,000          |                 |
| Overheads recovered @ 125% of Direct wage (1) | 1,20,000          | 3,37,500        | 1,12,500        | 5,70,000        |
| Actual overheads (2)                          | 3,90,000          | 84,000          | 1,35,000        | 6,09,000        |
| <b>(Under)/over recovery (1 - 2)</b>          | <b>(2,70,000)</b> | <b>2,53,500</b> | <b>(22,500)</b> | <b>(39,000)</b> |

**(b) Under Method Suggested (Department-Wise Rate)**

| Details                                    | Machining (₹) | Assembly (₹)  | Packing (₹)   | Total (₹)     |
|--------------------------------------------|---------------|---------------|---------------|---------------|
| Actual Machine Hours                       | 96,000        | -             | -             |               |
| Actual Direct Labour Hours                 | -             | 90,000        | 60,000        |               |
| Recovery rate per machine hour/labour hour | 4.50          | 1.40          | 2.50          |               |
| Overheads recovered (1)                    | 4,32,000      | 1,26,000      | 1,50,000      | 7,08,000      |
| Actual overheads (2)                       | 3,90,000      | 84,000        | 1,35,000      | 6,09,000      |
| <b>(Under)/over recovery (1 - 2)</b>       | <b>42,000</b> | <b>42,000</b> | <b>15,000</b> | <b>99,000</b> |

**BQ 24**

A company which sells four products, some of them unprofitable, proposes discontinuing the sale of one of them. The following information is available regarding income, costs and activity for the year ended 31<sup>st</sup> March, 2023.

| Details | A | B | C | D |
|---------|---|---|---|---|
|---------|---|---|---|---|



**OVERHEADS ABSORPTION COSTING METHOD 3.21**

|                                                                  |           |           |           |           |
|------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| Sales (₹)                                                        | 30,00,000 | 50,00,000 | 25,00,000 | 45,00,000 |
| Cost of sales (₹)<br>(before selling and distribution overheads) | 20,00,000 | 45,00,000 | 21,00,000 | 22,50,000 |
| Area of storage (Sq. ft.)                                        | 50,000    | 40,000    | 80,000    | 30,000    |
| Number of parcels sent                                           | 1,00,000  | 1,50,000  | 75,000    | 1,75,000  |
| Number of invoices sent                                          | 80,000    | 1,40,000  | 60,000    | 1,20,000  |

Selling and Distribution overheads and the basis of allocation are:

| <b>Details</b>                  | <b>₹</b>       | <b>Basis of allocation to products</b> |
|---------------------------------|----------------|----------------------------------------|
| Fixed cost:                     |                |                                        |
| Rent & insurance                | 3,00,000       | Square feet                            |
| Depreciation                    | 1,00,000       | Parcel                                 |
| Salesmen's salaries & expenses  | 6,00,000       | Sales volume                           |
| Administrative wages & salaries | 5,00,000       | Number of invoices                     |
| Variable cost:                  |                |                                        |
| Packing wages & materials       | ₹2 per parcel  |                                        |
| Commission                      | 4% of sales    |                                        |
| Stationery                      | ₹1 per invoice |                                        |

**You are required to prepare Costing Profit & Loss Statement, showing the percentage of profit or loss to sales for each product.**

**Answer**

**Statement Showing Costing Profit & Loss**

| <b>Details</b>                                       | <b>Total (₹)</b>   | <b>A (₹)</b>     | <b>B (₹)</b>      | <b>C (₹)</b>      | <b>D (₹)</b>     |
|------------------------------------------------------|--------------------|------------------|-------------------|-------------------|------------------|
| Sales (₹)                                            | 1,50,00,000        | 30,00,000        | 50,00,000         | 25,00,000         | 45,00,000        |
| Variable cost:                                       |                    |                  |                   |                   |                  |
| Cost of sales (₹)                                    | 1,08,50,000        | 20,00,000        | 45,00,000         | 21,00,000         | 22,50,000        |
| Packing wages & materials @ ₹2 per parcel            | 10,00,000          | 2,00,000         | 3,00,000          | 1,50,000          | 3,50,000         |
| Commission @ 4% of sales                             | 6,00,000           | 1,20,000         | 2,00,000          | 1,00,000          | 1,80,000         |
| Stationery @ ₹1 per invoice                          | 4,00,000           | 80,000           | 1,40,000          | 60,000            | 1,20,000         |
| <b>Total Variable cost (A)</b>                       | <b>1,28,50,000</b> | <b>24,00,000</b> | <b>51,40,000</b>  | <b>24,10,000</b>  | <b>29,00,000</b> |
| Fixed cost:                                          |                    |                  |                   |                   |                  |
| Rent & insurance (5 : 4 : 8 : 3)                     | 3,00,000           | 75,000           | 60,000            | 1,20,000          | 45,000           |
| Depreciation (100:150:75:175)                        | 1,00,000           | 20,000           | 30,000            | 15,000            | 35,000           |
| Salesmen's salaries & expenses (30: 50 : 25 : 45)    | 6,00,000           | 1,20,000         | 2,00,000          | 1,00,000          | 1,80,000         |
| Administrative wages & salaries (80: 140 : 60 : 120) | 5,00,000           | 1,00,000         | 1,75,000          | 75,000            | 1,50,000         |
| <b>Total Fixed cost (B)</b>                          | <b>15,00,000</b>   | <b>3,15,000</b>  | <b>4,65,000</b>   | <b>3,10,000</b>   | <b>4,10,000</b>  |
| <b>Total cost (A + B)</b>                            | <b>1,43,50,000</b> | <b>27,15,000</b> | <b>56,05,000</b>  | <b>27,20,000</b>  | <b>33,10,000</b> |
| <b>Profit or Loss (Sales - Total cost)</b>           | <b>6,50,000</b>    | <b>2,85,000</b>  | <b>(6,05,000)</b> | <b>(2,20,000)</b> | <b>11,90,000</b> |
| <b>% of Profit or Loss to sales</b>                  | <b>4.33%</b>       | <b>9.5%</b>      | <b>(12.10%)</b>   | <b>(8.80%)</b>    | <b>26.44%</b>    |

**MACHINE HOUR RATE****BQ 25**

A machine costing ₹1,00,00,000 is expected to run for 10 years. At the end of this period its scrap value is likely to be ₹9,00,000. Repairs during the whole life of the machine are expected to be ₹18,00,000 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. 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 ₹30,000 and the lighting charges amount to ₹8,000 per month. The foreman is paid a monthly salary of ₹19,200. Insurance is @ 1% p.a. and the expenses on oil, etc., are ₹900 per month.

*Find out the machine hour rate.*

**Answer**

| <b>Machine Hour Rate</b>                                  |                                                                                |                    |
|-----------------------------------------------------------|--------------------------------------------------------------------------------|--------------------|
| <b>Particulars</b>                                        |                                                                                | <b>Amount</b>      |
| <b>(A) Standing charges/ Fixed costs</b>                  |                                                                                |                    |
| Depreciation                                              | $[(\text{₹}1,00,00,000 - 9,00,000) \times 1/10 \text{ years} \times 1/12]$     | 75,833.33          |
| Rent                                                      | $(\text{₹}30,000 \times 1/4)$                                                  | 7,500              |
| Lighting charges                                          | $(\text{₹}8,000 \times 2/10)$                                                  | 1,600              |
| Foreman's salary                                          | $(\text{₹}19,200 \times 1/6)$                                                  | 3,200              |
| Insurance Premium                                         | $(\text{₹}1,00,00,000 \times 1\% \times 1/12)$                                 | 8,333.33           |
| <b>Total (A)</b>                                          |                                                                                | <b>96,466.66</b>   |
| <b>(B) Running charges/ Variable costs</b>                |                                                                                |                    |
| Repairs                                                   | $(\text{₹}18,00,000 \times 1/10 \text{ years} \times 1/12)$                    | 15,000             |
| Electricity                                               | $[(15 \text{ units} \times 4,380 \text{ hours} \times \text{₹}5) \times 1/12]$ | 27,375             |
| Sundry expenses (oil etc.)                                |                                                                                | 900                |
| <b>Total (B)</b>                                          |                                                                                | <b>43,275</b>      |
| <b>Total Cost (A + B)</b>                                 |                                                                                | <b>1,39,741.66</b> |
| <b>÷ Productive Machine Hours in a month (4,380 ÷ 12)</b> |                                                                                | <b>÷ 365</b>       |
| <b>Machine Hour Rate</b>                                  |                                                                                | <b>₹382.85</b>     |

### BQ 26

A Manufacturing unit has added a new machine to its fleet of five existing machines. The total cost of purchase and installation of the machine is ₹7,50,000. The machine has an estimated life of 15 years and is expected to realize ₹30,000 as scrap at the end of its working life.

*Other relevant data are as following:*

- Budgeted working hours is 2,400 based on 8 hours per day for 300 days. This includes 400 hours for plant maintenance.
- Electricity used by the machine is 15 units per hour at a cost of ₹2.00 per unit. No current is drawn during maintenance.
- The machine requires special oil for heating which is replaced once in every month at a cost of ₹2,500 on each occasion.
- Estimated cost of maintenance of the machine is ₹500 per week of 6 working days.
- 3 operators control the operations of the entire battery of six machines and the average wages per person amounts to ₹450 per week plus 40% fringe benefits.
- Departmental and general works overheads allocated to the operation during the last year was ₹60,000. During the current year it is estimated that there will be an increase of 12.5% of this amount. No incremental overhead is envisaged for the installation of the new machine.

*You are required to compute the machine hour rate.*

**Answer**

| <b>Machine Hour Rate</b>                   |                                                                  |                 |
|--------------------------------------------|------------------------------------------------------------------|-----------------|
| <b>Particulars</b>                         |                                                                  | <b>Amount</b>   |
| <b>(A) Standing charges/ Fixed costs</b>   |                                                                  |                 |
| Depreciation                               | $[(\text{₹}7,50,000 - 30,000) \times 1/15 \text{ years}]$        | 48,000          |
| Operators wages and fringe benefits        | $[(\text{₹}450 \times 300/6 \times 3 \times 1/6) + 40\%]$        | 15,750          |
| Departmental and general overheads         | $[(\text{₹}60,000 + 12.5\%) \times 1/6]$                         | 11,250          |
| <b>Total (A)</b>                           |                                                                  | <b>75,000</b>   |
| <b>(B) Running charges/ Variable costs</b> |                                                                  |                 |
| Maintenance                                | $(\text{₹}500 \times 300/6)$                                     | 25,000          |
| Electricity                                | $(15 \text{ units} \times 2,000 \text{ hours} \times \text{₹}2)$ | 60,000          |
| Special oil                                | $(\text{₹}2,500 \times 12)$                                      | 30,000          |
| <b>Total (B)</b>                           |                                                                  | <b>1,15,000</b> |

**OVERHEADS ABSORPTION COSTING METHOD 3.23**

|                                          |                 |
|------------------------------------------|-----------------|
| <b>Total Cost (A + B)</b>                | <b>1,90,000</b> |
| ÷ Productive Machine Hours (2,400 - 400) | ÷ 2,000         |
| <b>Machine Hour Rate</b>                 | <b>₹95.00</b>   |

**BQ 27**

A manufacturing unit has purchased and installed a new machine of ₹12,70,000 to its fleet of 7 existing machines. The new machine has an estimated life of 12 years and is expected to realise ₹70,000 as scrap at the end of its working life.

**Other relevant data are as follows:**

- (i) Budgeted working hours are 2,592 based on 8 hours per day for 324 days. This includes 300 hours for plant maintenance and 92 hours for setting up of plant.
- (ii) Estimated cost of maintenance of the machine is ₹25,000 p.a.
- (iii) The machine requires a special chemical solution, which is replaced at the end of each week (6 days in a week) at a cost of ₹400 each time.
- (iv) Four operators control operation of 8 machines and the average wages per person amounts to ₹420 per week plus 15% fringe benefits.
- (v) Electricity used by the machine during the production is 16 units per hour at a cost of ₹3 per unit. No current is taken during maintenance and setting up.
- (vi) Departmental and general works overhead allocated to the operation during last year was ₹50,000. During the current year it is estimated to increase 10% of this amount.

**Calculate machine hour rate, if (a) setting up time is unproductive; (b) setting up time is productive.**

**Answer**

$$\text{Machine Hour Rate} = \frac{\text{Total Cost}}{\text{Productive Hours}}$$

$$(a) \text{ Setting up time is unproductive} = ₹2,72,116 \div 2,200 = \text{₹123.69 per hour}$$

$$(b) \text{ Setting up time is productive} = ₹2,72,116 \div 2,292 = \text{₹118.72 per hour}$$

**Statement Showing Total Cost Related to Machine**

| Particulars                                                          | Amount           |
|----------------------------------------------------------------------|------------------|
| <b>(A) Standing charges/ Fixed costs</b>                             |                  |
| Depreciation [(₹12,70,000 - 70,000) × 1/12 years]                    | 1,00,000         |
| Operators wages and fringe benefits [(₹420 × 324/6 × 4 × 1/8) + 15%] | 13,041           |
| Departmental and general overheads [(₹50,000 + 10%) × 1/8]           | 6,875            |
| <b>Total (A)</b>                                                     | <b>1,19,916</b>  |
| <b>(B) Running charges/ Variable costs</b>                           |                  |
| Maintenance                                                          | 25,000           |
| Electricity (16 units × 2,200 hours × ₹3)                            | 1,05,600         |
| Special oil (₹400 × 324/6)                                           | 21,600           |
| <b>Total (B)</b>                                                     | <b>1,52,200</b>  |
| <b>Total Cost (A + B)</b>                                            | <b>₹2,72,116</b> |

**BQ 28**

In a manufacturing concern ABC Ltd. the machine shop has 8 identical machines manned by 6 operators. The machines cannot be worked without an operator wholly engaged on them. The total cost of the machines are ₹8,00,000.

**Following information relates to a six monthly period ended 30th June, 2017:**

|                                                |     |
|------------------------------------------------|-----|
| Normal available hours per month               | 208 |
| Absenteeism (without pay) hours per months     | 18  |
| Leave (with pay) hours per months              | 20  |
| Normal idle time (unavoidable) hours per month | 10  |
| Average rate of wages per day of 8 hours       | ₹20 |

**OVERHEADS ABSORPTION COSTING METHOD 3.24**

|                               |              |
|-------------------------------|--------------|
| Production bonus              | 15% on wages |
| Power and fuel consumption    | ₹8,050       |
| Supervision & indirect labour | ₹3,300       |
| Electricity                   | ₹1,200       |

*The following particulars are on a yearly basis:*

|                                       |                         |
|---------------------------------------|-------------------------|
| Repairs and maintenance               | 3% of value of machines |
| Insurance                             | ₹40,000                 |
| Depreciation                          | 10% of original cost    |
| Other sundry works expenses           | ₹12,000                 |
| Allocated general management expenses | ₹54,530                 |

*You are required to work out a comprehensive machine hour rate for the machine shop.*

**[₹23.87 per hour]**

**BQ 29**

*Operating data of a company given below:*

|                                   |   |                   |
|-----------------------------------|---|-------------------|
| Total number of weeks per quarter | = | 13 weeks          |
| Total number of hours per week    | = | 48 hours          |
| Stoppage due to maintenance       | = | 8 hours per month |
| Time taken for set up             | = | 2 hours per week  |

*Cost details:*

|                        |   |                              |
|------------------------|---|------------------------------|
| Cost of machine        | = | ₹2,00,000                    |
| Repair and maintenance | = | ₹24,000 per annum            |
| Consumable stores      | = | ₹30,000 per annum            |
| Rent, rates and taxes  | = | ₹8,000 per quarter           |
| Operator's wages       | = | ₹3,000 per month             |
| Supervisor's salary    | = | ₹5,000 per month             |
| Cost of power          | = | 15 units per hour at ₹3 p.u. |

*Notes:*

- (i) Life of the machine is 10 years. Depreciation is provided on straight line basis and is treated as variable cost.
- (ii) Repairs and maintenance and consumable stores are variable costs.
- (iii) Power is consumed for production runs and for set up but not for maintenance.
- (iv) The supervisor is supervising work on five identical machines including the one now considered.

*Required:*

- (a) Calculate the machine hour rate (if set up time is productive).
- (b) The company hires out excess capacity in the machine shop for outside jobs. Assuming that hire charges are fixed at variable cost plus 20%. What rate should be quoted by the company?

**Answer**

**(a) Machine Hour Rate**

| <b>Particulars</b>                         |                               | <b>Amount</b>   |
|--------------------------------------------|-------------------------------|-----------------|
| <b>(A) Running charges/ Variable costs</b> |                               |                 |
| Depreciation                               | (₹2,00,000 × 1/10)            | 20,000          |
| Repairs and maintenance                    |                               | 24,000          |
| Consumables                                |                               | 30,000          |
| Power                                      | (15 units × 2,400 hours × ₹3) | 1,08,000        |
| <b>Total (A)</b>                           |                               | <b>1,82,000</b> |
| <b>(B) Standing charges/ Fixed costs</b>   |                               |                 |
| Rent, rates and taxes                      | (₹8,000 × 4 quarters)         | 32,000          |
| Operators wages                            | (₹3,000 × 12)                 | 36,000          |

### OVERHEADS ABSORPTION COSTING METHOD 3.25

|                                   |                     |                 |
|-----------------------------------|---------------------|-----------------|
| Supervisor's salary               | (₹5,000 × 12 × 1/5) | 12,000          |
| <b>Total (B)</b>                  |                     | <b>80,000</b>   |
| <b>Total Cost (A + B)</b>         |                     | <b>2,62,000</b> |
| <b>÷ Productive Machine Hours</b> |                     | <b>÷ 2,400</b>  |
| <b>Machine Hour Rate</b>          |                     | <b>₹109.17</b>  |

(b) Hire Charges = (1,82,000 ÷ 2,400) + 20% = **₹91.00 per hour**

#### Working notes:

Productive machine hours = Total hours – Maintenance hours  
= (48 hours per week × 13 weeks × 4 quarters) – (8 hours × 12 months)  
= 2,496 hours – 96 hours = **2,400 hours**

#### BQ 30

Sree Ajeet Ltd. having fifteen different types of automatic machines furnishes information as under for 2022-2023:

- (1) Overhead expenses: Factory rent ₹1,80,000 (Floor area 1,00,000 sq. ft.), Heat and gas ₹60,000 and Supervision ₹1,50,000.
- (2) Wages of operator are ₹200 per day of 8 hours. Operator attends to one machine when it is under set up and two machines while they are under operation.

**In respect of Machine B (one of the above machines) the following particulars are furnished:**

- (a) Cost of machine ₹1,80,000, Life of machine is 10 years and scrap value at the end of its life ₹10,000.
- (b) Annual expenses on special equipment attached to the machine are estimated as ₹12,000.
- (c) Estimated operation time of the machine is 3,600 hours while set up time is 400 hours per annum.
- (d) The machine occupies 5,000 sq. ft. of floor area.
- (e) Power cost ₹5 per hour while machine is in operation.

**Estimate the comprehensive machine hour rate of machine B. Also find out machine cost to be absorbed in respect of use of machine B on the following two work order.**

| Particulars                    | Work order 1 | Work order 2 |
|--------------------------------|--------------|--------------|
| Machine set up time (Hours)    | 15           | 30           |
| Machine operation time (Hours) | 100          | 190          |

#### Answer

##### Statement Showing Comprehensive Machine Hour Rate

| Particulars                                    | Amount | Basis      | Set up        | Running         |
|------------------------------------------------|--------|------------|---------------|-----------------|
| Factory rent [(₹1,80,000/1,00,000) × 5,000]    | 9,000  | 400 : 3600 | 900           | 8,100           |
| Heat and gas (₹60,000 ÷ 15)                    | 4,000  | 400 : 3600 | 400           | 3,600           |
| Supervision (₹1,50,000 ÷ 15)                   | 10,000 | 400 : 3600 | 1,000         | 9,000           |
| Wages of operator:                             |        |            |               |                 |
| For operational hours [(₹200 ÷ 8) × 3,600 × ½] | 45,000 | Allocation | -             | 45,000          |
| For set up hours [(₹200 ÷ 8) × 400]            | 10,000 | Allocation | 10,000        | -               |
| Depreciation [(₹1,80,000 – ₹10,000) × 1/10]    | 17,000 | 400 : 3600 | 1,700         | 15,300          |
| Annual expenses of equipment                   | 12,000 | 400 : 3600 | 1,200         | 10,800          |
| Power (₹5 per hours × 3,600 hours)             | 54,000 | Allocation | -             | 18,000          |
| <b>Total Cost</b>                              | -      | -          | <b>15,200</b> | <b>1,09,800</b> |
| <b>÷ Hours</b>                                 | -      | -          | <b>÷ 400</b>  | <b>÷ 3,600</b>  |
| <b>Machine Hour Rate</b>                       | -      | -          | <b>₹38</b>    | <b>₹30.50</b>   |

**Computation of Machine B cost to be absorbed on the two work order:**

Work order 1 = 15 hours set up × ₹38 + 100 operational hours × ₹30.50 = **₹3,620**

Work order 2 = 30 hours set up × ₹38 + 190 operational hours × ₹30.50 = **₹6,935**

# PAST YEAR QUESTIONS

## PYQ 1

A company has three production departments and two service departments. Distribution summary of overheads is as follows:

### Production Department:

|   |         |
|---|---------|
| A | ₹13,600 |
| B | ₹14,700 |
| C | ₹12,800 |

### Service Department:

|   |        |
|---|--------|
| X | ₹9,000 |
| Y | ₹3,000 |

The expenses of service departments are charged on a percentage basis which is as follows:

|              | A   | B   | C   | X   | Y   |
|--------------|-----|-----|-----|-----|-----|
| Department X | 40% | 30% | 20% | -   | 10% |
| Department Y | 30% | 30% | 20% | 20% | -   |

Apportion the cost of Service Departments by using the Repeated Distribution method.

[(8 Marks) Nov 1998]

## Answer

### Distribution of Overheads (Repeated Distribution Method)

| Particulars                | Basis       | Production departments |               |               | Service departments |          |
|----------------------------|-------------|------------------------|---------------|---------------|---------------------|----------|
|                            |             | A                      | B             | C             | X                   | Y        |
| Total overheads            |             | 13,600                 | 14,700        | 12,800        | 9,000               | 3,000    |
| Apportionment of Expenses: |             |                        |               |               |                     |          |
| Department X               | 40:30:20:10 | 3,600                  | 2,700         | 1,800         | (9000)              | 900      |
| Department Y               | 30:30:20:20 | 1,170                  | 1,170         | 780           | 780                 | (3,900)  |
| Department X               | 40:30:20:10 | 312                    | 234           | 156           | (780)               | 78       |
| Department Y               | 30:30:20:20 | 23                     | 23            | 16            | 16                  | (78)     |
| Department X               | 40:30:20:10 | 6                      | 5             | 3             | (16)                | 2        |
| Department Y               | 30:30:20    | 1                      | 1             | -             | -                   | -        |
| <b>Total</b>               | <b>-</b>    | <b>18,712</b>          | <b>18,833</b> | <b>15,555</b> | <b>-</b>            | <b>-</b> |

## PYQ 2

ABC Ltd. manufactures a single product and absorbs the production overheads at a pre determined rate of ₹10 per machine hour. At the end of financial year 1998-99, it has been found that actual production overheads incurred were ₹6,00,000. It included ₹45,000 on account of 'written off' obsolete stores and ₹30,000 being the wages paid for the strike period under an award.

The production and sales data for the year 1998-99 is as under:

### Production:

|                                |              |
|--------------------------------|--------------|
| Finished goods                 | 20,000 units |
| Work-in-progress               | 8,000 units  |
| (50% complete in all respects) |              |

### Sales:

|                |              |
|----------------|--------------|
| Finished goods | 18,000 units |
|----------------|--------------|

The actual machine hours worked during the period were 48,000. It has been found that one third of the under absorption of production overheads was due to lack of production planning and the rest was attributable to normal increase in costs.

You are required to:



**OVERHEADS ABSORPTION COSTING METHOD 3.27**

- (i) Calculate the amount of under absorption of production overheads during the year 1998-99 and  
(ii) Show the accounting treatment of under absorption of production overheads.

**[(10 marks) Nov 1999]****Answer****(i) Computation of under absorption of Production Overheads:**

| <b>Particulars</b>                                                   | <b>Amount</b>   |
|----------------------------------------------------------------------|-----------------|
| Total production overheads actually incurred during the year 1998-99 | 6,00,000        |
| Less: Written off obsolete stores                                    | (45,000)        |
| Less: Wages paid for strike period                                   | (30,000)        |
| <b>Net production overheads actually incurred</b>                    | <b>5,25,000</b> |
| Production overheads absorbed (48,000 hours × ₹10)                   | 4,80,000        |
| <b>Under Recovery of production overheads</b>                        | <b>45,000</b>   |

**(ii) Accounting treatment of under-absorption of production overheads:**

- ₹15,000 (i.e.,  $45,000 \times \frac{1}{3}$ ) of under absorbed overheads were due to lack of production planning. This being abnormal should be debited to Costing Profit and Loss Account.
- The balance of ₹30,000 (i.e.,  $45,000 \times \frac{2}{3}$ ) of under absorbed overheads should be distributed over work in progress, finished goods and cost of sales by using supplementary rate.

$$\begin{aligned} \text{Supplementary OH Rate} &= \frac{\text{Under Absorbed Overhead}}{\text{Equivalent Units}} = \frac{30,000}{4,000 + 2,000 + 18,000} \\ &= \text{₹1.25 per unit} \end{aligned}$$

Distribution of unabsorbed overheads of ₹30,000 over work-in-progress, finished goods and cost of sales:

|                                        |        |
|----------------------------------------|--------|
| Work-in-Progress (4,000 units × ₹1.25) | 5,000  |
| Finished goods (2,000 units × ₹1.25)   | 2,500  |
| Cost of sales (18,000 units × ₹1.25)   | 22,500 |

**Journal Entries**

| <b>Entries</b>                                                | <b>Dr.</b> | <b>Cr.</b> |
|---------------------------------------------------------------|------------|------------|
| Cost of Sales A/c Dr.                                         | 22,500     | -          |
| Finished Goods Control A/c Dr.                                | 2,500      | -          |
| Work in Progress Control A/c Dr.                              | 5,000      | -          |
| Costing Profit & Loss A/c Dr.                                 | 15,000     | -          |
| To Overhead Control A/c                                       | -          | 45,000     |
| (Being under recovery of under absorbed oh recovered/charged) |            |            |

**PYQ 3**

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 ₹8 lakhs.

**These particulars are furnished for a 6 month period:**

|                                                |              |
|------------------------------------------------|--------------|
| Normal available hours per month               | 208          |
| Absenteeism (without pay) hours per months     | 18           |
| Leave (with pay) hours per months              | 20           |
| Normal idle time (unavoidable) hours per month | 10           |
| Average rate of wages per day of 8 hours       | ₹20          |
| Production bonus                               | 15% on wages |
| Power and fuel consumption                     | ₹9,000       |
| Supervision & indirect labour                  | ₹3,300       |
| Electricity                                    | ₹1,200       |

**OVERHEADS ABSORPTION COSTING METHOD 3.28**

The following particulars are on a yearly basis:

|                                       |                         |
|---------------------------------------|-------------------------|
| Repairs and maintenance               | 3% of value of machines |
| Insurance                             | ₹42,000                 |
| Depreciation                          | 10% of original cost    |
| Other factory expenses                | ₹12,000                 |
| Allocated general management expenses | ₹54,530                 |

You are required to work out a comprehensive machine hour rate for the machine shop.

[(8 Marks) May 2000]

**Answer**

**Computation of Comprehensive Machine Hour Rate for the "Machine Shop"**

| Particulars                                                               |                                            | Amount          |
|---------------------------------------------------------------------------|--------------------------------------------|-----------------|
| <b>(A) Standing Charges:</b>                                              |                                            |                 |
| Operators wages                                                           | $[(20 \div 8 \text{ hours}) \times 6,840]$ | 17,100          |
| Production bonus                                                          | $(17,100 \times 15\%)$                     | 2,565           |
| Supervision & indirect labour                                             |                                            | 3,300           |
| Lighting and electricity                                                  |                                            | 1,200           |
| Insurance                                                                 | $(42,000 \times 6/12)$                     | 21,000          |
| Depreciation                                                              | $(8,00,000 \times 10\% \times 6/12)$       | 40,000          |
| Other sundry works expense                                                | $(12,000 \times 6/12)$                     | 6,000           |
| General management expense allocated                                      | $(54,530 \times 6/12)$                     | 27,265          |
| <b>Total (A)</b>                                                          |                                            | <b>1,18,430</b> |
| <b>(B) Running Charges</b>                                                |                                            |                 |
| Repairs and maintenance                                                   | $(8,00,000 \times 3\% \times 6/12)$        | 12,000          |
| Power consumed                                                            |                                            | 9,000           |
| <b>Total (B)</b>                                                          |                                            | <b>21,000</b>   |
| <b>Total OH for the shop (i.e. for all machineries) for 6 month (A+B)</b> |                                            | <b>1,39,430</b> |
| ÷ Total machine hours                                                     |                                            | ÷ 5,760         |
| <b>Machine Hour Rate</b>                                                  |                                            | <b>₹24.21</b>   |

**Working Notes:**

**Calculation of effective productive hours available to the machine shop and paid hours:**

| Particulars                                                                                     | 6 Months, 6 Operators (Hours) |
|-------------------------------------------------------------------------------------------------|-------------------------------|
| Normal Available hours $(208 \text{ hours} \times 6 \text{ months} \times 6 \text{ operators})$ | 7,488                         |
| Less: Absenteeism hours $(18 \text{ hours} \times 6 \text{ months} \times 6 \text{ operators})$ | (648)                         |
| <b>Paid Hours per month</b>                                                                     | <b>6,840</b>                  |
| Less: Leave hours $(20 \text{ hours} \times 6 \text{ months} \times 6 \text{ operators})$       | (720)                         |
| Less: Normal idle time $(10 \text{ hours} \times 6 \text{ months} \times 6 \text{ operators})$  | (360)                         |
| <b>Effective Productive Hours</b>                                                               | <b>5,760</b>                  |

**PYQ 4**

The total overhead expenses of a factory are ₹4,46,380. Taking into account the normal working of the factory, overhead was recovered in production at ₹1.25 per hour. The actual hours worked were 2,93,104. On investigation, it was found that 50% of the unabsorbed overhead was on account of increase in the cost of indirect materials and indirect labour and the remaining 50% was due to factory inefficiency.

How would you proceed to close the books of accounts, assuming that besides 7,800 units produced of which 7,000 were sold, there were 200 equivalent units in work-in-progress? Also give the profit implication of the method suggested.

[(8 Marks) Nov 2000]

**Answer**

- (i) **Treatment of Unabsorbed OH & its implication on Profit:** The unabsorbed OH on account of increase in cost of indirect material & labour of ₹40,000 should be adjusted in the cost books by applying positive



supplementary rates.

$$\text{Supplementary Rate} = \frac{\text{Unabsorbed OH}}{\text{Equivalent completed units of Production}}$$

$$\text{Supplementary Rate} = \frac{40,000}{8,000 \text{ Units}} = \text{₹5 per unit}$$

The unabsorbed OH of ₹40,000 should be applied by using supplementary rate of ₹5 per equivalent completed unit proportionately on the basis of equivalent completed unit among Cost of Sales A/c, Stock of Finished Goods A/c, & WIP A/c as under:

| Items             | Equivalent completed units | Rate | Share of unabsorbed overheads |
|-------------------|----------------------------|------|-------------------------------|
| Cost of Sales A/c | 7,000                      | ₹5   | ₹35,000                       |
| Stock of Finished | 800                        | ₹5   | ₹4,000                        |
| WIP A/c           | 200                        | ₹5   | ₹1,000                        |
| <b>Total</b>      |                            |      | <b>₹40,000</b>                |

- (ii) The above treatments of unabsorbed OH will reduce the profit by ₹35,000, the amount by which the cost of sales has been increased. Moreover, the value of stock of Finished Goods & WIP will increase by ₹4,000 & ₹1,000 respectively. The unabsorbed OH of ₹40,000 due to factory inefficiency being in the nature of abnormal loss should be changed to costing P/L A/c & thereby the profit would be reduced by ₹40,000.

**Working Notes:**

**(a) Calculation of Unabsorbed Overheads:**

| Particulars                                      | Amount        |
|--------------------------------------------------|---------------|
| Actual overhead incurred                         | 4,46,380      |
| Less: overhead absorbed (₹1.25 × 2,93,104 Hours) | 3,66,380      |
| <b>Unabsorbed OH</b>                             | <b>80,000</b> |

|                                                                 |        |
|-----------------------------------------------------------------|--------|
| Unabsorbed OH on account of increase in cost (80,000 × 50%)     | 40,000 |
| Unabsorbed OH on account of factory inefficiency (80,000 × 50%) | 40,000 |

**(b) Calculation of equivalent completed units:**

|                                                        |                    |
|--------------------------------------------------------|--------------------|
| Unit sold                                              | 7,000              |
| Units in closing stock of Finished Goods (7,800-7,000) | 800                |
| Equivalent WIP units                                   | 200                |
| <b>Total Equivalent Completed Units</b>                | <b>8,000 units</b> |

**PYQ 5**

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                                               | ₹5,00,000       |
| Life of machine                                                   | 10 years        |
| Estimated scrap value at the end of life                          | ₹20,000         |
| Repairs and maintenance per annum                                 | ₹60,480         |
| Consumable stores per annum                                       | ₹47,520         |
| Rent of building per annum (The machine 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 per hour 25 units per hour                                  | at ₹2 per unit. |

**OVERHEADS ABSORPTION COSTING METHOD 3.30**

Power is required for productive purposes only. Set up time, though productive, does not require power. The supervisor and operator are permanent. Repairs and maintenance and consumable stores vary with the running of the Machine.

**Calculate a two-tier machine hour rate for (a) set up time, (b) running time.**

**[(8 Marks) May 2002]**

**Answer**

**Statement Showing Two Tier Machine Hour Rate**

| <b>Particulars</b>                                                             | <b>Amount</b> | <b>Basis</b> | <b>Set up</b> | <b>Running</b> |
|--------------------------------------------------------------------------------|---------------|--------------|---------------|----------------|
| Depreciation $[(5,00,000 - 20,000) \times 1/10 \times 1/12]$                   | 4,000         | 20 : 180     | 400           | 3,600          |
| Repairs & Maintenance $(60,480 \times 1/12)$                                   | 5,040         | Allocation   | -             | 5,040          |
| Consumable Stores $(47,520 \times 1/12)$                                       | 3,960         | Allocation   | -             | 3,960          |
| Building Rent $(72,000 \times 1/6 \times 1/12)$                                | 1,000         | 20 : 180     | 100           | 900            |
| Supervisor's Salary $(6,000 \div 3)$                                           | 2,000         | 20 : 180     | 200           | 1,800          |
| Wage of operator                                                               | 2,500         | 20 : 180     | 250           | 2,250          |
| General Lighting                                                               | 1,000         | 20 : 180     | 100           | 900            |
| Power $(25 \text{ units} \times ₹2 \text{ per unit} \times 180 \text{ hours})$ | 9,000         | Allocation   | -             | 9,000          |
| <b>Total Cost</b>                                                              | -             | -            | <b>1,050</b>  | <b>27,450</b>  |
| <b>÷ Hours</b>                                                                 | -             | -            | <b>÷ 20</b>   | <b>÷ 180</b>   |
| <b>Machine Hour Rate</b>                                                       | -             | -            | <b>₹52.50</b> | <b>₹152.50</b> |

**PYQ 6**

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 department conducts merchandising and marketing operations independently.

**The following data are available for October, 2003:**

| <b>Departments</b>  | <b>Revenues</b> | <b>Number of Employees</b> | <b>Processing Time used<br/>(in minutes)</b> |
|---------------------|-----------------|----------------------------|----------------------------------------------|
| Corporate Sales     | ₹16,67,750      | 42                         | 2,400                                        |
| Consumer Sales      | ₹8,33,875       | 28                         | 2,000                                        |
| Administrative      | -               | 14                         | 400                                          |
| Information systems | -               | 21                         | 1,400                                        |

**Cost incurred in each of four departments for October, 2003 are as follows:**

|                     |            |
|---------------------|------------|
| Corporate sales     | ₹12,97,751 |
| Consumers sales     | ₹6,36,818  |
| Administrative      | ₹94,510    |
| Information systems | ₹3,04,720  |

The company uses number of employees as a basis to allocate Administrative costs and processing time as a basis to allocate Information systems costs.

**Required:**

- Allocate the support department costs to the sales departments using the direct method.
- 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.
- How could you have ranked the support departments differently?
- Allocate the support department costs to two sales departments using the reciprocal allocation method.

**[[ (10 Marks) Nov 2003 ]]**

**Answer**

- (i) Statement Showing Allocation of support department costs to the sales departments  
(By Using Direct Method)**

| <b>Particulars</b> | <b>Basis</b> | <b>Sales departments</b> |                 | <b>Support departments</b> |           |
|--------------------|--------------|--------------------------|-----------------|----------------------------|-----------|
|                    |              | <b>Corporate</b>         | <b>Consumer</b> | <b>Admin</b>               | <b>IS</b> |

**OVERHEADS ABSORPTION COSTING METHOD 3.31**

|                                  |                  |                  |                 |          |            |
|----------------------------------|------------------|------------------|-----------------|----------|------------|
| Total overheads                  |                  | 12,97,751        | 6,36,818        | 94,510   | 3,04,720   |
| Apportionment of Expenses:       |                  |                  |                 |          |            |
| Administrative Dept (42:28)      | No. of employees | 56,706           | 37,804          | (94,510) | -          |
| Information system (2,400:2,000) | Processing time  | 1,66,211         | 1,38,509        | -        | (3,04,720) |
| <b>Total</b>                     | <b>-</b>         | <b>15,20,668</b> | <b>8,13,131</b> | <b>-</b> | <b>-</b>   |

**(ii) Ranking of support departments based on percentage of their services rendered to other support departments:**

$$\text{Services by Administrative to Information systems} = \frac{21}{42+28+21} \times 100 = 23.077\%$$

$$\text{Services by Information systems to Administrative} = \frac{400}{2,400+2,000+400} \times 100 = 8.333\%$$

Ranking as per percentage of services, Administrative as first and information system as second.

**Statement Showing Allocation of Support Departments Costs  
(By Using Step-Down Method)**

| Particulars                      | Basis            | Sales departments |                 | Support departments |            |
|----------------------------------|------------------|-------------------|-----------------|---------------------|------------|
|                                  |                  | Corporate         | Consumer        | Admin               | IS         |
| Total overheads                  |                  | 12,97,751         | 6,36,818        | 94,510              | 3,04,720   |
| Apportionment of Expenses:       |                  |                   |                 |                     |            |
| Administrative Dept (42:28:21)   | No. of employees | 43,620            | 29,080          | (94,510)            | 21,810     |
| Information system (2,400:2,000) | Processing time  | 1,78,107          | 1,48,423        | -                   | (3,26,530) |
| <b>Total</b>                     | <b>-</b>         | <b>15,19,478</b>  | <b>8,14,321</b> | <b>-</b>            | <b>-</b>   |

**(iii) An alternative ranking is based on the rupee amount of services rendered to other service departments:**

$$\text{Services by Administrative to Information systems} = \frac{21}{42+28+21} \times ₹94,510 = ₹21,810$$

$$\text{Services by Information systems to Administrative} = \frac{400}{2,400+2,000+400} \times ₹3,04,720 = ₹25,393$$

Ranking as per amount of services, information system as first and Administrative as second.

**(iv) Statement Showing the Allocation of Support Department Costs to the Sales Departments  
(By Using Repeated Distribution Method)**

| Particulars                | Basis    | Sales departments |                 | Support departments |            |
|----------------------------|----------|-------------------|-----------------|---------------------|------------|
|                            |          | Corporate         | Consumer        | Admin               | IS         |
| Total overheads            |          | 12,97,751         | 6,36,818        | 94,510              | 3,04,720   |
| Apportionment of Expenses: |          |                   |                 |                     |            |
| Administrative Dept.       | 42:28:21 | 43,620            | 29,080          | (94,510)            | 21,810     |
| Information System Dept.   | 24:20:4  | 1,63,265          | 1,36,054        | 27,211              | (3,26,530) |
| Administrative Dept.       | 42:28:21 | 12,559            | 8,373           | (27,211)            | 6,279      |
| Information System Dept.   | 24:20:4  | 3,140             | 2,616           | 523                 | (6,279)    |
| Administrative Dept.       | 42:28:21 | 241               | 161             | (523)               | 121        |
| Information System Dept.   | 24:20:4  | 61                | 50              | 10                  | (121)      |
| Administrative Dept.       | 42:28    | 6                 | 4               | (10)                | -          |
| <b>Total</b>               | <b>-</b> | <b>15,20,643</b>  | <b>8,13,156</b> | <b>-</b>            | <b>-</b>   |

**PYQ 7**

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:

**OVERHEADS ABSORPTION COSTING METHOD 3.32****Departmental cost**

|                    |            |
|--------------------|------------|
| Show 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          |
|                               | <b>1,500 employees</b> |

**Cost drivers Maintenance department:****No. of work orders**

|                               |                   |
|-------------------------------|-------------------|
| Snow mobile engine department | 570 orders        |
| Boat engine department        | 190 orders        |
| Factory office department     | 40 orders         |
|                               | <b>800 orders</b> |

**Required:**

- (i) Compute the cost driver allocation percentage and then use these percentages to allocate the service department cost by using direct method.
- (ii) Compute the cost driver allocation percentage and then use these percentages to allocate the service department costs by using non-reciprocal method/step method.

**[(8 Marks) May 2005]****Answer****(i) Cost Driver Allocation Percentage**

| <b>Factory office department</b> | <b>Number of employees</b>   | <b>Percentage</b> |
|----------------------------------|------------------------------|-------------------|
| Snow-mobile engine               | 1,080                        | 80%               |
| Boat engine                      | 270                          | 20%               |
| <b>Total</b>                     | <b>1,350</b>                 | <b>100%</b>       |
| <b>Maintenance department</b>    | <b>Number of work orders</b> | <b>Percentage</b> |
| Snowmobile engine                | 570                          | 75%               |
| Boat engine                      | 190                          | 25%               |
| <b>Total</b>                     | <b>760</b>                   | <b>100</b>        |

**Statement of Allocation of Service Department Cost**  
**(Using Direct Method)**

| <b>Particulars</b>        | <b>Factory office</b> | <b>Maintenance</b> | <b>Snowmobile</b> | <b>Boat engine</b> |
|---------------------------|-----------------------|--------------------|-------------------|--------------------|
| Departmental Cost         | 3,00,000              | 2,40,000           | 6,00,000          | 17,00,000          |
| Factory office department | (3,00,000)            | -                  | 2,40,000          | 60,000             |
| Maintenance department    | -                     | (2,40,000)         | 1,80,000          | 60,000             |
| <b>Total</b>              | <b>-</b>              | <b>-</b>           | <b>10,20,000</b>  | <b>18,20,000</b>   |

**(ii) Cost Driver Allocation Percentage**

| <b>Factory office department</b> | <b>Number of employees</b>   | <b>Percentage</b> |
|----------------------------------|------------------------------|-------------------|
| Snow mobile engine               | 1,080                        | 72%               |
| Boat engine                      | 270                          | 18%               |
| Maintenance department           | 150                          | 10%               |
| <b>Total</b>                     | <b>1,500</b>                 | <b>100%</b>       |
| <b>Maintenance department</b>    | <b>Number of work orders</b> | <b>Percentage</b> |
| Snowmobile engine                | 570                          | 75%               |
| Boat engine                      | 190                          | 25%               |
| <b>Total</b>                     | <b>760</b>                   | <b>100</b>        |

## OVERHEADS ABSORPTION COSTING METHOD 3.33

### Statement of Allocation of Service Department Cost (Using Step Down Method)

| Particulars               | Factory office | Maintenance | Snowmobile       | Boat engine      |
|---------------------------|----------------|-------------|------------------|------------------|
| Departmental Cost         | 3,00,000       | 2,40,000    | 6,00,000         | 17,00,000        |
| Factory office department | (3,00,000)     | 30,000      | 2,16,000         | 54,000           |
| Maintenance department    | -              | (2,70,000)  | 2,02,500         | 67,500           |
| <b>Total</b>              | <b>-</b>       | <b>-</b>    | <b>10,18,500</b> | <b>18,21,500</b> |

### PYQ 8

From the details furnished below you are required to compute a comprehensive machine hour rate:

|                                                             |                           |
|-------------------------------------------------------------|---------------------------|
| Purchase price of the machine (depreciation @ 10% p.a.)     | ₹3,24,000                 |
| Normal working hours for the month                          | 200 hours                 |
| (The machine works to only 75% of capacity)                 |                           |
| Wages of Machine man                                        | ₹125 per day (of 8 hours) |
| Wages for a helper (machine attendant)                      | ₹75 per day (of 8 hours)  |
| Power cost for the month for the time worked                | ₹15,000                   |
| Supervision charges apportioned for the machine centre      | ₹3,000 for the month      |
| Electricity & Lighting for the month                        | ₹7,500                    |
| Repairs & maintenance (machine) including consumable stores | ₹17,500 per month         |
| Insurance of Plant & Building (apportioned) for the year    | ₹16,250                   |
| Other general expenses per annum                            | ₹27,500                   |

The workers are paid a fixed dearness allowance of ₹1,575 per month. Production bonus payable to workers in terms of an award is equal to 33- $\frac{1}{3}$ % 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.

[(8 Marks) Nov 2005]

### Answer

#### Statement Showing Comprehensive Machine Hour Rate

| Particulars                        | Amount                               |
|------------------------------------|--------------------------------------|
| <b>(A) Standing Charges:</b>       |                                      |
| Supervision charges                | 3,000                                |
| Electricity and lighting           | 7,500                                |
| Insurance of Plant and Building    | (16,250 × 1/12) 1,354                |
| Depreciation                       | (32,400 × 1/12) 2,700                |
| Other general expense              | (27,500 × 1/12) 2,292                |
| <b>Total (A)</b>                   | <b>16,846</b>                        |
| <b>(B) Running Charges</b>         |                                      |
| Repairs and maintenance            | 17,500                               |
| Power                              | 15,000                               |
| Wages of machine man (W.N. 2)      | (can be treated as fixed cost) 6,737 |
| Wages of helper (W.N. 2)           | (can be treated as fixed cost) 4,945 |
| <b>Total (B)</b>                   | <b>44,182</b>                        |
| <b>Total OH for the shop (A+B)</b> | <b>61,028</b>                        |
| ÷ Total machine hours              | ÷ 150                                |
| <b>Machine Hour Rate</b>           | <b>₹406.85</b>                       |

### Working Notes:

1. Effective machine working hours per month = 200 hour × 75% = **150 hours**

### 2. Calculation of Labour Cost:

| Particulars                                                  | Machine Man | Helper |
|--------------------------------------------------------------|-------------|--------|
| Wages for 200 hours (₹125 ÷ 8H) × 200H and (₹75 ÷ 8H) × 200H | 3,125       | 1,875  |
| Dearness Allowance                                           | 1,575       | 1,575  |

**OVERHEADS ABSORPTION COSTING METHOD 3.34**

|                                                 |              |              |
|-------------------------------------------------|--------------|--------------|
| Production bonus (33 - 1/3% of Basic plus D.A.) | 4,700        | 3,450        |
| Leave wages (10% of Basic plus D.A.)            | 1,567        | 1,150        |
|                                                 | 470          | 345          |
| <b>Total labour cost</b>                        | <b>6,737</b> | <b>4,945</b> |

**PYQ 9**

RST Ltd. has two production departments, Machining and Finishing. There are three service departments Human Resource (HR), Maintenance and Design. The budgeted costs in these service departments are as follows:

| <b>Particulars</b> | <b>HR</b>       | <b>Maintenance</b> | <b>Design</b>   |
|--------------------|-----------------|--------------------|-----------------|
| Variable           | 1,00,000        | 1,60,000           | 1,00,000        |
| Fixed              | 4,00,000        | 3,00,000           | 6,00,000        |
| <b>Total</b>       | <b>5,00,000</b> | <b>4,60,000</b>    | <b>7,00,000</b> |

**The usage of these Service Departments' output during the year just completed is as follows (Provision of Service Output in hours of service)**

| <b>Users of services</b> | <b>Providers of services</b> |                    |               |
|--------------------------|------------------------------|--------------------|---------------|
|                          | <b>HR</b>                    | <b>Maintenance</b> | <b>Design</b> |
| HR                       | -                            | -                  | -             |
| Maintenance              | 500                          | -                  | -             |
| Design                   | 500                          | 500                | -             |
| Machining                | 4,000                        | 3,500              | 4,500         |
| Finishing                | 5,000                        | 4,000              | 1,500         |
| <b>Total</b>             | <b>10,000</b>                | <b>8,000</b>       | <b>6,000</b>  |

**Required:**

- (i) Use the direct method to re-apportion RST Ltd'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 reappportion the firm's service department cost.

**[(7 Marks) Nov 2006]**

**Answer**

**(1) Statement Showing Re-apportionment of Service Departments Cost  
(Using Direct Method)**

| <b>Service department</b> | <b>Basis</b> | <b>Total</b> | <b>Production department</b> |                  |
|---------------------------|--------------|--------------|------------------------------|------------------|
|                           |              |              | <b>Machining</b>             | <b>Finishing</b> |
| H.R.                      | (4:5)        | 5,00,000     | 2,22,222                     | 2,77,778         |
| Maintenance               | (7:8)        | 4,60,000     | 2,14,667                     | 2,45,333         |
| Design                    | (3:1)        | 7,00,000     | 5,25,000                     | 1,75,000         |
| <b>Total</b>              |              |              | <b>9,61,889</b>              | <b>6,98,111</b>  |

- (2) Sequence of re-apportioning:** As H.R. department serves large number of departements, so its cost should be first re apportioned then overhead of maintenance departement should be re-apportioned and lastly overhead of design department should be re-apportioned.

**(3) Statement Showing Re-apportionment of Service Department Cost  
(Using Step Down Method)**

| <b>Particulars</b>  | <b>Departments</b> |                    |               |                  |                  |
|---------------------|--------------------|--------------------|---------------|------------------|------------------|
|                     | <b>H.R.</b>        | <b>Maintenance</b> | <b>Design</b> | <b>Machining</b> | <b>Finishing</b> |
| Total Overhead      | 5,00,000           | 4,60,000           | 7,00,000      | -                | -                |
| Re-Apportionment:   |                    |                    |               |                  |                  |
| H.R. (1:1:8:10)     | (5,00,000)         | 25,000             | 25,000        | 2,00,000         | 2,50,000         |
| Maintenance (1:7:8) | -                  | (4,85,000)         | 30,313        | 2,12,187         | 2,42,500         |
| Design (3:1)        | -                  | -                  | (7,55,313)    | 5,66,485         | 1,88,828         |
| <b>Total</b>        | <b>-</b>           | <b>-</b>           | <b>-</b>      | <b>9,78,672</b>  | <b>6,81,328</b>  |



**OVERHEADS ABSORPTION COSTING METHOD 3.35****PYQ 10**

A company has three production departments (M1, M2 and A1) and three service departments, one of which Engineering service department, servicing the M1 and M2 only.

**The relevant information are as follows:**

|    | <b>Product X</b>      | <b>Product Y</b>       |
|----|-----------------------|------------------------|
| M1 | 10 Machine hours      | 6 Machine hours        |
| M2 | 4 Machine hours       | 14 Machine hours       |
| A1 | 4 Direct Labour hours | 18 Direct Labour hours |

**The annual budgeted overhead costs for the year are:**

|                                                                       | <b>Indirect Wages</b> | <b>Consumable Supplies</b> |
|-----------------------------------------------------------------------|-----------------------|----------------------------|
| M1                                                                    | 46,520                | 12,600                     |
| M2                                                                    | 41,340                | 18,200                     |
| A1                                                                    | 16,220                | 4,200                      |
| Stores                                                                | 8,200                 | 2,800                      |
| Engineering Service                                                   | 5,340                 | 4,200                      |
| General Service                                                       | 7,520                 | 3,200                      |
| Depreciation on Machinery                                             |                       | 39,600                     |
| Insurance of Machinery                                                |                       | 7,200                      |
| Insurance of Building                                                 |                       | 3,240                      |
| (Total building insurance cost for 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 ₹6,000 and is charged into cost at notional value of 8% per annum. This cost is additional to the rent shown above. The value of issues of materials to the production departments are in the same proportion as shown above for the consumable supplies.

**The following data are also available:**

| <b>Department</b>   | <b>Book Value of Machinery</b> | <b>Area in Square Feet</b> | <b>Effective H.P. Hours %</b> | <b>Direct Labour Hour</b> | <b>Capacity Machine Hrs</b> |
|---------------------|--------------------------------|----------------------------|-------------------------------|---------------------------|-----------------------------|
| 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                      | -                             | -                         | -                           |
| Engineering 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.

**[(15 Marks) May 2007]**

**Answer**

**(i) Overhead Analysis Sheet**

| <b>Particulars</b> | <b>Basis</b> | <b>Production departments</b> |           |           | <b>Service departments</b> |            |            |
|--------------------|--------------|-------------------------------|-----------|-----------|----------------------------|------------|------------|
|                    |              | <b>M1</b>                     | <b>M2</b> | <b>A1</b> | <b>Stores</b>              | <b>E S</b> | <b>G S</b> |
| Indirect wages     | Allocation   | 46,520                        | 41,340    | 16,220    | 8,200                      | 5,340      | 7,520      |
| Consumables        | Allocation   | 12,600                        | 18,200    | 4,200     | 2,800                      | 4,200      | 3,200      |
| Depreciation       | Value        | 15,840                        | 11,880    | 3,960     | 1,584                      | 4,752      | 1,584      |
| Insurance on:      |              |                               |           |           |                            |            |            |



**OVERHEADS ABSORPTION COSTING METHOD 3.36**

|                      |          |               |               |               |               |               |               |
|----------------------|----------|---------------|---------------|---------------|---------------|---------------|---------------|
| Machine              | Value    | 2,880         | 2,160         | 720           | 288           | 864           | 288           |
| Building (1/3 to M1) | Area     | 1,080         | 648           | 864           | 216           | 270           | 162           |
| Power                | H.P. %   | 3,240         | 2,268         | 324           | -             | 648           | -             |
| Light                | Area     | 1,080         | 1,296         | 1,728         | 432           | 540           | 324           |
| Rent                 | Area     | 2,697         | 3,236         | 4,315         | 1,079         | 1,348         | -             |
| Notional rent        | 8%×6,000 | -             | -             | -             | -             | -             | 480           |
| <b>Total</b>         | <b>-</b> | <b>85,937</b> | <b>81,028</b> | <b>32,331</b> | <b>14,599</b> | <b>17,962</b> | <b>13,558</b> |

**(ii) Allocation of Service Department Overheads**

| <b>Particulars</b> | <b>Basis</b>                        | <b>Production departments</b> |                 |               | <b>Service departments</b> |           |           |
|--------------------|-------------------------------------|-------------------------------|-----------------|---------------|----------------------------|-----------|-----------|
|                    |                                     | <b>M1</b>                     | <b>M2</b>       | <b>A1</b>     | <b>Stores</b>              | <b>ES</b> | <b>GS</b> |
| Total Overheads    |                                     | 85,937                        | 81,028          | 32,331        | 14,599                     | 17,962    | 13,558    |
| Apportionment:     |                                     |                               |                 |               |                            |           |           |
| Stores             | Consumables<br>(126:182:42)         | 5,256                         | 7,591           | 1,752         | (14,599)                   | -         | -         |
| Engineering Dept   | Machine<br>hours                    | 7,983                         | 9,979           | -             | -                          | (17,962)  | -         |
| General Service    | (4:5)<br>Labour hours<br>(20:15:30) | 4,172                         | 3,129           | 6,257         | -                          | -         | (13,558)  |
| <b>Total OH</b>    | <b>-</b>                            | <b>1,03,348</b>               | <b>1,01,727</b> | <b>40,340</b> | <b>-</b>                   | <b>-</b>  | <b>-</b>  |

**(iii) Calculation of recovery rate:**

| <b>Particulars</b>                      | <b>M1</b> | <b>M2</b> | <b>A1</b> |
|-----------------------------------------|-----------|-----------|-----------|
| Total OH                                | 1,03,348  | 1,01,727  | 40,340    |
| ÷ Base of recovery                      |           |           |           |
| Machine hours                           | 40,000    | 50,000    | -         |
| Labour hours                            | -         | -         | 3,00,000  |
| Recovery rate (per machine/labour hour) | ₹2.5837   | ₹2.0345   | ₹0.1345   |

**(iv) Absorbed overheads:**

| <b>Particulars</b>                                  | <b>Product X</b> | <b>Product Y</b> |
|-----------------------------------------------------|------------------|------------------|
| M1 @ ₹2.5837 per machine hour of 10/6 machine hours | 25.84            | 15.50            |
| M2 @ ₹2.0345 per machine hour of 4/14 machine hours | 8.14             | 28.48            |
| A1 @ ₹0.1345 per labour hour of 4/18 labour hours   | 0.54             | 2.42             |
| <b>Absorbed OH</b>                                  | <b>34.52</b>     | <b>46.40</b>     |

**Note:** Machine Shops A and B have got the production capacity of both direct labour hours and machine hours. It appears to reason that overhead absorption of Machine Shops. A and B should be based on machine hours absorption overhead rate of Assembly shop should be based on labour hours.

**PYQ 11**

A machine shop cost centre contains three machines of equal capacities. Three operators are employed on each machine, payable ₹20 per hour each. The factory works for forty eight hours in a week which includes 4 hours setup time. The work is jointly done by operators. The operators are paid fully for the forty-eight hours. In addition, they are paid a bonus of 10 percent of productive time. Costs are reported for this company on the basis of four-weekly period.

The company for the purpose of computing machine hour rate includes the direct wages of the operator and also recoups overheads allocated to the machine. The following details of factory overheads applicable to the cost centre are available:

- Depreciation 10% per annum on original cost of the machine. Original cost of the each machine is ₹52,000
- Maintenance and repairs per week per machine is ₹60.
- Consumable stores per week per machine are ₹75.
- Power: 20 units per hour per machine at the rate of 80 paise per unit.

**OVERHEADS ABSORPTION COSTING METHOD 3.37**

- Apportionment to the cost centre: Rent per annum ₹5,400, Heat and Light per annum ₹9,720 and foreman's salary per annum ₹12,960.

**Required**

- Calculate the cost of running one machine for a four week period.
- Calculate machine hour rate.

**[(8 Marks) Nov 2007/ May 2015]****Answer****(i) Computation of Cost of Running One Machine for a Four Week Period**

| <b>Particulars</b>                                       |                                                                                                                | <b>Amount</b> |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------|
| <b>(A) Standing Charges:</b>                             |                                                                                                                |               |
| Rent                                                     | $(5,400 \times \frac{1}{3} \times \frac{4}{52})$                                                               | 138.46        |
| Heat and light                                           | $(9,720 \times \frac{1}{3} \times \frac{4}{52})$                                                               | 249.23        |
| Forman's salary                                          | $(12,960 \times \frac{1}{3} \times \frac{4}{52})$                                                              | 332.31        |
| Depreciation                                             | $(52,000 \times 10\% \times \frac{4}{52})$                                                                     | 400           |
| Wages                                                    | $(48 \text{ hours} \times 4 \text{ weeks} \times ₹20 \text{ per hour} \times 3 \text{ operators per machine})$ | 11,520        |
| Bonus 10% of                                             | $(44 \text{ hours} \times 4 \text{ weeks} \times ₹20 \text{ per hour} \times 3 \text{ operators})$             | 1,056         |
| <b>Total Standing Charges (A)</b>                        |                                                                                                                | <b>13,696</b> |
| <b>(B) Running Expenses:</b>                             |                                                                                                                |               |
| Repairs and maintenance                                  | $(₹60 \times 4 \text{ weeks})$                                                                                 | 240           |
| Consumable stores                                        | $(₹75 \times 4 \text{ weeks})$                                                                                 | 300           |
| Power                                                    | $(44 \text{ hours} \times 4 \text{ weeks} \times 20 \text{ units} \times .80)$                                 | 2,816         |
| <b>Total Running expenses (B)</b>                        |                                                                                                                | <b>3,356</b>  |
| <b>Total Expenses of one machine for four week (A+B)</b> |                                                                                                                | <b>17,052</b> |

**(ii) Machine hour rate** = Total Expenses for 4 weeks ÷ Effective Hours for 4 weeks  
= ₹17,052 ÷ 176 hours (44 hours × 4 weeks) = **₹96.89 per hour**

**PYQ 12**

A machine was purchased from a manufacturer who claimed that his machine could produce 36.5 tonnes in a year consisting of 365 days. Holidays, break-down, etc., were normally allowed in the factory for 65 days. Sales were expected to be 25 tonnes during the year and the plant actually produced 25.2 tonnes during the year.

**You are required to state (i) Rated capacity, (ii) Practical capacity, (iii) Normal capacity and (iv) Actual capacity.**

**[(2 Marks) Nov 2008]****Answer**

**(i) Rated Capacity** = **36.50 tonnes or 100%**  
**(ii) Practical Capacity:**  
Number of working days in a year =  $365 - 65 = 300 \text{ days}$   
Practical capacity =  $\frac{36.5 \times 300}{365} = \textbf{30 tonnes or 82.19\%}$   
**(iii) Normal Capacity** = **25 tonnes or 68.49%**  
**(iv) Actual Capacity** = **25.2 tonnes or 69.04%**

**PYQ 13**

You are given the following information of the three machines of a manufacturing department of X Ltd.:

**Preliminary estimates of expenses (per annum)**

|              | <b>Total</b> | <b>Machines</b> |            |            |
|--------------|--------------|-----------------|------------|------------|
|              |              | <b>A</b>        | <b>B</b>   | <b>C</b>   |
|              | <b>(₹)</b>   | <b>(₹)</b>      | <b>(₹)</b> | <b>(₹)</b> |
| Depreciation | 20,000       | 7,500           | 7,500      | 5,000      |
| Spare parts  | 10,000       | 4,000           | 4,000      | 2,000      |
| Power        | 40,000       |                 |            |            |

**OVERHEADS ABSORPTION COSTING METHOD 3.38**

|                                   |        |        |        |        |
|-----------------------------------|--------|--------|--------|--------|
| Consumable stores                 | 8,000  | 3,000  | 2,500  | 2,500  |
| Insurance of machinery            | 8,000  |        |        |        |
| Indirect Labour                   | 20,000 |        |        |        |
| Building maintenance expenses     | 20,000 |        |        |        |
| Annual interest on capital outlay | 50,000 | 20,000 | 20,000 | 10,000 |
| Monthly charge for rent and rates | 10,000 |        |        |        |
| Salary of foreman (per month)     | 20,000 |        |        |        |
| Salary of attendant (per month)   | 5,000  |        |        |        |

(The foreman and the attendant control all the three machines and spend equal time on them)

**The following additional information is also available:**

|                               | <b>A</b> | <b>B</b> | <b>C</b> |
|-------------------------------|----------|----------|----------|
| Estimated Direct Labour Hours | 1,00,000 | 1,50,000 | 1,50,000 |
| Ratio of K.W. Rating          | 3        | 2        | 3        |
| Floor space (square feet)     | 40,000   | 40,000   | 20,000   |

There are 12 holidays (plus 52 Sundays) in the year, of which two were on Saturday. The manufacturing department works 8 hours in a day and Saturdays are half days. All machines work at 90% capacity throughout the year and 2% is reasonable for breakdown.

**Required:**

**Calculate predetermined machine hour rates for the above machines after taking into consideration the following factors:**

- An increase of 15% in the price of spare parts.
- An increase of 25% in the consumption of spare parts for machine 'B' & 'C' only.
- 20% general increase in wages rates.

**[(8 Marks) May 2011]**

**Answer**

**Machine Hour Rate**

| <b>Particulars</b>                                                       | <b>Machines</b>         |                                |                                |
|--------------------------------------------------------------------------|-------------------------|--------------------------------|--------------------------------|
|                                                                          | <b>A</b>                | <b>B</b>                       | <b>C</b>                       |
| Depreciation                                                             | 7,500                   | 7,500                          | 5,000                          |
| Spare parts                                                              | 4,600<br>(4,000 × 1.15) | 5,750<br>(4,000 × 1.15 × 1.25) | 2,875<br>(2,000 × 1.15 × 1.25) |
| Power (in the ratio of K.W. Rating)                                      | 15,000                  | 10,000                         | 15,000                         |
| Consumable Stores                                                        | 3,000                   | 2,500                          | 2,500                          |
| Insurance of Machine<br>(In the ratio of Depreciation)                   | 3,000                   | 3,000                          | 2,000                          |
| Indirect Labour (20,000 × 1.20)<br>(In the ratio of direct labour hours) | 6,000                   | 9,000                          | 9,000                          |
| Building Maintenance Expenses<br>(In the ratio Floor space)              | 8,000                   | 8,000                          | 4,000                          |
| Rent & Rates (10,000 × 12)<br>(In the ratio of floor space)              | 48,000                  | 48,000                         | 24,000                         |
| Foreman Salary<br>(20,000 × 12) in (1:1:1)                               | 80,000                  | 80,000                         | 80,000                         |
| Attendant Salary<br>(5000 × 12) in (1:1:1)                               | 20,000                  | 20,000                         | 20,000                         |
| Total overhead                                                           | 1,95,100                | 1,93,750                       | 1,64,375                       |
| ÷ Productive Machine Hours                                               | 1,947                   | 1,947                          | 1,947                          |
| <b>Machine Hour rate</b>                                                 | <b>100.21</b>           | <b>99.51</b>                   | <b>84.42</b>                   |

**Note:** Interest on capital outlay is a financial matter and, therefore it has been excluded from the cost.

**Working Note:**

**Calculation of Productive machine hours worked during the year:**

**OVERHEADS ABSORPTION COSTING METHOD 3.39**

|                                                                    |             |
|--------------------------------------------------------------------|-------------|
| Total No. of days in one year                                      | 365         |
| Less: Sundays                                                      | 52          |
| Less: Holidays other than Sundays and including 2 Saturdays        | 12          |
| Working days                                                       | <b>301</b>  |
| (a) Normal working days other than Saturdays                       | 251         |
| (b) Saturday (Out of 12 holidays 2 holidays were on Saturday)      | 50          |
| (c) Normal working hours per day                                   | 8 hours     |
| (d) Working hours on Saturdays                                     | 4 hours     |
| (e) Total machine Hours available (251 × 8 hours) + (50 × 4 hours) | 2,208 hours |
| (f) 10% Idle time (10% of 2,208 hours)                             | 221 hours   |
| (g) Productive Hours (2,208 - 221)                                 | 1987 hours  |
| (h) Breakdown time (2% of 1,987 hours)                             | 40 hours    |
| (i) Actual Productive time per machine per annum (1987 - 40)       | 1,947 hrs   |

**PYQ 14**

X Ltd. recovers overheads at a pre-determined rate of ₹50 per man-day. The total factory overheads incurred and the man-days actually worked were ₹79 lakhs and 1.5 lakhs days respectively. During the period 30,000 units were sold. At the end of the period 5,000 completed units were held in stock but there was no opening stock of finished goods. Similarly, there was no stock of uncompleted units at the beginning of the period but at the end of the period there were 10,000 uncompleted units which may be treated as 50% complete.

On analyzing the reasons, it was found that 60% of the unabsorbed overheads were due to defective planning and the balances were attributable to increase in overhead cost.

**How would unabsorbed overhead be treated in cost accounts?**

**[(8 Marks) Nov 2011]**

**Answer**

**Calculation of under or over absorption of overhead:**

|                  |   |                       |   |                 |
|------------------|---|-----------------------|---|-----------------|
| Absorbed OH      | = | 1,50,000 × 50         | = | 75,00,000       |
| Actual OH        | = | 79,00,000             |   |                 |
| Under absorption | = | 79,00,000 – 75,00,000 | = | <b>4,00,000</b> |

**Treatment of unabsorbed overheads:**

|                                 |   |                                            |
|---------------------------------|---|--------------------------------------------|
| 60% Abnormal                    | = | 2,40,000 charged to Profit and Loss A/c    |
| 40% Normal increase in OH costs | = | 1,60,000 charged to FG stock, WIP and COGS |
| Supplementary OH Recovery Rate  | = | Under recovery ÷ Total equivalent units    |
|                                 | = | 1,60,000 ÷ 40,000 = <b>₹4 per unit</b>     |

**Distribution of unabsorbed overheads of ₹30,000 over work-in-progress, finished goods and cost of sales:**

|                                     |   |           |
|-------------------------------------|---|-----------|
| Work-in-Progress (5,000 units × ₹4) | = | ₹20,000   |
| Finished goods (5,000 units × ₹4)   | = | ₹20,000   |
| Cost of sales (30,000 units × ₹4)   | = | ₹1,20,000 |

**Journal Entries**

| S. No.   | Particulars                                                                                                                           | Dr.                                      | Cr.       |
|----------|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------|
| <b>1</b> | Production OH Control A/c Dr.<br>To General Ledger Adjustment A/c                                                                     | 79,00,000                                | 79,00,000 |
| <b>2</b> | WIP of Sales A/c Dr.<br>To Production OH Control A/c                                                                                  | 75,00,000                                | 75,00,000 |
| <b>3</b> | Cost of Sales A/c Dr.<br>Finished Goods Control A/c Dr.<br>WIP Control A/c Dr.<br>Costing P/L A/c Dr.<br>To Production OH control A/c | 1,20,000<br>20,000<br>20,000<br>2,40,000 | 4,00,000  |

**OVERHEADS ABSORPTION COSTING METHOD 3.40****PYQ 15**

A machine costing ₹10 lacs was purchased on 01.04.2011. The expected life of the machine is 10 years. At the end of this period its scrap value is likely to be ₹10,000. The total cost of all the machines including new one was ₹90 lacs.

*The other information is given as follows:*

- (a) Working hours of the machine for the year was 4,200 including 200 non productive hours.
- (b) Repairs and maintenance for the new machine during the year was ₹5,000.
- (c) Insurance premium was paid for all the machines ₹9,000.
- (d) New machine consumes 8 units of electricity per hour, the rate per unit being ₹3.75.
- (e) The new machine occupies 1/10 area of the department. Rent of the department is ₹2,400 per month.
- (f) Depreciation is charged on straight line basis.

*Compute machine hour rate for the new machine.*

*[(5 Marks) May 2012]*

**Answer**

**Machine Hour Rate**

| Particulars                                              | Amount          |
|----------------------------------------------------------|-----------------|
| <b>(A) Standing charges:</b>                             |                 |
| Rent [(₹2,400 × 12 months) × 1/10]                       | 2,880           |
| Depreciation (10 lacs – 10,000) × 1/10 years             | 99,000          |
| *Insurance Premium (9,000 ÷ 90,00,000) × 10 lacs         | 1,000           |
| <b>Total (A)</b>                                         | <b>1,02,880</b> |
| <b>(B) Running charges:</b>                              |                 |
| Repairs & Maintenance                                    | 5,000           |
| **Electricity ( 8 units × 4,000 hours × ₹3.75)           | 1,20,000        |
| <b>Total (B)</b>                                         | <b>1,25,000</b> |
| <b>Total Cost (A + B)</b>                                | <b>2,27,880</b> |
| <b>Machine Hour Rate (Total cost ÷ Productive hours)</b> | <b>₹56.97</b>   |

\*Insurance premium assumed to be incurred on the basis of cost of machine & same basis has been used for apportionment of expense.

\*\*Electricity expense assumed to be incurred on productive hours only i.e. 4,000 hours.

**PYQ 16**

The following account balances and distribution of indirect charges are taken from the accounts of a manufacturing concern for the year ending on 31<sup>st</sup> March, 2012.

| Items                  | Total Amount | Production Department |        |        | Services Departments |        |
|------------------------|--------------|-----------------------|--------|--------|----------------------|--------|
|                        |              | X                     | Y      | Z      | A                    | B      |
| Indirect material      | 1,25,000     | 20,000                | 30,000 | 45,000 | 25,000               | 5,000  |
| Indirect Labour        | 2,60,000     | 45,000                | 50,000 | 70,000 | 60,000               | 35,000 |
| Superintendence 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       |                       |        |        |                      |        |
| Deprecation            | 2,70,000     |                       |        |        |                      |        |

*The departmental data are also available:*

| Details                       | Production Department |          |          | Service Departments |          |
|-------------------------------|-----------------------|----------|----------|---------------------|----------|
|                               | X                     | Y        | Z        | A                   | B        |
| Area (Sq. ft)                 | 4,400                 | 4,000    | 3,000    | 2,400               | 1,200    |
| Capital Value of Assets (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               | -        |

**OVERHEADS ABSORPTION COSTING METHOD 3.41**

|                   |    |    |     |    |    |
|-------------------|----|----|-----|----|----|
| 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 percentage:**

| <b>Departments</b> | <b>X</b> | <b>Y</b> | <b>Z</b> | <b>A</b> | <b>B</b> |
|--------------------|----------|----------|----------|----------|----------|
| Department A       | 30       | 30       | 20       | -        | 20       |
| Department B       | 25       | 40       | 25       | 10       | -        |

Prepare an overhead distribution statement to show total overhead of production department after re-apportioning service departments overhead by using simultaneous equation method. Show all the calculation to the nearest rupee.

**[(8 Marks) Nov 2012]**

**Answer**

**Statement Showing Secondary Distribution**

| <b>Particulars</b>        | <b>Basis</b>        | <b>Production</b> |                 |                 | <b>Service</b>  |               |
|---------------------------|---------------------|-------------------|-----------------|-----------------|-----------------|---------------|
|                           |                     | <b>X</b>          | <b>Y</b>        | <b>Z</b>        | <b>A</b>        | <b>B</b>      |
| Indirect Mat.             | Allocation          | 20,000            | 30,000          | 45,000          | 25,000          | 5,000         |
| Indirect labour           | "                   | 45,000            | 50,000          | 70,000          | 60,000          | 35,000        |
| Superintendent's          | "                   | -                 | -               | 96,000          | -               | -             |
| Fuel & Heat               | Radiator Sec.       | 1,500             | 3,000           | 4,500           | 3,750           | 2,250         |
| Power                     | Kwt. Hours          | 52,500            | 60,000          | 45,000          | 22,500          | -             |
| Rent & Rates              | Area                | 44,000            | 40,000          | 30,000          | 24,000          | 12,000        |
| Insurance                 | Capital Asset value | 4,000             | 6,000           | 5,000           | 1,000           | 2,000         |
| Meals charges             | No of Employees     | 12,000            | 14,000          | 24,000          | 6,000           | 4,000         |
| Depreciation              | Capital Value       | 60,000            | 90,000          | 75,000          | 15,000          | 30,000        |
| <b>Total (Prim. Dist)</b> |                     | <b>2,39,000</b>   | <b>2,93,000</b> | <b>3,94,500</b> | <b>1,57,250</b> | <b>90,250</b> |
| Apportionment:            |                     |                   |                 |                 |                 |               |
| Department A              | (30 : 30 : 20 : 20) | 50,900            | 50,900          | 33,934          | (1,69,668)      | 33,934        |
| Department B              | (25 : 40 : 25 : 10) | 31,046            | 49,674          | 31,046          | 12,418          | (1,24,184)    |
| <b>Total OH</b>           | <b>-</b>            | <b>3,20,946</b>   | <b>3,93,574</b> | <b>4,59,480</b> | <b>-</b>        | <b>-</b>      |

**Working Note:**

**Calculation of adjusted expenses of service department by using Simultaneous Equation method:**

$$\begin{aligned} \text{Expenses of Department A} &= 1,57,250 + 10\% \text{ of Expenses of B} \\ \text{Expenses of Department B} &= 90,250 + 20\% \text{ of Expenses of A} \end{aligned}$$

**Now:**

$$\begin{aligned} \text{Expenses of Department A} &= 1,57,250 + 10\% (90,250 + 20\% \text{ of A}) \\ \text{Expenses of Department A} &= 1,57,250 + 9,025 + 2\% \text{ of A} \\ 98\% \text{ of Expenses of A} &= 1,66,275 \end{aligned}$$

$$\text{Expenses of Department A} = 1,66,275 \div 98\% = 1,69,668$$

$$\text{Expenses of Department B} = 90,250 + 20\% \text{ of A} = 1,24,184$$

**PYQ 17**

**Calculate Machine Hour Rate from the following particulars:**

|                                |   |                            |
|--------------------------------|---|----------------------------|
| Cost of machine                | : | ₹25,00,000                 |
| Salvage value                  | : | ₹1,25,000                  |
| Estimated life of machine      | : | 25,000 hours               |
| Working hours (per annum)      | : | 3,000 hours                |
| Hours required for maintenance | : | 400 hours                  |
| Setting-up time required       | : | 8% of actual working hours |

**Additional Information:**



**OVERHEADS ABSORPTION COSTING METHOD 3.42**

- (i) Power 25 units @ ₹5 per unit per hour.
- (ii) Cost of repairs and maintenance ₹26,000 per annum.
- (iii) Chemicals required for operating the machine ₹2,600 per month.
- (iv) Overheads chargeable to the machine ₹18,000 per month.
- (v) Insurance premium (per annum) 2% of the cost of machine.
- (vi) No. of operators – 02 (looking after three other machines also).
- (vii) Salary per operator per month ₹18,500.

**[(8 Marks) Nov 2013]****Answer****Statement of Machine Hour Rate**

| Particulars                                                            | Amount          |
|------------------------------------------------------------------------|-----------------|
| <b>(A) Standing Charges:</b>                                           |                 |
| Overhead chargeable ( $₹18,000 \times 12$ )                            | 2,16,000        |
| Insurance premium (2% of ₹25,00,000)                                   | 50,000          |
| Operators salaries ( $2 \times ₹18,500 \times 12 \times \frac{1}{4}$ ) | 1,11,000        |
| <b>Total (A)</b>                                                       | <b>3,77,000</b> |
| <b>(B) Running Charges:</b>                                            |                 |
| Depreciation ( $(25,00,000 - 1,25,000) \times \frac{2,407}{25,000}$ )  | 2,28,665        |
| Power (25 units $\times$ 2,407 hours $\times$ ₹5)                      | 3,00,875        |
| Repairs & Maintenance                                                  | 26,000          |
| Chemicals ( $₹2,600 \times 12$ )                                       | 31,200          |
| <b>Total (B)</b>                                                       | <b>5,86,740</b> |
| <b>Total Operating Cost (A + B)</b>                                    | <b>9,63,740</b> |
| $\div$ Productive hours                                                | $\div 2,407$    |
| <b>Machine Hour Rate</b>                                               | <b>₹400.39</b>  |

**Working Notes:****Calculation of actual hours and productive hours:**

|                                                         |              |
|---------------------------------------------------------|--------------|
| Total working hours per annum                           | 3,000        |
| Less: hours required for maintenance                    | (400)        |
| <b>Working hours after maintenance</b>                  | <b>2,600</b> |
| Less: Setting-up hours ( $2,600 \times \frac{8}{108}$ ) | (193)        |
| <b>Actual hours/ Effective working hours</b>            | <b>2,407</b> |

**Assumptions as per suggested answer:**

- Working hours (i.e. 3,000 hours) are inclusive of maintenance and setting-up time.
- It is assumed that no power is consumed by the machine during unproductive hours i.e. during maintenance and unproductive setting-up hours.
- Depreciation is calculated on the basis of estimated life of the machine hours actually work.

**Note:** As this numerical problem does not specifically mention about the nature of setting-up time; means whether setting-up time is unproductive or productive is not clear. The problem can be solved assuming setting-up time either as productive or as unproductive.

**PYQ 18**

The following particulars refers to process used in the treatment of materials subsequently, incorporated in a component forming part of an electrical appliance:

- (i) The original cost of the machine used (Purchased in June 2008) was ₹10,000. Its estimated life is 10 years, the estimated scrap value was ₹1,000, and the estimated working time per year (50 weeks of 44 hours) is 2200 hours of which machine maintenance etc., is estimated to take up 200 hours. No other loss of working time expected setting up time, estimated at 100 hours, is regarded as productive time (Holiday to be ignored).



**OVERHEADS ABSORPTION COSTING METHOD 3.43**

- (ii) Electricity used by the machine during production is 16 units per hour at cost of a 9 paise per unit. No current is taken during maintenance or setting up.
- (iii) The machine required a chemical solution which is replaced at the end of week at a cost of ₹20 each time.
- (iv) The estimated cost of maintenance per year is ₹1,200.
- (v) Two attendants control the operation of machine together with five other machines. Their combined weekly wages, insurance and employer's contribution to holiday pay amount ₹120.
- (vi) Departmental and general works overhead allocated to this machine for the current year amount to ₹2,000.

*You are required to calculate machine hour rate of operating the machine.*

*[(5 Marks) May 2016]*

**Answer**

**Statement of Machine Hour Rate (1 Machine ; 1 Year)**

| Particulars                                              | Amount        |
|----------------------------------------------------------|---------------|
| <b>(A) Standing Charges:</b>                             |               |
| Depreciation [(10,000 – 1,000) ÷ 10 Years]               | 900           |
| Attendants wages, insurance etc. (120 × 50 weeks × 1/6)  | 1,000         |
| Departmental and works overhead                          | 2,000         |
| <b>Total Standing Charges (A)</b>                        | <b>3,900</b>  |
| <b>(B) Running Expenses:</b>                             |               |
| Electricity (1900 hours × 16 units per hour × 0.09)      | 2,736         |
| Chemical solution (₹20 × 50 weeks)                       | 1,000         |
| Maintenance                                              | 1,200         |
| <b>Total Running expenses (B)</b>                        | <b>4,936</b>  |
| <b>Total Expenses of one machine for four week (A+B)</b> | <b>8,836</b>  |
| ÷ Productive Machine Hours (Running and setting up)      | ÷ 2000        |
| <b>Machine Hour Rate</b>                                 | <b>₹4.418</b> |

**PYQ 19**

APP Limited is a manufacturing concern and recovers overheads at a pre-determined rate of ₹30 per man-day. The total factory overheads incurred and the man-days actually worked were ₹51 lakhs and 1.5 lakhs days respectively. During the period 50,000 units were sold. At the end of the period 5,000 completed units were held in stock but there was no opening stock of finished goods. Similarly, there was no stock of uncompleted units at the beginning of the period but at the end of the period there were 10,000 uncompleted units which may be treated as 50% complete.

On analyzing the reasons, it was found that 60% of the unabsorbed overheads were due to defective planning and the balances were attributable to increase in overhead cost.

*How would unabsorbed overhead be treated in cost accounts?*

*[(8 Marks) Nov 2017]*

**Answer**

**Calculation of under or over absorption of overhead:**

|                  |   |                       |   |                  |
|------------------|---|-----------------------|---|------------------|
| Absorbed OH      | = | 1,50,000 × 30         | = | ₹45,00,000       |
| Actual OH        | = | 51,00,000             |   |                  |
| Under absorption | = | 51,00,000 – 45,00,000 | = | <b>₹6,00,000</b> |

**Treatment of unabsorbed overheads:**

|                                 |   |                                             |
|---------------------------------|---|---------------------------------------------|
| 60% Abnormal                    | = | ₹3,60,000 charged to Profit and Loss A/c    |
| 40% Normal increase in OH costs | = | ₹2,40,000 charged to FG stock, WIP and COGS |

|                                |   |                                         |
|--------------------------------|---|-----------------------------------------|
| Supplementary OH Recovery Rate | = | Under recovery ÷ Total equivalent units |
|                                | = | ₹2,40,000 ÷ 60,000 = <b>₹4 per unit</b> |

**OVERHEADS ABSORPTION COSTING METHOD 3.44****Apportionment of unrecovered overheads (due to increase in overheads):**

|                                     |   |           |
|-------------------------------------|---|-----------|
| Work-in-Progress (5,000 units × ₹4) | = | ₹20,000   |
| Finished goods (5,000 units × ₹4)   | = | ₹20,000   |
| Cost of sales (50,000 units × ₹4)   | = | ₹2,00,000 |

**Journal Entries**

| <b>Entries</b>                                                |     | <b>Dr.</b> | <b>Cr.</b> |
|---------------------------------------------------------------|-----|------------|------------|
| Cost of Sales A/c                                             | Dr. | 2,00,000   | -          |
| Finished Goods Control A/c                                    | Dr. | 20,000     | -          |
| Work in Progress Control A/c                                  | Dr. | 20,000     | -          |
| Costing Profit & Loss A/c                                     | Dr. | 3,60,000   | -          |
| To Overhead Control A/c                                       |     | -          | 6,00,000   |
| (Being under recovery of under absorbed oh recovered/charged) |     |            |            |

**PYQ 20**

Delta Ltd. Is a manufacturing concern having two production departments P<sub>1</sub> and P<sub>2</sub> and two service departments S<sub>1</sub> and S<sub>2</sub>. After making a primary distribution of factory overheads of all departments are as under:

|                |   |           |
|----------------|---|-----------|
| P <sub>1</sub> | = | ₹4,02,000 |
| P <sub>2</sub> | = | ₹2,93,000 |
| S <sub>1</sub> | = | ₹3,52,000 |
| S <sub>2</sub> | = | ₹33,000   |

**Overheads of service departments are apportioned as below:**

|                           | <b>P<sub>1</sub></b> | <b>P<sub>2</sub></b> | <b>S<sub>1</sub></b> | <b>S<sub>2</sub></b> |
|---------------------------|----------------------|----------------------|----------------------|----------------------|
| Department S <sub>1</sub> | 40%                  | 50%                  | -                    | 10%                  |
| Department S <sub>2</sub> | 50%                  | 40%                  | 10%                  | -                    |

A product 'Z' passes through all the two production departments – P<sub>1</sub> and P<sub>2</sub> and each unit of product remain in process for 2 and 3 hours respectively. The material and labour cost of one unit of product 'Z' is ₹500 and ₹350 respectively. The company run for all 365 days of the year and 16 hours per day.

**You are required to:**

- (1) To make secondary distribution of overheads of service departments by applying Simultaneous Equation method and
- (2) Determine the total cost of one unit of product Z.

**[(8 Marks) May 2018]****Answer****(1) Statement Showing Secondary Distribution**

| <b>Particulars</b>            | <b>Basis</b>         | <b>Production Departments</b> |                      | <b>Service Departments</b> |                      |
|-------------------------------|----------------------|-------------------------------|----------------------|----------------------------|----------------------|
|                               |                      | <b>P<sub>1</sub></b>          | <b>P<sub>2</sub></b> | <b>S<sub>1</sub></b>       | <b>S<sub>2</sub></b> |
| Overheads                     | Primary distribution | 4,02,000                      | 2,93,000             | 3,52,000                   | 33,000               |
| Apportionment:                |                      |                               |                      |                            |                      |
| Department S <sub>1</sub>     | (40:50:10)           | 1,43,555                      | 1,79,445             | (3,58,889)                 | 35,889               |
| Department S <sub>2</sub>     | (50:40:10)           | 34,445                        | 27,555               | 6,889                      | (68,889)             |
| <b>Total Overheads</b>        |                      | <b>5,80,000</b>               | <b>5,00,000</b>      | <b>-</b>                   | <b>-</b>             |
| ÷ Production Hours            |                      | 5,840                         | 5,840                | -                          | -                    |
| <b>Recovery rate per hour</b> | <b>-</b>             | <b>99.32</b>                  | <b>85.62</b>         | <b>-</b>                   | <b>-</b>             |

**Calculation of adjusted expenses of service department by using Simultaneous Equation method:**

|                                       |   |                                              |
|---------------------------------------|---|----------------------------------------------|
| Expenses of Department S <sub>1</sub> | = | 3,52,000 + 10% of Expenses of S <sub>2</sub> |
| Expenses of Department S <sub>2</sub> | = | 33,000 + 10% of Expenses of S <sub>1</sub>   |

**OVERHEADS ABSORPTION COSTING METHOD 3.45****Now:**Expenses of Department S<sub>1</sub> = 3,52,000 + 10% (33,000 + 10% of S<sub>1</sub>)Expenses of Department S<sub>1</sub> = 3,52,000 + 3,300 + 1% of S<sub>1</sub>**Expenses of Department S<sub>1</sub>** = 3,55,300 ÷ 99% = **3,58,889****Expenses of Department S<sub>2</sub>** = 33,000 + 10% of S<sub>1</sub>

= 33,000 + 10% of 3,58,889

= 33,000 + 35,889 = **68,889****(2) Statement Showing Cost Per Unit of 'Z'**

| Particulars                                 | Amount          |
|---------------------------------------------|-----------------|
| Direct Materials                            | 500             |
| Direct Labour                               | 350             |
| <b>Prime Cost</b>                           | <b>850</b>      |
| Production Overheads:                       |                 |
| Department P <sub>1</sub> (2 hours × 99.32) | 198.64          |
| Department P <sub>2</sub> (3 hours × 85.62) | 256.86          |
| <b>Total Cost</b>                           | <b>1,305.50</b> |

**Working Notes:**

Calculation of production hours = 365 × 16 hours = 5,840 hours

**PYQ 21**

RJS produces a single product and absorbs the production overheads at a pre determined rate. Information relating to a period is as under:

|                                        |                |
|----------------------------------------|----------------|
| Production overheads actually incurred | ₹4,84,250      |
| Overheads recovery rate at production  | ₹1.45 per hour |
| Actual hours worked                    | 2,65,000 hours |

**Production:**

|                                |              |
|--------------------------------|--------------|
| Finished goods                 | 17,500 units |
| Work-in-progress               | 5,000 units  |
| (50% complete in all respects) |              |

**Sales:**

|                |              |
|----------------|--------------|
| Finished goods | 12,500 units |
|----------------|--------------|

At the end of the period, it was discovered that the actual production overheads incurred included ₹40,000 on account of 'written off obsolete stores' and wages paid for the strike period under an award. It was also found that 30% of the under absorption of production overheads was due to production inefficiency and the rest was attributable to normal increase in costs.

**Required to calculate:**

- (1) The amount of under absorbed production overheads during the period.
- (2) Show the accounting treatment of under absorption of production overheads and pass journal entry. **[(8 Marks) Nov 2018]**

**Answer****(1) Computation of under absorption of Production Overheads during the period:**

| Particulars                                                        | Amount          |
|--------------------------------------------------------------------|-----------------|
| Total production overheads actually incurred during the period     | 4,84,250        |
| Less: Written off obsolete stores and wages paid for strike period | (40,000)        |
| <b>Net production overheads actually incurred</b>                  | <b>4,44,250</b> |
| Production overheads absorbed (2,65,000 hours × ₹1.45)             | 3,84,250        |
| <b>Under Recovery of production overheads</b>                      | <b>₹60,000</b>  |

**OVERHEADS ABSORPTION COSTING METHOD 3.46****(2) Accounting treatment of under-absorption of production overheads:**

- a. ₹18,000 (i.e. ₹60,000 × 30%) of under absorbed overheads were due to lack of production planning. This being abnormal should be debited to Costing Profit and Loss Account.
- b. The balance of ₹42,000 (i.e. ₹60,000 × 70%) of under absorbed overheads should be distributed over work in progress, finished goods and cost of sales by using supplementary rate.

$$\begin{aligned} \text{Supplementary OH Rate (Positive)} &= \frac{\text{Under Absorbed Overhead}}{\text{Equivalent Units}} = \frac{42,000}{12,500 + 5,000 + 2,500} \\ &= \text{₹2.10 per unit} \end{aligned}$$

**Distribution of unabsorbed overheads of ₹42,000 over work-in-progress, finished goods and cost of sales:**

|                                        |   |         |
|----------------------------------------|---|---------|
| Work-in-Progress (2,500 units × ₹2.10) | = | ₹5,250  |
| Finished goods (5,000 units × ₹2.10)   | = | ₹10,500 |
| Cost of sales (12,500 units × ₹2.10)   | = | ₹26,250 |

**Journal Entries**

| Entries                                                       | Dr.    | Cr.    |
|---------------------------------------------------------------|--------|--------|
| Cost of Sales A/c Dr.                                         | 26,250 | -      |
| Finished Goods Control A/c Dr.                                | 10,500 | -      |
| Work in Progress Control A/c Dr.                              | 5,250  | -      |
| Costing Profit & Loss A/c Dr.                                 | 18,000 | -      |
| To Overhead Control A/c                                       | -      | 60,000 |
| (Being under recovery of under absorbed oh recovered/charged) |        |        |

**PYQ 22**

M/s. NOP Limited has its own power plant and generates its own power. Information regarding power requirements and power used are as follows:

| Particulars                                  | Production Departments |        | Service Departments |        |
|----------------------------------------------|------------------------|--------|---------------------|--------|
|                                              | A                      | B      | X                   | Y      |
| Needed capacity production (in hours)        | 20,000                 | 25,000 | 15,000              | 10,000 |
| Used during the quarter ended September 2018 | 16,000                 | 20,000 | 12,000              | 8,000  |

During the quarter ended September 2018, cost for generating power amounted to ₹12.60 Lakhs out of which ₹4.20 Lakhs 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 67,500 hours and 48,750 hours respectively.

**Required:**

- (1) Prepare overheads distribution sheet.
- (2) Calculate factory overhead per labour hour for department A and department B.

**[(5 Marks) Nov 2018]****Answer****(1) Overheads Distribution Sheet**

| Particulars                                | Basis                         | Production Departments |                 | Service Departments |                 |
|--------------------------------------------|-------------------------------|------------------------|-----------------|---------------------|-----------------|
|                                            |                               | A                      | B               | X                   | Y               |
| Fixed overheads (4,20,000)                 | Needed capacity (20:25:15:10) | 1,20,000               | 1,50,000        | 90,000              | 60,000          |
| Variable overheads (12,60,000 – 4,20,000)  | Used capacity (16:20:12:8)    | 2,40,000               | 3,00,000        | 1,80,000            | 1,20,000        |
| <b>Total overheads</b>                     | -                             | <b>3,60,000</b>        | <b>4,50,000</b> | <b>2,70,000</b>     | <b>1,80,000</b> |
| Apportionment of expenses of: Department X | 6 : 4 : 2                     | 1,35,000               | 90,000          | (2,70,000)          | 45,000          |

**OVERHEADS ABSORPTION COSTING METHOD 3.47**

|                        |          |                 |                 |          |            |
|------------------------|----------|-----------------|-----------------|----------|------------|
| Department Y           | 4 : 1    | 1,80,000        | 45,000          | -        | (2,25,000) |
| <b>Total overheads</b> | <b>-</b> | <b>6,75,000</b> | <b>5,85,000</b> | <b>-</b> | <b>-</b>   |

**(2) Calculation of factory overhead per hour:**

|              |   |                         |   |                     |
|--------------|---|-------------------------|---|---------------------|
| Department A | = | 6,75,000 ÷ 67,500 hours | = | <b>₹10 per hour</b> |
| Department B | = | 5,85,000 ÷ 48,750 hours | = | <b>₹12 per hour</b> |

**PYQ 23**

M/s. Zaina Private Limited has purchased a machine costing ₹29,14,800 and it is expected to have a salvage value of ₹1,50,000 at the end of its effective life of 15 years. Ordinarily the machine is expected to run for 4,500 hours per annum but it is estimated that 300 hours per annum will be lost for normal repair & maintenance.

**The other details in respect of the machine are as follows:**

- (a) Repair & maintenance during the whole life of the machine are expected to be ₹5,40,000.
- (b) Insurance premium (per annum) 2% of the cost of the machine.
- (c) Oil and lubricants required for operating the machine (per annum) ₹87,384.
- (d) Power consumption: 10 units per hour @ ₹7 per unit. No power consumption during repair and maintenance.
- (e) Salary to operator per month ₹24,000. The operator devotes one-third of his time to the machine.

**You are required to calculate comprehensive machine hour rate.**

**[(5 Marks) May 2019]**

**Answer**

| <b>Machine Hour Rate</b>                   |                                        |  |                 |
|--------------------------------------------|----------------------------------------|--|-----------------|
| <b>Particulars</b>                         |                                        |  | <b>Amount</b>   |
| <b>(A) Standing charges/ Fixed costs</b>   |                                        |  |                 |
| Depreciation                               | [(₹29,14,800 – 1,50,000) × 1/15 years] |  | 1,84,320        |
| Insurance Premium                          | (₹29,14,800 × 2%)                      |  | 58,296          |
| Salary to Operator                         | (₹24,000 × 1/3 × 12)                   |  | 96,000          |
| <b>Total (A)</b>                           |                                        |  | <b>3,38,616</b> |
| <b>(B) Running charges/ Variable costs</b> |                                        |  |                 |
| Repairs                                    | (₹5,40,000 × 1/15 years)               |  | 36,000          |
| Power                                      | (10 units × 4,200 hours × ₹7)          |  | 2,94,000        |
| Oil and lubricants                         |                                        |  | 87,384          |
| <b>Total (B)</b>                           |                                        |  | <b>4,17,384</b> |
| <b>Total Cost (A + B)</b>                  |                                        |  | <b>7,56,000</b> |
| ÷ Productive Machine Hours (4,500 - 300)   |                                        |  | ÷ 4,200         |
| <b>Machine Hour Rate</b>                   |                                        |  | <b>₹180.00</b>  |

**PYQ 24**

ABS enterprise produces a product and adopts the policy to recover factory overheads applying blanket rate based on machine hours. The cost records of the concern reveal following information:

|                               |            |
|-------------------------------|------------|
| Budgeted production overheads | ₹10,35,000 |
| Budgeted machine hours        | 90,000     |
| Actual machine hours worked   | 45,000     |
| Actual production overheads   | ₹8,80,000  |

**Production overheads (actual) include:**

|                                                  |         |
|--------------------------------------------------|---------|
| Paid to worker as per court's award              | ₹50,000 |
| Wages paid for strike period                     | ₹38,000 |
| Stores written off                               | ₹22,000 |
| Expenses of previous year booked in current year | ₹18,500 |

**Production:**

**OVERHEADS ABSORPTION COSTING METHOD 3.48**

|                        |              |
|------------------------|--------------|
| Finished goods         | 30,000 units |
| Sale of finished goods | 27,000 units |

The analysis of cost information reveals that  $\frac{1}{3}$  of the under absorption of overheads was due to defective production planning and the balance was attributable to increase in costs.

**You are required:**

- (1) To find out the amount of under absorbed production overheads.
- (2) To give the ways of treating it in cost accounts.
- (3) To apportion the under absorbed overheads over the items.

**[(10 Marks) Nov 2019]****Answer****(1) Computation of Amount of Under Absorption of Production Overheads**

| Particulars                                                                                                   | Amount           |
|---------------------------------------------------------------------------------------------------------------|------------------|
| Total production overheads actually incurred                                                                  | 8,80,000         |
| Less: Paid to worker as per court's award                                                                     | (50,000)         |
| Less: Wages paid for strike period                                                                            | (38,000)         |
| Less: Stores written off                                                                                      | (22,000)         |
| Less: Expenses of previous year booked in current year                                                        | (18,500)         |
| <b>Net production overheads actually incurred</b>                                                             | <b>7,51,500</b>  |
| Production overheads absorbed ( $\text{₹}10,35,000 \div 90,000 \text{ hours}$ ) $\times 45,000 \text{ hours}$ | 5,17,500         |
| <b>Under Recovery of production overheads</b>                                                                 | <b>₹2,34,000</b> |

**(2) Accounting treatment of under-absorption of production overheads:**

(a) ₹78,000 (i.e.,  $\text{₹}2,34,000 \times \frac{1}{3}$ ) of under absorbed overheads were due to defective production planning. This being abnormal should be debited to Costing Profit and Loss Account.

(b) The balance of ₹1,56,000 (i.e.,  $\text{₹}2,34,000 \times \frac{2}{3}$ ) of under absorbed overheads should be distributed over finished goods and cost of sales by using supplementary rate.

$$\begin{aligned} \text{Supplementary OH Rate} &= \frac{\text{Under Absorbed Overheads}}{\text{Total Units}} = \frac{1,56,000}{30,000} \\ &= \text{₹5.20 per unit} \end{aligned}$$

**(3) Apportionment of ₹1,56,000 Under Absorbed Overheads:**

|                                             |   |           |
|---------------------------------------------|---|-----------|
| Finished goods (3,000 units $\times$ ₹5.20) | = | ₹15,600   |
| Cost of sales (27,000 units $\times$ ₹5.20) | = | ₹1,40,400 |

**Journal Entries**

| Entries                                                       |     | Dr.      | Cr.      |
|---------------------------------------------------------------|-----|----------|----------|
| Finished Goods Control A/c                                    | Dr. | 15,600   | -        |
| Cost of Sales A/c                                             | Dr. | 1,40,400 | -        |
| Costing Profit & Loss A/c                                     | Dr. | 78,000   | -        |
| To Overhead Control A/c                                       |     |          | 2,34,000 |
| (Being under recovery of under absorbed oh recovered/charged) |     |          |          |

**PYQ 25**

TEE Ltd. is a manufacturing company having three production departments 'P', 'Q' and 'R' and two service departments 'X' and 'Y' details pertaining to which are as under:

|                       | P        | Q      | R        | X      | Y      |
|-----------------------|----------|--------|----------|--------|--------|
| Direct wages (₹)      | 5,000    | 1,500  | 4,500    | 2,000  | 800    |
| Working hours         | 13,191   | 7,598  | 14,995   | -      | -      |
| Value of machines (₹) | 1,00,000 | 80,000 | 1,00,000 | 20,000 | 50,000 |
| H.P. of machines      | 100      | 80     | 100      | 20     | 50     |
| Light points (Nos.)   | 20       | 10     | 15       | 5      | 10     |
| Floor space (sq. ft.) | 2,000    | 2,500  | 3,500    | 1,000  | 1,000  |



**OVERHEADS ABSORPTION COSTING METHOD 3.49**

**The expenses are as follows:**

|                                                       |         |
|-------------------------------------------------------|---------|
| Rent and rates                                        | ₹10,000 |
| General lighting                                      | ₹600    |
| Indirect wages                                        | ₹3,450  |
| Power                                                 | ₹3,500  |
| Depreciation on machines                              | ₹70,000 |
| Sundries (apportionment on the basis of direct wages) | ₹13,800 |

The expenses of the Service Departments are allocated as under:

| <b>Departments</b> | <b>P</b> | <b>Q</b> | <b>R</b> | <b>X</b> | <b>Y</b> |
|--------------------|----------|----------|----------|----------|----------|
| X                  | 45%      | 15%      | 30%      | -        | 10%      |
| Y                  | 35%      | 25%      | 30%      | 10%      | -        |

Product 'A' is processes for manufacture in Department P, Q, R for 6, 5, and 2 hours respectively. Direct Costs of Product A are: Direct material cost is 65 per unit and Direct labour cost is 40 per unit.

**You are required to:**

- Prepare a statement showing distribution of overheads among the production and service departments.
- Calculate recovery rate per hour of each production department after redistributing the service department costs.
- Find out the total cost of 'Product A'.

**[(10 Marks) Nov 2020]**

**Answer**

**(i) Statement Showing Distribution of Overheads among Production and Service Departments**

| <b>Items</b>             | <b>Basis of Charge</b> | <b>Production Departments</b> |               |               | <b>Service Departments</b> |               |
|--------------------------|------------------------|-------------------------------|---------------|---------------|----------------------------|---------------|
|                          |                        | <b>P</b>                      | <b>Q</b>      | <b>R</b>      | <b>X</b>                   | <b>Y</b>      |
| Direct wages             | Allocation             | -                             | -             | -             | 2,000                      | 800           |
| Rent and rates           | Area                   | 2,000                         | 2,500         | 3,500         | 1,000                      | 1,000         |
| General lighting         | Light points           | 200                           | 100           | 150           | 50                         | 100           |
| Indirect wages           | Direct wages           | 1,250                         | 375           | 1,125         | 500                        | 200           |
| Power                    | H.P.                   | 1,000                         | 800           | 1,000         | 200                        | 500           |
| Depreciation on machines | Value of machines      | 20,000                        | 16,000        | 20,000        | 4,000                      | 10,000        |
| Sundries                 | Direct wages           | 5,000                         | 1,500         | 4,500         | 2,000                      | 800           |
| <b>Total overheads</b>   | <b>Primary Dist.</b>   | <b>29,450</b>                 | <b>21,275</b> | <b>30,275</b> | <b>9,750</b>               | <b>13,400</b> |

**(ii) Statement Showing Recovery Rate Per Hour**

| <b>Items</b>            | <b>Basis</b>      | <b>Production Departments</b> |               |               | <b>Service Departments</b> |          |
|-------------------------|-------------------|-------------------------------|---------------|---------------|----------------------------|----------|
|                         |                   | <b>P</b>                      | <b>Q</b>      | <b>R</b>      | <b>X</b>                   | <b>Y</b> |
| Overheads               | Primary Dist.     | 29,450                        | 21,275        | 30,275        | 9,750                      | 13,400   |
| Re-apportionment:       |                   |                               |               |               |                            |          |
| Department X            | 45 : 15 : 30 : 10 | 4,388                         | 1,462         | 2,925         | (9,750)                    | 975      |
| Department Y            | 35 : 25 : 30 : 10 | 5,031                         | 3,594         | 4,313         | 1,437                      | (14,375) |
| Department X            | 45 : 15 : 30 : 10 | 647                           | 216           | 431           | (1,437)                    | 143      |
| Department Y            | 35 : 25 : 30 : 10 | 50                            | 36            | 43            | 14                         | (143)    |
| Department X            | 45 : 15 : 30      | 7                             | 2             | 5             | (14)                       | -        |
| <b>Total OH</b>         | <b>-</b>          | <b>39,573</b>                 | <b>26,585</b> | <b>37,992</b> | <b>-</b>                   | <b>-</b> |
| ÷ Working hours         | <b>-</b>          | <b>13,191</b>                 | <b>7,598</b>  | <b>14,995</b> | <b>-</b>                   | <b>-</b> |
| <b>OH rate per hour</b> |                   | <b>₹3.00</b>                  | <b>₹3.50</b>  | <b>₹2.53</b>  | <b>-</b>                   | <b>-</b> |

**Note:** Cost of service departments are redistributed by using Repeated Distribution Method.

**(iii) Calculation of cost of Product A:**

Direct material cost

₹65.00



**OVERHEADS ABSORPTION COSTING METHOD 3.50**

|                                           |                |
|-------------------------------------------|----------------|
| Direct labour cost                        | ₹40.00         |
| Overheads: Department P (6 hours × ₹3.00) | ₹18.00         |
| Department Q (5 hours × ₹3.50)            | ₹17.50         |
| Department R (2 hours × ₹2.53)            | ₹5.06          |
| <b>Cost of Product A</b>                  | <b>₹145.56</b> |

**PYQ 26**

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 ₹32 lakhs.

**These following particulars are furnished for a 6 month period:**

|                                                       |              |
|-------------------------------------------------------|--------------|
| Normal available hours per month                      | 208          |
| Absenteeism (without pay) hours per operator          | 18           |
| Leave (with pay) hours per operator                   | 20           |
| Normal unavoidable idle time hours per operator       | 10           |
| Average rate of wages per day of 8 hours per operator | ₹100         |
| Production bonus estimated                            | 10% on wages |
| Power consumed                                        | ₹40,250      |
| Supervision & indirect labour                         | ₹16,500      |
| Lighting and electricity                              | ₹6,000       |

**The following particulars are given for a year:**

|                                                 |                         |
|-------------------------------------------------|-------------------------|
| Repairs and maintenance (including consumables) | 5% of value of machines |
| Insurance                                       | ₹3,60,000               |
| Depreciation                                    | 10% of original cost    |
| Sundry work expenses                            | ₹50,000                 |
| Management expenses allocated                   | ₹5,00,000               |

**Prepare a statement showing the comprehensive machine hour rate for the machine shop.**

**[(5 Marks) Jan 2021]**

**Answer**

**Computation of Comprehensive Machine Hour Rate for the "Machine Shop"**

| <b>Particulars</b>                                                        |                                           | <b>Amount</b>   |
|---------------------------------------------------------------------------|-------------------------------------------|-----------------|
| <b>(A) Standing Charges:</b>                                              |                                           |                 |
| Operators wages                                                           | $(100 \div 8) \times 7,380 \text{ hours}$ | 92,250          |
| Production bonus                                                          | $(92,250 \times 10\%)$                    | 9,225           |
| Supervision & indirect labour                                             |                                           | 16,500          |
| Lighting and electricity                                                  |                                           | 6,000           |
| Insurance                                                                 | $(3,60,000 \times 6/12)$                  | 1,80,000        |
| Depreciation                                                              | $(32,00,000 \times 10\% \times 6/12)$     | 1,60,000        |
| Sundry works expense                                                      | $(50,000 \times 6/12)$                    | 25,000          |
| Management expenses allocated                                             | $(5,00,000 \times 6/12)$                  | 2,50,000        |
| <b>Total (A)</b>                                                          |                                           | <b>7,38,975</b> |
| <b>(B) Running Charges</b>                                                |                                           |                 |
| Repairs and maintenance                                                   | $(32,00,000 \times 5\% \times 6/12)$      | 80,000          |
| Power consumed                                                            |                                           | 40,250          |
| <b>Total (B)</b>                                                          |                                           | <b>1,20,250</b> |
| <b>Total OH for the shop (i.e. for all machineries) for 6 month (A+B)</b> |                                           | <b>8,59,225</b> |
| <b>÷ Total machine hours</b>                                              |                                           | <b>÷ 7,200</b>  |
| <b>Machine Hour Rate</b>                                                  |                                           | <b>₹119.34</b>  |

**Working Notes:**

**Calculation of effective productive hours available to the machine shop and paid hours:**

| <b>Particulars</b>                                          | <b>6 Months, 6 Operators (Hours)</b> |
|-------------------------------------------------------------|--------------------------------------|
| Normal Available hours (208 hours × 6 months × 6 operators) | 7,488                                |

**OVERHEADS ABSORPTION COSTING METHOD 3.51**

|                                                  |                     |
|--------------------------------------------------|---------------------|
| Less: Absenteeism hours (18 hours × 6 operators) | (108)               |
| <b><i>Paid Hours per month</i></b>               | <b><i>7,380</i></b> |
| Less: Leave hours (20 hours × 6 operators)       | (120)               |
| Less: Normal idle time (10 hours × 6 operators)  | (60)                |
| <b><i>Effective Productive Hours</i></b>         | <b><i>7,200</i></b> |

**PYQ 27**

SNS Trading Company has three Main Departments and two Service Departments. The data for each department is given below:

| <b><i>Departments</i></b>          | <b><i>Expenses (in ₹)</i></b> | <b><i>Area in (Sq. Mtr)</i></b> | <b><i>No. of Employees</i></b> |
|------------------------------------|-------------------------------|---------------------------------|--------------------------------|
| <b><i>Main Departments:</i></b>    |                               |                                 |                                |
| Purchase Department                | 5,00,000                      | 12                              | 800                            |
| Packing Department                 | 8,00,000                      | 15                              | 1700                           |
| Distribution Department            | 3,50,000                      | 7                               | 700                            |
| <b><i>Service Departments:</i></b> |                               |                                 |                                |
| Maintenance Department             | 6,40,000                      | 4                               | 200                            |
| Personnel Department               | 3,20,000                      | 6                               | 250                            |

The cost of Maintenance Department and Personnel Department is distributed on the basis of 'Area in Square Metres' and 'Number of Employees' respectively.

***You are required to:***

- (1)*** Prepare a statement showing the distribution of expenses of Service departments to Main departments using "Step Ladder Method" of overhead distribution.
- (2)*** Compute the rate per hour of each Main departments, given that, the Purchase department, Packing department and Distribution department works for 12 hours a day, 24 hours a day and 8 hours a day respectively. Assume that there are 365 days in a year and there are no holidays.

***[(5 Marks) July 2021]***

***Answer***

***(1) Statement Showing Distribution of Expenses of Service Departments***

| <b><i>Particulars</i></b> | <b><i>Basis</i></b> | <b><i>Production Departments</i></b> |                         |                            | <b><i>Service Departments</i></b> |                         |
|---------------------------|---------------------|--------------------------------------|-------------------------|----------------------------|-----------------------------------|-------------------------|
|                           |                     | <b><i>Purchase</i></b>               | <b><i>Packing</i></b>   | <b><i>Distribution</i></b> | <b><i>Maintenance</i></b>         | <b><i>Personnel</i></b> |
| Expenses                  | Allocation          | 5,00,000                             | 8,00,000                | 3,50,000                   | 6,40,000                          | 3,20,000                |
| Re-apportionment:         |                     |                                      |                         |                            |                                   |                         |
| Maintenance Dept.         | Area                | 1,92,000                             | 2,40,000                | 1,12,000                   | (6,40,000)                        | 96,000                  |
| Personnel Dept.           | No. of Employees    | 1,04,000                             | 2,21,000                | 91,000                     | -                                 | (4,16,000)              |
| <b><i>Total OH</i></b>    | <b><i>-</i></b>     | <b><i>7,96,000</i></b>               | <b><i>12,61,000</i></b> | <b><i>5,53,000</i></b>     | <b><i>-</i></b>                   | <b><i>-</i></b>         |

***(2) Calculation of rate per hour:***

|                         |   |                                   |                         |
|-------------------------|---|-----------------------------------|-------------------------|
| Rate per hour           | = | Total Overheads ÷ Total Hours     |                         |
| Purchase Department     | = | 7,96,000 ÷ (12 hours × 365 days)  | = <b><i>₹181.74</i></b> |
| Packing Department      | = | 12,61,000 ÷ (24 hours × 365 days) | = <b><i>₹143.95</i></b> |
| Distribution Department | = | 5,53,000 ÷ (8 hours × 365 days)   | = <b><i>₹189.38</i></b> |

**PYQ 28**

XYZ Ltd. manufactures a single product. It recovers factory overheads at a pre-determined rate of ₹20 per man-day.

During the year 2020-21, the total factory overheads incurred and the man-days actually worked were ₹35,50,000 and 1,50,000 respectively. Out of the amount of ₹35,50,000, ₹2,00,000 were in respect of wages for strike period and ₹1,00,000 was in respect of expenses off the previous year booked in the current year. During the period, 50,000 units were sold. At the end of period, 12,000 completed units were held in stock but there was no opening stock of finished goods. Similarly, there was no stock of uncompleted units at the

**OVERHEADS ABSORPTION COSTING METHOD 3.52**

beginning of the period but at the end of the period there were 20,000 uncompleted units which may be treated as 65% complete in all respects.

On investigation, it was found that 40% of the unabsorbed overheads due to factory inefficiency and the rest were attributed to increase in the cost of indirect materials and indirect labour.

**You are required to:**

1. Calculate the amount of unabsorbed overheads during the year 2020-21.
2. Show the accounting treatment of unabsorbed overheads in cost accounts and pass journal entry.

**[(10 Marks) Dec 2021]**

**Answer**

**1. Computation of Amount of Unabsorbed Overheads:**

| Particulars                                                | Amount           |
|------------------------------------------------------------|------------------|
| Total production overheads actually incurred               | 35,50,000        |
| Less: Amount payable in respect of wages for strike period | (2,00,000)       |
| Less: Expenses off the previous year                       | (1,00,000)       |
| <b>Net production overheads actually incurred</b>          | <b>32,50,000</b> |
| Production overheads absorbed (1,50,000 man-days × ₹20)    | 30,00,000        |
| <b>Unabsorbed overheads</b>                                | <b>₹2,50,000</b> |

**2. Accounting treatment of unabsorbed overheads:**

(a) ₹1,00,000 (₹2,50,000 × 40%) of unabsorbed overheads were due to factory inefficiency and debited to Costing Profit and Loss Account.

(b) The balance of ₹1,50,000 of unabsorbed overheads should be distributed over Finished goods stock, WIP stock and cost of sales by using supplementary rate.

$$\begin{aligned}
 \text{Supplementary OH Rate} &= \text{Unabsorbed overheads} \div \text{Equivalent Units} \\
 &= ₹1,50,000 \div 75,000 \text{ units (50,000 + 12,000 + 65\% of 20,000)} \\
 &= \text{₹2 per unit}
 \end{aligned}$$

**Distribution of unabsorbed overheads of ₹1,50,000:**

|                                    |   |           |
|------------------------------------|---|-----------|
| Cost of Sales (50,000 × ₹2)        | = | ₹1,00,000 |
| Finished Goods Stock (12,000 × ₹2) | = | ₹24,000   |
| WIP Stock (13,000 × ₹2)            | = | ₹26,000   |

**Journal Entries**

| Entries                                             | Dr.          | Cr.      |
|-----------------------------------------------------|--------------|----------|
| Cost of Sales A/c                                   | Dr. 1,00,000 | -        |
| Finished Goods Control A/c                          | Dr. 24,000   | -        |
| WIP Control A/c                                     | Dr. 26,000   | -        |
| Costing Profit & Loss A/c                           | Dr. 1,00,000 | -        |
| To Overhead Control A/c                             | -            | 2,50,000 |
| (Being unabsorbed factory overheads being absorbed) |              |          |

**PYQ 29**

USP Ltd. is the manufacture of 'double grip motorcycle tyres. In the manufacturing process, it undertakes three different job namely, Vulcanising, Brushing and Striping. All of these jobs requires the use of a special machine and also the aid of a robot when necessary. The robot is hired from outside and the hire charges paid for every six month is ₹2,70,000, An estimated of overhead expenses relating to the special machine is given below:

- Rent for a quarter is ₹18,000
- The cost of the special machine is ₹19,20,000 and depreciation is charged @ 10% per annum on straight line basis.
- Other indirect expenses are recovered at 20% of direct wages.

**OVERHEADS ABSORPTION COSTING METHOD 3.53**

The factory manager has informed that in the coming year, the total direct wages will be ₹12,00,000 which will be incurred evenly throughout the year. During the first month of operation, the following details are available from the job book:

**Number of hours the special machine was used**

| <b>Jobs</b> | <b>Without the aid of the robot</b> | <b>With the aid of the robot</b> |
|-------------|-------------------------------------|----------------------------------|
| Vulcanising | 500                                 | 400                              |
| Brushing    | 1,000                               | 400                              |
| Striping    | -                                   | 1,200                            |

**You are required to:**

- (a) Compute the Machine Hour Rate for the company as a whole for a month (A) when the robot is used and (B) when the robot is not used.
- (b) Compute the Machine Hour Rate for the individual jobs i.e. Vulcanising, Brushing and Striping.
- [(10 Marks) Nov 2022]**

**Answer****(a) Machine hour rate for the company as a whole for a month:**

|                                |   |                                    |   |        |
|--------------------------------|---|------------------------------------|---|--------|
| (A) When the Robot is used     | = | $\frac{69,000}{2,000 \text{ hrs}}$ | = | ₹34.50 |
| (B) When the Robot is not used | = | $\frac{18,000}{1,500 \text{ hrs}}$ | = | ₹12.00 |

**(b) Machine hour rate for individual jobs:**

| <b>Particulars</b>              | <b>Vulcanising</b> |              | <b>Brushing</b> |              | <b>Striping</b> |              |
|---------------------------------|--------------------|--------------|-----------------|--------------|-----------------|--------------|
|                                 | <b>Hours</b>       | <b>₹</b>     | <b>Hours</b>    | <b>₹</b>     | <b>Hours</b>    | <b>₹</b>     |
| Without Robot @ ₹12.00 per hour | 500                | 6,000        | 1,000           | 12,000       | -               | -            |
| With Robot @ ₹34.50 per hour    | 400                | 13,800       | 400             | 13,800       | 1,200           | 41,400       |
| Total Overheads                 | -                  | 19,800       | -               | 25,800       | -               | 41,400       |
| ÷ Hours                         | -                  | ÷900         | -               | ÷1,400       | -               | ÷1,200       |
| <b>Machine Hour Rate</b>        | <b>-</b>           | <b>22.00</b> | <b>-</b>        | <b>18.43</b> | <b>-</b>        | <b>34.50</b> |

**Working note:**

- Total machine hours used (500 + 1,000 + 400 + 400 + 1,200) 3,500
  - Total machine hours without the use of robot (500 + 1,000) 1,500
  - Total machine hours with the use of robot (400 + 400 + 1,200) 2,000
  - Total overheads of the machine per month:
 

|                                                 |                   |
|-------------------------------------------------|-------------------|
| Rent (₹18,000 ÷ 3 months)                       | ₹6,000.00         |
| Depreciation (₹19,20,000 × 10%) ÷ 12 months     | ₹16,000.00        |
| Indirect Charges (₹12,00,000 × 20% ÷ 12 months) | ₹20,000.00        |
| <b>Total</b>                                    | <b>₹42,000.00</b> |
  - Robot hire charges for a month (₹2,70,000 ÷ 6 months) = ₹45,000
  - Overheads for using machines without Robot =  $\frac{42,000}{3,500 \text{ hrs}} \times 1,500 \text{ hrs.} = ₹18,000$
  - Overheads for using machines with Robot =  $\frac{42,000}{3,500 \text{ hrs}} \times 2,000 \text{ hrs.} + ₹45,000$
- = ₹69,000**

# SUGGESTED REVISION

| Ques. No.                                                                                          | Observations or KEY Points<br>(Note down during revisions) | Page No. of<br>Practical<br>Register | 1 <sup>st</sup> & 2 <sup>nd</sup><br>Revision | 3 <sup>rd</sup> , 4 <sup>th</sup> &<br>5 <sup>th</sup><br>Revision | Revision<br>during<br>Exams |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------|-----------------------------------------------|--------------------------------------------------------------------|-----------------------------|
| <b>BQ (Book Questions covering Study Module of ICAI, PM, RTP's, MTP's and Important Questions)</b> |                                                            |                                      |                                               |                                                                    |                             |
| 1                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 2                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 3                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 4                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 5                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 6                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 7                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 8                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 9                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 10                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 11                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 12                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 13                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 14                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 15                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 16                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 17                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 18                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 19                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 20                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 21                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 22                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 23                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 24                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 25                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 26                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 27                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 28                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 29                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 30                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| <b>PYQ (Past Year Questions)-</b>                                                                  |                                                            |                                      |                                               |                                                                    |                             |
| 1                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 2                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 3                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 4                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 5                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 6                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 7                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 8                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 9                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 10                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 11                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 12                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 13                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 14                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 15                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 16                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |

**OVERHEADS ABSORPTION COSTING METHOD 3.55**

|           |  |  |          |          |          |
|-----------|--|--|----------|----------|----------|
| <b>17</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>18</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>19</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>20</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>21</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>22</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>23</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>24</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>25</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>26</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>27</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>28</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>29</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |

# ***CHAPTER - 4***

## ***COST SHEET & UNIT COSTING***

### ***LEARNING OUTCOMES***

***When you have finished studying this chapter, you should be able to:***

- ***Understand the meaning of prime cost, works cost, cost of production, cost of goods sold and cost of sales.***
- ***Classify and ascertain cost on the basis of function.***
- ***Prepare cost sheet/statement for production of goods and providing services.***
- ***Prepare budgeted cost and income statement.***
- ***Describe Unit costing method.***
- ***Prepare and calculate the cost under Unit costing.***



**BQ 1**

The following information has been obtained from the records of ABC Corporation for the period from June 1 to June 30, 2022.

|                                                  | On June 1, 2022 | On June 30, 2022 |
|--------------------------------------------------|-----------------|------------------|
| Cost of raw materials                            | 60,000          | 50,000           |
| Cost of Work-in Progress                         | 12,000          | 15,000           |
| Cost of Stock of finished goods                  | 90,000          | 1,10,000         |
| Purchase of raw materials during June'22         |                 | 4,80,000         |
| Wages paid                                       |                 | 2,40,000         |
| Factory Overheads                                |                 | 1,00,000         |
| Administration overheads (related to production) |                 | 50,000           |
| Selling & Distribution Overheads                 |                 | 25,000           |
| Sales                                            |                 | 10,00,000        |

Prepare a statement giving the following information:

- (a) Materials consumed,
- (b) Prime cost,
- (c) Factory cost,
- (d) Cost of goods sold and
- (e) Net Profit.

[(a) 4,90,000 (b) 7,30,000 (c) 8,27,000 (d) 8,57,000 (e) 1,18,000]

**BQ 2**

From the following figures, Calculate cost of production and profit for the month of March 2022:

| Particulars                            | Amount    | Particulars                       | Amount      |
|----------------------------------------|-----------|-----------------------------------|-------------|
| Stock on 1 <sup>st</sup> March, 2022:  |           | Purchase of Raw materials         | 28,57,000   |
| Raw Materials                          | 6,06,000  | Sales of Finished goods           | 1,34,00,000 |
| Finished Goods                         | 3,59,000  | Direct wages                      | 37,50,000   |
| Stock on 31 <sup>st</sup> March, 2022: |           | Factory expenses                  | 21,25,000   |
| Raw Materials                          | 7,50,000  | Office expenses                   | 10,34,000   |
| Finished Goods                         | 3,09,000  | Selling and distribution expenses | 7,50,000    |
| Work-in-process:                       |           | Sale of scrap                     | 26,000      |
| On 1 <sup>st</sup> March, 2022         | 12,56,000 |                                   |             |
| On 31 <sup>st</sup> March, 2022        | 14,22,000 |                                   |             |

**Answer****Cost Sheet**

| Particulars                          | Amount           |
|--------------------------------------|------------------|
| Raw Materials Purchased              | 28,57,000        |
| Add: Opening stock of Raw Materials  | 6,06,000         |
| Less: Closing stock of Raw Materials | (7,50,000)       |
| <b>Materials Consumed</b>            | <b>27,13,000</b> |
| Direct Wages                         | 37,50,000        |
| <b>Prime Cost</b>                    | <b>64,63,000</b> |
| Factory Expenses                     | 21,25,000        |
| Add: Opening WIP                     | 12,56,000        |
| Less: Closing WIP                    | (14,22,000)      |
| <b>Factory Cost</b>                  | <b>84,22,000</b> |
| Less: Sale of Scrap                  | (26,000)         |
| <b>Cost of Production</b>            | <b>83,96,000</b> |
| Add: Opening Finished Goods          | 3,59,000         |
| Less: Closing Finished Goods         | (3,09,000)       |

**COST SHEET & UNIT COSTING 4.2**

|                                   |                           |                    |
|-----------------------------------|---------------------------|--------------------|
|                                   | <b>Cost of Goods Sold</b> | <b>84,46,000</b>   |
| Office Expenses                   |                           | 10,34,000          |
| Selling and Distribution Expenses |                           | 7,50,000           |
|                                   | <b>Cost of Sales</b>      | <b>1,02,30,000</b> |
| Profit (b.f.)                     |                           | 31,70,000          |
|                                   | <b>Sales</b>              | <b>1,34,00,000</b> |

**BQ 3**

The following data are available from books and records of Q Ltd. for the month of August 2022. Direct labour cost ₹16,000 (160% of the factory overhead) and Cost of goods sold ₹56,000.

|                                                 | <b>August 1</b> | <b>August 31</b> |
|-------------------------------------------------|-----------------|------------------|
| Raw Material                                    | 8,000           | 8,600            |
| Work in progress                                | 8,000           | 12,000           |
| Finished goods                                  | 14,000          | 18,000           |
| Selling Expenses                                |                 | 3,400            |
| Administration expenses (related to production) |                 | 2,600            |
| Sales (for the Month)                           |                 | 75,000           |

**You are required to prepare a statement showing the cost of goods manufactured and sold and the profit earned.**

**[Raw materials purchases ₹36,000; Prime cost ₹51,400; Works cost ₹57,400; Cost of production ₹60,000; Cost of sales ₹59,400; Profit ₹15,600]**

**BQ 4**

The books of Adarsh Manufacturing Company present the following data for the month of April, 2023. Direct labour cost ₹17,500 being 175% of works overheads. Cost of goods sold excluding administrative expenses ₹56,000.

**Inventory accounts showed the following opening and closing balances:**

|                   | <b>April 1</b> | <b>April 30</b> |
|-------------------|----------------|-----------------|
| Raw materials     | 8,000          | 10,600          |
| Works in progress | 10,500         | 14,500          |
| Finished Goods    | 17,600         | 19,000          |

**Other data are:**

|                                     |        |
|-------------------------------------|--------|
| Selling expenses                    | 3,500  |
| General and administration expenses | 2,500  |
| Sales of the month                  | 75,000 |

**You are required to:**

- (1)** Compute the value of materials purchased.
- (2)** Prepare a cost statement showing the various elements of cost and also the profit earned.

**Answer**

**(1) Statement Showing Material Purchased**

| <b>Particulars</b>                                          | <b>Amount</b> |
|-------------------------------------------------------------|---------------|
| <b>Cost of Goods Sold excluding Administrative Expenses</b> | <b>56,000</b> |
| Add: Closing Finished Goods                                 | 19,000        |
| Less: Opening Finished Goods                                | (17,600)      |
| <b>Factory Cost</b>                                         | <b>57,400</b> |
| Add: Closing WIP                                            | 14,500        |
| Less: Opening WIP                                           | (10,500)      |
| <b>Gross Factory Cost</b>                                   | <b>61,400</b> |
| Less: Factory Overheads                                     | (10,000)      |

**COST SHEET & UNIT COSTING 4.3**

|                                |               |
|--------------------------------|---------------|
| <b>Prime Cost</b>              | <b>51,400</b> |
| Less Direct Wages              | (17,500)      |
| <b>Raw Material Consumed</b>   | <b>33,900</b> |
| Add: Closing Raw Materials     | 10,600        |
| Less Opening Raw Materials     | (8,000)       |
| <b>Raw Materials Purchased</b> | <b>36,500</b> |

**(2) Cost Sheet**

| <b>Particulars</b>                        | <b>Amount</b> |
|-------------------------------------------|---------------|
| Raw Materials Purchased (W.N.)            | 36,500        |
| Add: Opening stock of Raw Materials       | 8,000         |
| Less: Closing stock of Raw Materials      | (10,600)      |
| <b>Materials Consumed</b>                 | <b>33,900</b> |
| Direct Wages                              | 17,500        |
| <b>Prime Cost</b>                         | <b>51,400</b> |
| Factory Overheads ( $17,500 \div 175\%$ ) | 10,000        |
| Add: Opening WIP                          | 10,500        |
| Less: Closing WIP                         | (14,500)      |
| <b>Factory Cost</b>                       | <b>57,400</b> |
| Add: Opening Finished Goods               | 17,600        |
| Less: Closing Finished Goods              | (19,000)      |
| <b>Cost of Goods Sold</b>                 | <b>56,000</b> |
| General Administrative Expenses           | 2,500         |
| Selling and Distribution Overheads        | 3,500         |
| <b>Cost of Sales</b>                      | <b>62,000</b> |
| Profit (b.f.)                             | 13,000        |
| <b>Sales</b>                              | <b>75,000</b> |

**BQ 5**

**The following data relate to the manufacture of a standard product during the month of April 2022:**

|                                                      |                       |
|------------------------------------------------------|-----------------------|
| Raw Materials consumed                               | ₹1,80,000             |
| Direct Wages                                         | ₹90,000               |
| Machine hours worked                                 | 10,000 hours          |
| Machine hours rate                                   | ₹8 per hour           |
| Administration overheads (not related to production) | ₹35,000               |
| Selling overhead                                     | ₹5 per unit           |
| Units produced                                       | 4,000 units           |
| Units sold                                           | 3,600 @ ₹125 per unit |

**You are required to prepare a cost sheet showing the cost per unit and profit for the month.**

**[Profit ₹82,000, ₹102.22 per unit]**

**BQ 6**

**The following data relate to the manufacture of a standard product during the four week ended 28<sup>th</sup> February 2023:**

|                                                  |                        |
|--------------------------------------------------|------------------------|
| Raw Materials consumed                           | ₹4,00,000              |
| Direct Wages                                     | ₹2,40,000              |
| Machine hours worked                             | 3,200 hours            |
| Machine hours rate                               | ₹40 per hour           |
| Administration overheads (related to production) | 10% of works cost      |
| Selling overhead                                 | ₹20 per unit           |
| Units produced and sold                          | 10,000 @ ₹120 per unit |

**You are required to find out the cost per unit and profit for the four week period.**

**[Profit ₹1,55,200, ₹104.48 per unit]**

**BQ 7**

The following figures for the month of April, 2023 were extracted from the records of a factory:

|                                                |                         |
|------------------------------------------------|-------------------------|
| Opening Stock of finished goods (5,000 Units)  | ₹45,000                 |
| Purchase of raw materials                      | ₹2,57,100               |
| Direct Wages                                   | ₹1,05,000               |
| Factory Overheads                              | 100% of Direct wages    |
| Administration Overheads                       | ₹1.00 per unit produced |
| Selling and distribution Overheads             | 10% of sales            |
| Closing stock of finished goods (10,000 Units) | ?                       |
| Sales (45,000 units)                           | ₹6,60,000               |

Prepare a cost sheet for the month of April 2023, assuming that sales are made on the basis of "first-in first out" principle.

[Profit ₹1,35,320]

**BQ 8**

From the following particulars, you are required to prepare monthly cost sheet of Aditya Industries:

| Particulars                                         | Amount (₹)  |
|-----------------------------------------------------|-------------|
| Opening Inventories:                                |             |
| - Raw materials                                     | 12,00,000   |
| - Work-in-process                                   | 18,00,000   |
| - Finished goods (10,000 units)                     | 9,60,000    |
| Closing Inventories:                                |             |
| - Raw materials                                     | 14,00,000   |
| - Work-in-process                                   | 16,04,000   |
| - Finished goods                                    | ?           |
| Raw materials purchased                             | 1,44,00,000 |
| GST paid on raw materials purchased (ITC available) | 7,20,000    |
| Wages paid to production workers                    | 36,64,000   |
| Expenses paid for utilities                         | 1,45,600    |
| Office and administration expenses paid             | 26,52,000   |
| Travelling allowance paid to office staffs          | 1,21,000    |
| Selling expenses                                    | 6,46,000    |

|                      |                 |
|----------------------|-----------------|
| Machine hours worked | 21,600 hours    |
| Machine hour rate    | ₹ 8.00 per hour |
| Units sold           | 1,60,000        |
| Units produced       | 1,94,000        |
| Desired profit       | 15% on sales    |

**Answer****Cost Sheet of Aditya Industries**

| Particulars                                              | Total Cost         | Cost Per Unit |
|----------------------------------------------------------|--------------------|---------------|
| Raw materials purchased                                  | 1,44,00,000        | -             |
| Add: Opening value of raw materials                      | 12,00,000          | -             |
| Less: Closing value of raw materials                     | (14,00,000)        | -             |
| Materials consumed                                       | <b>1,42,00,000</b> | <b>73.19</b>  |
| Wages paid to production workers                         | 36,64,000          | 18.89         |
| Expenses paid for utilities                              | 1,45,600           | 0.75          |
| <b>Prime Cost</b>                                        | <b>1,80,09,600</b> | <b>92.83</b>  |
| Factory overheads (₹8 × 21,600 hours)                    | 1,72,800           | 0.89          |
| Add: Opening value of WIP                                | 18,00,000          | -             |
| Less: Closing value of WIP                               | (16,04,000)        | -             |
| <b>Cost of Production</b>                                | <b>1,83,78,400</b> | <b>94.73</b>  |
| Add: Value of opening finished stock                     | 9,60,000           | -             |
| Less: Value of closing finished stock (₹94.734 × 44,000) | (41,68,296)        | -             |

**COST SHEET & UNIT COSTING 4.5**

|                                            |                    |               |
|--------------------------------------------|--------------------|---------------|
| <b>Cost of Goods Sold</b>                  | <b>1,51,70,104</b> | <b>94.81</b>  |
| Office and administration expenses paid    | 26,52,000          | 16.58         |
| Travelling allowance paid to office staffs | 1,21,000           | 0.76          |
| Selling expenses                           | 6,46,000           | 4.03          |
| <b>Cost of Sales</b>                       | <b>1,85,89,104</b> | <b>116.18</b> |
| Add: Profit @15% on sales                  | 32,80,430          | 20.50         |
| <b>Sales (1,85,89,104 ÷ 85%)</b>           | <b>2,18,69,534</b> | <b>136.68</b> |

**Note:**

- (a) Units produced: 1,94,000; Opening Units: 10,000; Total available units: 2,04,000 & units sold 1,60,000.  
 (b) FIFO method is used for valuation of stock, alternatively student can solve the problem with weighted average method.

**BQ 9**

From the following data of Arnav Metallic Ltd., calculate Cost of production:

| Particulars                                                                 | Amount (₹) |
|-----------------------------------------------------------------------------|------------|
| Repair & maintenance paid for plant & machinery                             | 9,80,500   |
| Insurance premium paid for plant & machinery                                | 96,000     |
| Raw materials purchased                                                     | 64,00,000  |
| Opening stock of raw materials                                              | 2,88,000   |
| Closing stock of raw materials                                              | 4,46,000   |
| Wages paid                                                                  | 23,20,000  |
| Value of opening Work-in-process                                            | 4,06,000   |
| Value of closing Work-in-process                                            | 6,02,100   |
| Quality control cost for the products in manufacturing process              | 86,000     |
| Research & development cost for improvement in production process           | 92,600     |
| Administrative cost for:                                                    |            |
| Factory & production                                                        | 9,00,000   |
| Others                                                                      | 11,60,000  |
| Amount realised by selling scrap generated during the manufacturing process | 9,200      |
| Packing cost necessary to preserve the goods for further processing         | 10,200     |
| Salary paid to Director (Technical)                                         | 8,90,000   |

**Answer****Statement Showing Cost of Production of Arnav Metallic Ltd. for the period**

| Particulars                                                  | Total Cost         |
|--------------------------------------------------------------|--------------------|
| Raw materials purchased                                      | 64,00,000          |
| Add: Opening stock                                           | 2,88,000           |
| Less: Closing stock                                          | (4,46,000)         |
| Material consumed                                            | 62,42,000          |
| Wages paid                                                   | 23,20,000          |
| <b>Prime Cost</b>                                            | <b>85,62,000</b>   |
| Repair and maintenance cost of plant & machinery             | 9,80,500           |
| Insurance premium paid for plant & machinery                 | 96,000             |
| Add: Opening value of WIP                                    | 4,06,000           |
| Less: Closing value of WIP                                   | (6,02,100)         |
| <b>Factory Cost</b>                                          | <b>94,42,400</b>   |
| Quality control cost                                         | 86,000             |
| Research & development cost                                  | 92,600             |
| Administrative overheads related with factory and production | 9,00,000           |
| Less: Amount realised by selling scrap                       | (9,200)            |
| Add: Primary packing cost                                    | 10,200             |
| <b>Cost of Production</b>                                    | <b>1,05,22,000</b> |

**Notes:**

1. Other administrative overhead does not form part of cost of production.

2. Salary paid to Director (Technical) is an administrative cost.

**BQ 10**

The following details are available from the books of R Ltd. for the year ending 31<sup>st</sup> March 2023:

| <i>Particulars</i>                                                   | <i>Amount (₹)</i> |
|----------------------------------------------------------------------|-------------------|
| Purchase of raw materials                                            | 84,00,000         |
| Consumable materials                                                 | 4,80,000          |
| Direct wages                                                         | 60,00,000         |
| Carriage inward                                                      | 1,72,600          |
| Wages to foreman and store keeper                                    | 8,40,000          |
| Other indirect wages to factory staffs                               | 1,35,000          |
| Expenditure on research and development on new production technology | 9,60,000          |
| Salary to accountants                                                | 7,20,000          |
| Employer's contribution to EPF & ESI                                 | 7,20,000          |
| Cost of power & fuel                                                 | 28,00,000         |
| Production planning office expenses                                  | 12,60,000         |
| Salary to delivery staffs                                            | 14,30,000         |
| Income tax                                                           | 2,80,000          |
| Fees to statutory auditor                                            | 1,80,000          |
| Fees to cost auditor                                                 | 80,000            |
| Fees to independent directors                                        | 9,40,000          |
| Donation to PM-national relief fund                                  | 1,10,000          |
| Value of sales                                                       | 2,82,60,000       |
| Position of inventories as on 01-04-2022:                            |                   |
| Raw Material                                                         | 6,20,000          |
| WIP                                                                  | 7,84,000          |
| Finished goods                                                       | 14,40,000         |
| Position of inventories as on 31-03-2023:                            |                   |
| Raw Material                                                         | 4,60,000          |
| WIP                                                                  | 6,64,000          |
| Finished goods                                                       | 9,80,000          |

*From the above information prepare a cost sheet for the year ended 31<sup>st</sup> March 2023.*

**Answer**

**Cost Sheet of R Ltd.**  
**(for the year ended at 31<sup>st</sup> March, 2023)**

| <i>Particulars</i>                        | <i>Amount (₹)</i> | <i>Amount (₹)</i>  |
|-------------------------------------------|-------------------|--------------------|
| Material Consumed:                        |                   |                    |
| Raw materials purchased                   | 84,00,000         |                    |
| Add: Carriage inward                      | 1,72,600          |                    |
| Add: Opening stock of raw materials       | 6,20,000          |                    |
| Less: Closing stock of raw materials      | (4,60,000)        | 87,32,600          |
| Direct employee (labour) cost:            |                   |                    |
| Direct wages                              | 60,00,000         |                    |
| Employer's Contribution towards PF & ESIS | 7,20,000          | 67,20,000          |
| Direct expenses:                          |                   |                    |
| Consumable materials                      | 4,80,000          |                    |
| Cost of power & fuel                      | 28,00,000         | 32,80,000          |
| <b>Prime Cost</b>                         |                   | <b>1,87,32,600</b> |
| Works/ Factory overheads:                 |                   |                    |
| Wages to foreman and store keeper         | 8,40,000          |                    |
| Other indirect wages to factory staffs    | 1,35,000          | 9,75,000           |

**COST SHEET & UNIT COSTING 4.7**

|                                                                        |            |                    |
|------------------------------------------------------------------------|------------|--------------------|
| <b>Gross Factory Cost</b>                                              |            | <b>1,97,07,600</b> |
| Add: Opening value of WIP                                              | 7,84,000   |                    |
| Less: Closing value of WIP                                             | (6,64,000) |                    |
| <b>Factory Cost</b>                                                    |            | <b>1,98,27,600</b> |
| Research & development cost paid for improvement in production process | 9,60,000   |                    |
| Production planning office expenses                                    | 12,60,000  |                    |
| <b>Cost of Production</b>                                              |            | <b>2,20,47,600</b> |
| Add: Opening stock of finished goods                                   | 14,40,000  |                    |
| Less: Closing stock of finished goods                                  | (9,80,000) |                    |
| <b>Cost of Goods Sold</b>                                              |            | <b>2,25,07,600</b> |
| Administrative Overheads:                                              |            |                    |
| Salary to accountants                                                  | 7,20,000   |                    |
| Fees to statutory auditor                                              | 1,80,000   |                    |
| Fees to cost auditor                                                   | 80,000     |                    |
| Fee paid to independent directors                                      | 9,40,000   | 19,20,000          |
| Selling and Distribution Overheads:                                    |            |                    |
| Salary to delivery staffs                                              |            | 14,30,000          |
| <b>Cost of Sales</b>                                                   |            | <b>2,58,57,600</b> |
| Add: Profit (b.f.)                                                     |            | 24,02,400          |
| <b>Sales</b>                                                           |            | <b>2,82,60,000</b> |

**Notes:** Income tax and Donation to PM National Relief Fund is avoided in the cost sheet.

**BQ 11**

Arnav Inspat Udyog Ltd. has the following expendiures for the year ended 31<sup>st</sup> March, 2023:

| <b>Sl. No.</b> | <b>Particulars</b>                                                                          | <b>Amount (₹)</b> | <b>Amount (₹)</b> |
|----------------|---------------------------------------------------------------------------------------------|-------------------|-------------------|
| 1              | Raw materials purchased                                                                     |                   | 10,00,00,000      |
| 2              | GST paid on the above purchases @18% (eligible for input tax credit)                        |                   | 1,80,00,000       |
| 3              | Freight inward                                                                              |                   | 11,20,600         |
| 4              | Wages paid to factory workers                                                               |                   | 29,20,000         |
| 5              | Contribution made towards employees' PF & ESIS                                              |                   | 3,60,000          |
| 6              | Production bonus paid to factory workers                                                    |                   | 2,90,000          |
| 7              | Royalty paid for production                                                                 |                   | 1,72,600          |
| 8              | Amount paid for power & fuel                                                                |                   | 4,62,000          |
| 9              | Amount paid for purchase of moulds and patterns (life is equivalent to two year production) |                   | 8,96,000          |
| 10             | Job charges paid to job workers                                                             |                   | 8,12,000          |
| 11             | Stores and spares consumed                                                                  |                   | 1,12,000          |
| 12             | Depreciation on:                                                                            |                   |                   |
|                | Factory building                                                                            | 84,000            |                   |
|                | Office building                                                                             | 56,000            |                   |
|                | Plant & machinery                                                                           | 1,26,000          |                   |
|                | Delivery vehicles                                                                           | 86,000            | 3,52,000          |
| 13             | Salary paid to supervisors                                                                  |                   |                   |
| 14             | Repairs & maintenance paid for:                                                             |                   | 1,26,000          |
|                | Plant & machinery                                                                           | 48,000            |                   |
|                | Sales office building                                                                       | 18,000            |                   |
|                | Vehicles used by directors                                                                  | 19,600            | 85,600            |
| 15             | Insurance premium paid for:                                                                 |                   |                   |
|                | Plant & machinery                                                                           | 31,200            |                   |
|                | Factory building                                                                            | 18,100            |                   |
|                | Stock of raw materials & WIP                                                                | 36,000            | 85,300            |



**COST SHEET & UNIT COSTING 4.8**

|    |                                                                    |           |           |
|----|--------------------------------------------------------------------|-----------|-----------|
| 16 | Expenses paid for quality control check activities                 |           | 19,600    |
| 17 | Salary paid to quality control staffs                              |           | 96,200    |
| 18 | Research & development cost paid improvement in production process |           | 18,200    |
| 19 | Expense paid for pollution control and engineering & maintenance   |           | 26,600    |
| 20 | Expense paid for administration of factory work                    |           | 1,18,600  |
| 21 | Salary paid to functional managers:                                |           |           |
|    | Production control                                                 | 9,60,000  |           |
|    | Finance & accounts                                                 | 9,18,000  |           |
|    | Sales & marketing                                                  | 10,12,000 | 28,90,000 |
| 22 | Salary paid to general manager                                     |           | 12,56,000 |
| 23 | Packing cost paid for:                                             |           |           |
|    | Primary packing necessary to maintain quality                      | 96,000    |           |
|    | For re-distribution of finished goods                              | 1,12,000  | 2,08,000  |
| 24 | Wages of employees engaged in distribution of goods                |           | 7,20,000  |
| 25 | Fee paid to auditors                                               |           | 1,80,000  |
| 26 | Fee paid legal advisors                                            |           | 1,20,000  |
| 27 | Fee paid to independent directors                                  |           | 2,20,000  |
| 28 | Performance bonus paid to sales staffs                             |           | 1,80,000  |
| 29 | Value of stock as on 1 <sup>st</sup> April, 2022:                  |           |           |
|    | Raw materials                                                      | 18,00,000 |           |
|    | Work-in-process                                                    | 9,20,000  |           |
|    | Finished goods                                                     | 11,00,000 | 38,20,000 |
| 30 | Value of stock as on 31 <sup>st</sup> March, 2023:                 |           |           |
|    | Raw materials                                                      | 9,60,000  |           |
|    | Work-in-process                                                    | 8,70,000  |           |
|    | Finished goods                                                     | 18,00,000 | 36,30,000 |

Amount realized by selling of scrap and waste generated during manufacturing process ₹86,000.

**From the above data you are requested to prepare statement of cost for Arnav Ispat Udyog Ltd. for the year ended 31<sup>st</sup> March, 2023, showing (i) Prime cost, (ii) Factory cost, (iii) Cost of production, (iv) Cost of goods sold and (v) Cost of sales.**

**Answer**

**Statement of Cost of Arnav Ispat Udyog Ltd  
For the year ended 31<sup>st</sup> March, 2023**

| <b>Particulars</b>                             | <b>Amount</b> | <b>Amount</b>       |
|------------------------------------------------|---------------|---------------------|
| Material consumed:                             |               |                     |
| Raw materials purchased                        | 10,00,00,000  |                     |
| Freight inward                                 | 11,20,600     |                     |
| Add: Opening stock of raw materials            | 18,00,000     |                     |
| Less: Closing stock of raw materials           | (9,60,000)    | 10,19,60,600        |
| Direct employee (labour) cost:                 |               |                     |
| Wages paid to factory workers                  | 29,20,000     |                     |
| Contribution made towards employees' PF & ESIS | 3,60,000      |                     |
| Production bonus paid to factory workers       | 2,90,000      | 35,70,000           |
| Direct expenses:                               |               |                     |
| Royalty paid for production                    | 1,72,600      |                     |
| Amount paid for power & fuel                   | 4,62,000      |                     |
| Amortised cost of moulds and patterns          | 4,48,000      |                     |
| Job charges paid to job workers                | 8,12,000      | 18,94,600           |
| <b>Prime Cost</b>                              |               | <b>10,74,25,200</b> |
| Works/Factory overheads:                       |               |                     |
| Stores and spares consumed                     | 1,12,000      |                     |

**COST SHEET & UNIT COSTING 4.9**

|                                                                    |           |                     |
|--------------------------------------------------------------------|-----------|---------------------|
| Depreciation on factory building                                   | 84,000    |                     |
| Depreciation on plant & machinery                                  | 1,26,000  |                     |
| Repairs & maintenance paid for plant & machinery                   | 48,000    |                     |
| Insurance premium paid for plant & machinery                       | 31,200    |                     |
| Insurance premium paid for factory building                        | 18,100    |                     |
| Insurance premium paid for stock of raw materials & WIP            | 36,000    |                     |
| Salary paid to supervisors                                         | 1,26,000  |                     |
| Expenses paid for pollution control and engineering & maintenance  | 26,600    | 6,07,900            |
| Gross factory cost                                                 |           | 10,80,33,100        |
| Add: Opening value of WIP                                          |           | 9,20,000            |
| Less: Closing value of WIP                                         |           | (8,70,000)          |
| <b>Works / Factory Cost</b>                                        |           | <b>10,80,83,100</b> |
| Quality control cost:                                              |           |                     |
| Expenses paid for quality control check activities                 | 19,600    |                     |
| Salary paid to quality control staffs                              | 96,200    | 1,15,800            |
| Research & development cost paid improvement in production process |           | 18,200              |
| Administration cost related with production:                       |           |                     |
| Expenses paid for administration of factory work                   | 1,18,600  |                     |
| Salary paid to production control manager                          | 9,60,000  | 10,78,600           |
| Less: Realisable value on sale scrap and waste                     |           | (86,000)            |
| Add: Primary packing cost                                          |           | 96,000              |
| <b>Cost of Production</b>                                          |           | <b>10,93,05,700</b> |
| Add: Opening stock of Finished goods                               |           | 11,00,000           |
| Less: Closing stock of Finished goods                              |           | (18,00,000)         |
| <b>Cost of Goods Sold</b>                                          |           | <b>10,86,05,700</b> |
| Administrative overheads:                                          |           |                     |
| Depreciation on office building                                    | 56,000    |                     |
| Repairs & maintenance paid for vehicles used by directors          | 19,600    |                     |
| Salary paid to manager-finance & accounts                          | 9,18,000  |                     |
| Salary paid to general manager                                     | 12,56,000 |                     |
| 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 overheads:                                                 |           |                     |
| Repairs & maintenance paid for sales office building               | 18,000    |                     |
| Salary paid to manager of sales & marketing                        | 10,12,000 |                     |
| Performance bonus paid to sales staffs                             | 1,80,000  |                     |
| Distribution overheads:                                            |           | 12,10,000           |
| Depreciation on delivery vehicles                                  | 86,000    |                     |
| Packing cost paid for re-distribution of finished goods            | 1,12,000  |                     |
| Wages of employees engaged in distribution of goods                | 7,20,000  | 9,18,000            |
| <b>Cost of Sales</b>                                               |           | <b>11,35,03,300</b> |

**Notes:**

GST paid of purchase of raw materials would not be part of cost of materials as it eligible for input credit.

**BQ 12**

RTA Ltd. has the following expendiures for the year ended 31<sup>st</sup> March, 2023:

| <b>Sl. No.</b> | <b>Particulars</b>            | <b>Amount (₹)</b> | <b>Amount (₹)</b> |
|----------------|-------------------------------|-------------------|-------------------|
| 1              | Raw materials purchased       |                   | 5,00,00,000       |
| 2              | Freight inward                |                   | 9,20,600          |
| 3              | Wages paid to factory workers |                   | 25,20,000         |
| 4              | Royalty paid for production   |                   | 1,80,000          |

**COST SHEET & UNIT COSTING 4.10**

|    |                                                                    |           |           |
|----|--------------------------------------------------------------------|-----------|-----------|
| 5  | Amount paid for power & fuel                                       |           | 3,50,000  |
| 6  | Job charges paid to job workers                                    |           | 3,10,000  |
| 7  | Stores and spares consumed                                         |           | 1,10,000  |
| 8  | Depreciation on office building                                    |           | 50,000    |
| 9  | Repairs & maintenance paid for:                                    |           |           |
|    | Plant & machinery                                                  | 40,000    |           |
|    | Sales office building                                              | 20,000    | 60,000    |
| 10 | Insurance premium paid for:                                        |           |           |
|    | Plant & machinery                                                  | 28,200    |           |
|    | Factory building                                                   | 18,800    | 47,000    |
| 11 | Expenses paid for quality control check activities                 |           | 18,000    |
| 12 | Research & development cost paid improvement in production process |           | 20,000    |
| 13 | Expense paid for pollution control and engineering & maintenance   |           | 36,000    |
| 14 | Salary paid to Sales & Marketing manager                           |           | 5,60,000  |
| 15 | Salary paid to General Manager                                     |           | 6,40,000  |
| 16 | Packing cost paid for:                                             |           |           |
|    | Primary packing necessary to maintain quality                      | 46,000    |           |
|    | For re-distribution of finished goods                              | 80,000    | 1,26,000  |
| 17 | Fee paid to independent directors                                  |           | 1,20,000  |
| 18 | Performance bonus paid to sales staffs                             |           | 1,20,000  |
| 19 | Value of stock as on 1 <sup>st</sup> April, 2022:                  |           |           |
|    | Raw materials                                                      | 10,00,000 |           |
|    | Work-in-process                                                    | 8,60,000  |           |
|    | Finished goods                                                     | 12,00,000 | 30,60,000 |
| 20 | Value of stock as on 31 <sup>st</sup> March, 2023:                 |           |           |
|    | Raw materials                                                      | 8,40,000  |           |
|    | Work-in-process                                                    | 6,60,000  |           |
|    | Finished goods                                                     | 10,50,000 | 25,50,000 |

Amount realized by selling of scrap and waste generated during manufacturing process ₹48,000.

**From the above data you are requested to prepare statement of cost for RTA Ltd. for the year ended 31<sup>st</sup> March, 2023, showing (i) Prime cost, (ii) Factory cost, (iii) Cost of production, (iv) Cost of goods sold and (v) Cost of sales.**

**Answer**

**Statement of Cost of RTA  
For the year ended 31<sup>st</sup> March, 2023**

| <b>Particulars</b>                               | <b>Amount</b> | <b>Amount</b>      |
|--------------------------------------------------|---------------|--------------------|
| Material consumed:                               |               |                    |
| Raw materials purchased                          | 5,00,00,000   |                    |
| Freight inward                                   | 9,20,600      |                    |
| Add: Opening stock of raw materials              | 10,00,000     |                    |
| Less: Closing stock of raw materials             | (8,40,000)    | 5,10,80,600        |
| Direct wages paid to factory workers             |               | 25,20,000          |
| Direct expenses:                                 | 1,80,000      |                    |
| Royalty paid for production                      | 3,50,000      |                    |
| Amount paid for power & fuel                     | 3,10,000      | 8,40,000           |
| Job charges paid to job workers                  |               |                    |
| <b>Prime Cost</b>                                |               | <b>5,44,40,600</b> |
| Works/Factory overheads:                         |               |                    |
| Stores and spares consumed                       | 1,10,000      |                    |
| Repairs & maintenance paid for plant & machinery | 40,000        |                    |
| Insurance premium paid for plant & machinery     | 28,200        |                    |

**COST SHEET & UNIT COSTING 4.11**

|                                                                          |          |                    |
|--------------------------------------------------------------------------|----------|--------------------|
| Insurance premium paid for factory building                              | 18,800   |                    |
| Expenses paid for pollution control and engineering & maintenance        | 36,000   | 2,33,000           |
| Gross factory cost                                                       |          | 5,46,73,600        |
| Add: Opening value of WIP                                                |          | 8,60,000           |
| Less: Closing value of WIP                                               |          | (6,60,000)         |
| <b>Works / Factory Cost</b>                                              |          | <b>5,48,73,600</b> |
| Quality control cost: Expenses paid for quality control check activities |          | 18,000             |
| Research & development cost paid improvement in production process       |          | 20,000             |
| Less: Realisable value on sale scrap and waste                           |          | (48,000)           |
| Add: Primary packing cost                                                |          | 46,000             |
| <b>Cost of Production</b>                                                |          | <b>5,49,09,600</b> |
| Add: Opening stock of Finished goods                                     |          | 12,00,000          |
| Less: Closing stock of Finished goods                                    |          | (10,50,000)        |
| <b>Cost of Goods Sold</b>                                                |          | <b>5,50,59,600</b> |
| Administrative overheads:                                                |          |                    |
| Depreciation on office building                                          | 50,000   |                    |
| Salary paid to general manager                                           | 6,40,000 |                    |
| Fee paid to independent directors                                        | 1,20,000 | 8,10,000           |
| Selling overheads:                                                       |          |                    |
| Repairs & maintenance paid for sales office building                     | 20,000   |                    |
| Salary paid to manager of sales & marketing                              | 5,60,000 |                    |
| Performance bonus paid to sales staffs                                   | 1,20,000 | 7,00,000           |
| Distribution overheads:                                                  |          |                    |
| Packing cost paid for re-distribution of finished goods                  |          | 80,000             |
| <b>Cost of Sales</b>                                                     |          | <b>5,66,49,600</b> |

**BQ 13**

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 2022:

- (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 ₹3,20,000 and ₹15,000 respectively. Freight paid on purchases is ₹8,500.
- (ii) Stitching and finishing need 2,000 man hours at ₹80 per hour.
- (iii) Other direct cost of ₹10 per labour hour is incurred.
- (iv) DFG has 4 machines at a total cost of ₹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 ₹45,000 and ₹72,000 respectively. DFG pays ₹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 ₹18,000.
- (vii) During the month 35 kg. of leather and cotton cuttings are sold at ₹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.

**Prepare a cost sheet following functional classification for the month of September 2022.**

**Answer**

**Cost Sheet for the month of September 2022**

| Particulars | Total Cost | Cost Per Unit |
|-------------|------------|---------------|
|-------------|------------|---------------|

**COST SHEET & UNIT COSTING 4.12**

|                                                             |                 |               |
|-------------------------------------------------------------|-----------------|---------------|
| Direct materials consumed:                                  |                 |               |
| Leather sheets                                              | 3,20,000        | 320.00        |
| Cotton cloths                                               | 15,000          | 15.00         |
| Add: Freight paid on purchase                               | 8,500           | 8.50          |
| Direct wages (₹80 × 2,000 hours)                            | 1,60,000        | 160.00        |
| Direct expenses (₹10 × 2,000 hours)                         | 20,000          | 20.00         |
| <b>Prime Cost</b>                                           | <b>5,23,500</b> | <b>523.50</b> |
| Factory overheads:                                          |                 |               |
| Depreciation on machines {(₹22,00,000×90%)÷120 months}      | 16,500          | 16.50         |
| Apportion cost of factory rent {(1,20,000 ÷ 2,400) × 1,960} | 98,000          | 98.00         |
| <b>Works Cost</b>                                           | <b>6,38,000</b> | <b>638.00</b> |
| Less: Realisable value of cuttings (₹150×35 kg.)            | (5,250)         | (5.25)        |
| <b>Cost of Production</b>                                   | <b>6,32,750</b> | <b>632.75</b> |
| Less: Closing stock of bags (100 bags × ₹632.75)            | (63,275)        | -             |
| <b>Cost of Goods Sold</b>                                   | <b>5,69,475</b> | <b>632.75</b> |
| Administrative Overheads:                                   |                 |               |
| Staff salary                                                | 45,000          | 50.00         |
| Apportioned rent {(1,20,000 ÷ 2,400) × 240}                 | 12,000          | 13.33         |
| Selling and Distribution Overheads:                         |                 |               |
| Staff salary                                                | 72,000          | 80.00         |
| Apportioned rent {(1,20,000 ÷ 2,400) × 200}                 | 10,000          | 11.11         |
| Freight paid on delivery of bags                            | 18,000          | 20.00         |
| <b>Cost of Sales</b>                                        | <b>7,26,475</b> | <b>807.19</b> |

**Working Note:**

1. Factory space = Total space – space occupied by Administrative and Sales office  
= 2,400 - 240 - 200 = 1,960 sq. feet
2. Units Produced = Main input raw material used ÷ Main material consumption for 1 unit output  
= 2,000 meter leather ÷ 2 meter = 1,000 bags
3. Units sold = Units produced – Closing units  
= 1,000 – 100 = 900 bags

**BQ 14**

A Ltd. Co. has capacity to produce 1,00,000 units of a product every month. Its works cost at varying levels of production is as under:

| <b>Level</b> | <b>Works cost per unit (₹)</b> |
|--------------|--------------------------------|
| 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 ₹1,50,000 and fixed marketing expenses amount to ₹2,50,000 per month respectively. The variable distribution cost amounts to ₹30 per unit.

**It can market 100% of its output at ₹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 ₹25,000; 3rd prize of ₹10,000 and three consolation prizes of ₹5,000 each to customers buying the product.

**COST SHEET & UNIT COSTING 4.13**

- (c) It spends ₹1,00,000 on refreshments served every month to its customers.  
 (d) It sponsors a television programme every week at a cost of ₹20,00,000 per month.

**It can market 30% of its output at ₹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**

**A Ltd. Co**  
**Cost Sheet (for the month)**

| <b>Particulars</b>                        | <b>30%<br/>(30,000 units)</b> | <b>100%<br/>(1,00,000 units)</b> |
|-------------------------------------------|-------------------------------|----------------------------------|
| Works Cost @ ₹380/₹310 per unit           | 1,14,00,000                   | 3,10,00,000                      |
| Administrative overheads (Fixed)          | 1,50,000                      | 1,50,000                         |
| <b>Cost of Production</b>                 | <b>1,15,50,000</b>            | <b>3,11,50,000</b>               |
| Fixed marketing expenses                  | 2,50,000                      | 2,50,000                         |
| Variable distribution cost @ ₹30 per unit | 9,00,000                      | 30,00,000                        |
| <b>Additional expenses:</b>               |                               |                                  |
| Gifts @ ₹30 per unit                      | -                             | 30,00,000                        |
| Customers prizes                          | -                             | 1,00,000                         |
| Refreshment                               | -                             | 1,00,000                         |
| Sponsorship cost                          | -                             | 20,00,000                        |
| <b>Cost of Sales</b>                      | <b>1,27,00,000</b>            | <b>3,96,00,000</b>               |
| Profit                                    | 38,00,000                     | 1,04,00,000                      |
| <b>Sales @ ₹550/₹500 per unit</b>         | <b>1,65,00,000</b>            | <b>5,00,00,000</b>               |

**Advice:** At 100% capacity utilization, profit of A Ltd Company is ₹1,04,00,000 whereas at 30% profit is only ₹38,00,000. Therefore, it is advisable to the company to work at 100% capacity and incur special marketing cost.

**BQ 15**

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

| <b>Week</b> | <b>Units<br/>Manufactured</b> | <b>Direct Materials</b> | <b>Direct Wages</b> | <b>Factory<br/>Overheads</b> |
|-------------|-------------------------------|-------------------------|---------------------|------------------------------|
| 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**

**[Sale Price ₹35.00 per unit]**

**BQ 16**

Wonder Ltd. Has a capacity of 1,20,000 Units per annum as its optimum capacity. The production costs are as under:

|                 |                      |
|-----------------|----------------------|
| Direct Material | ₹90 per unit         |
| Direct Labour   | ₹60 per unit         |
| Overheads:      |                      |
| Fixed:          | ₹30,00,000 per annum |
| Variable:       | ₹100 per unit        |

Semi Variable overheads are ₹20,00,000 per annum up to 50% capacity and an extra amount of ₹4,00,000 for every 25% increase in capacity or part thereof. The production is made to order and not for stocks. Ignore Administration, Selling and Distribution overheads.



**COST SHEET & UNIT COSTING 4.14**

If the production programme of the factory is as indicated below and the management desires a profit of ₹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 |

**Answer**

**Statement Showing Average selling Price Per Unit**

| <b>Particulars</b>                                | <b>First 3 Months</b> | <b>Next 9 Months</b> | <b>Total</b>       |
|---------------------------------------------------|-----------------------|----------------------|--------------------|
| <b>Number of Units (W.N. 1)</b>                   | <b>15,000</b>         | <b>72,000</b>        | <b>87,000</b>      |
| Raw Materials @ ₹90 per unit                      | 13,50,000             | 64,80,000            | 78,30,000          |
| Direct Labour @ ₹60 per unit                      | 9,00,000              | 43,20,000            | 52,20,000          |
| <b>Prime Cost</b>                                 | <b>22,50,000</b>      | <b>1,08,00,000</b>   | <b>1,30,50,000</b> |
| Factory Overheads:                                |                       |                      |                    |
| Fixed                                             | 7,50,000              | 22,50,000            | 30,00,000          |
| Variable @ ₹100 per unit                          | 15,00,000             | 72,00,000            | 87,00,000          |
| Semi Variable (W.N. 2)                            | 5,00,000              | 21,00,000            | 26,00,000          |
| <b>Total Cost</b>                                 | <b>50,00,000</b>      | <b>2,23,50,000</b>   | <b>2,73,50,000</b> |
| Add: Profit                                       |                       |                      | 20,00,000          |
| <b>Sales Value</b>                                |                       |                      | <b>2,93,50,000</b> |
| <b>Average Sales Price (2,93,50,000 ÷ 87,000)</b> |                       |                      | <b>₹337.36</b>     |

**Working Notes:**

**1. Calculation of production per annum:**

|                                                |   |                     |
|------------------------------------------------|---|---------------------|
| 50% for 3 months (1,20,000 units × 50% × 3/12) | = | 15,000 units        |
| 80% for 9 months (1,20,000 units × 80% × 9/12) | = | 72,000 units        |
| <b>Total production for the year</b>           | = | <b>87,000 units</b> |

**2. Calculation of Semi-variable cost:**

|                                                             |   |           |
|-------------------------------------------------------------|---|-----------|
| First Three Months (20,00,000 × 3/12)                       | = | 5,00,000  |
| Next Nine Months [(20,00,000 + 4,00,000 + 4,00,000) × 9/12] | = | 21,00,000 |

**BQ 17**

A manufacturing Company has an installed capacity of 1,20,000 units per annum. The cost structure of the product manufactured is as under:

**(i) Variable cost per unit:**

|                                                    |       |
|----------------------------------------------------|-------|
| Materials                                          | ₹8.00 |
| Labour (subject to a minimum of ₹56,000 per month) | ₹8.00 |
| Overheads                                          | ₹3.00 |

**(ii) Fixed overheads ₹1,04,000 per annum.**

**(iii) Semi-variable overhead ₹48,000 per annum at 60% capacity, which increase by ₹6,000 per annum for increase of every 10% of the capacity utilization or any part thereof, for the year as a whole.**

The capacity utilization for the next year is estimated at 60% for two months, 75% for next six months and 80% for remaining part of the year. Assume that there are no opening and closing stock.

**If the company is planning to have a profit of 25% on the selling price calculate selling price per unit.**

**Answer**

**Statement Showing Selling Price Per unit**

| <b>Particulars</b>              | <b>First 2 Month</b> | <b>Next 6 Month</b> | <b>Next 4 Month</b> | <b>Total</b>  |
|---------------------------------|----------------------|---------------------|---------------------|---------------|
| <b>Number of Units (W.N. 1)</b> | <b>12,000</b>        | <b>45,000</b>       | <b>32,000</b>       | <b>89,000</b> |



**COST SHEET & UNIT COSTING 4.15**

|                                           |                 |                 |                 |                  |
|-------------------------------------------|-----------------|-----------------|-----------------|------------------|
| Raw Materials @ ₹8 per unit               | 96,000          | 3,60,000        | 2,56,000        | 7,12,000         |
| Direct Labour (W.N. 2)                    | 1,12,000        | 3,60,000        | 2,56,000        | 7,28,000         |
| <b>Prime Cost</b>                         | <b>2,08,000</b> | <b>7,20,000</b> | <b>5,12,000</b> | <b>14,40,000</b> |
| Factory Overheads:                        |                 |                 |                 |                  |
| Fixed                                     | 17,333          | 52,000          | 34,667          | 1,04,000         |
| Variable @ ₹3 per unit                    | 36,000          | 1,35,000        | 96,000          | 2,67,000         |
| Semi Variable (W.N. 3)                    | 8,000           | 30,000          | 20,000          | 58,000           |
| <b>Total Cost</b>                         | <b>2,69,333</b> | <b>9,37,000</b> | <b>6,62,667</b> | <b>18,69,000</b> |
| Add: Profit @ 25% on sales or 33⅓ on cost |                 |                 |                 | 6,23,000         |
| <b>Sales Value</b>                        |                 |                 |                 | <b>24,92,000</b> |
| <b>Sales Price (24,92,000 ÷ 89,000)</b>   |                 |                 |                 | <b>₹28.00</b>    |

**Working Notes:****1. Calculation of production per annum:**

|                                                |   |                     |
|------------------------------------------------|---|---------------------|
| 60% for 2 months (1,20,000 units × 60% × 2/12) | = | 12,000 units        |
| 75% for 6 months (1,20,000 units × 75% × 6/12) | = | 45,000 units        |
| 80% for 4 months (1,20,000 units × 80% × 4/12) | = | 32,000 units        |
| <b>Total production for the year</b>           | = | <b>89,000 units</b> |

**2. Calculation of Labour cost:**

|                                                                 |   |          |
|-----------------------------------------------------------------|---|----------|
| First Two Months (12,000 × 8 or 56,000 × 2) whichever is higher | = | 1,12,000 |
| Next Six Months (45,000 × 8 or 56,000 × 6) whichever is higher  | = | 3,60,000 |
| Next Four Months (32,000 × 8 or 56,000 × 4) whichever is higher | = | 2,56,000 |

**3. Calculation of Semi-variable cost:**

|                                                    |   |        |
|----------------------------------------------------|---|--------|
| First Two Months (48,000 × 2/12)                   | = | 8,000  |
| Next Six Months [(48,000 + 6,000 + 6,000) × 6/12]  | = | 30,000 |
| Next Four Months [(48,000 + 6,000 + 6,000) × 4/12] | = | 20,000 |

**BQ 18**

Sreelekha Manufacturing Company manufactures two types of pens P & Q: **The cost data for the year ended 30<sup>th</sup> June 2023 is as follows:**

|                      |                 |
|----------------------|-----------------|
| Direct Materials     | 4,00,000        |
| Direct Wages         | 2,24,000        |
| Production Overheads | 96,000          |
|                      | <b>7,20,000</b> |

**It's further ascertained that:**

- (a) Direct Materials in type P cost twice as much direct Materials as in type Q.
- (b) Direct wages for type Q were 60% of those for type P.
- (c) Production overhead was of the same rate for both types.
- (d) Administration Overheads for each was 200% of direct labour (related to production).
- (e) Selling cost were 50 Paise per pen for both types.
- (f) Production during the year:
  - (i) Type P 40,000 pens and
  - (ii) Type Q 1,20,000 pens.
- (g) Sales during the year:
  - (i) Type P 36,000 pens and
  - (ii) Type Q 1,00,000 pens.
- (h) Selling prices were ₹14 per pen for type P and ₹10 per pen for type Q.

**Prepare statement showing per unit cost of production, total cost, profit and also total sales value and profit separately for the two types of pen P and Q.**

[Profit (total) ₹4,34,400; P ₹1,04,400, per unit ₹2.90; Q ₹3,30,000, per unit ₹3.3]

**BQ 19**

The Fancy Toys Company are manufacturer of two types of toys, x and y. The manufacturing costs for the year ended 31<sup>st</sup> March, 2023 were:

|                     |                 |
|---------------------|-----------------|
| Direct material     | 2,00,000        |
| Direct wages        | 1,12,000        |
| Production Overhead | 48,000          |
|                     | <b>3,60,000</b> |

There was no work-in-progress at the beginning or at the end of the year.

**It is ascertained that:**

- (i) Direct materials in type x costs twice as much as direct material in type y.
- (ii) The direct wages for type y were 60% of those for type x.
- (iii) Production overhead was 30 paise, the same per toy of x and y types.
- (iv) Administration overhead for each grade was 200% of direct labour (related to production).
- (v) Selling cost was 25 paise per toy for each type of toy.
- (vi) Production during the year was:

(a) Type x 40,000 toys of which 36,000 were sold and

(b) Type y 1,20,000 toys of which 1,00,000 were sold.

(vii) Selling price were ₹7 per toy for type x and ₹5 per toy for type y.

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

**Answer**

**The Fancy Toys Company**  
**Cost Sheet for the year ending 31.03.2023**

| Particulars                              | Toy 'x'         |             | Toy 'y'         |             |
|------------------------------------------|-----------------|-------------|-----------------|-------------|
|                                          | Total           | Per unit    | Total           | Per unit    |
| Direct Materials                         | 80,000          | 2.00        | 1,20,000        | 1.00        |
| Direct Labour                            | 40,000          | 1.00        | 72,000          | 0.60        |
| <b>Prime Cost</b>                        | <b>1,20,000</b> | <b>3.00</b> | <b>1,92,000</b> | <b>1.60</b> |
| Production overheads                     | 12,000          | 0.30        | 36,000          | 0.30        |
| <b>Factory Cost</b>                      | <b>1,32,000</b> | <b>3.30</b> | <b>2,28,000</b> | <b>1.90</b> |
| Administrative overheads @ 200% of wages | 80,000          | 2.00        | 1,44,000        | 1.20        |
| <b>Cost of Production</b>                | <b>2,12,000</b> | <b>5.30</b> | <b>3,72,000</b> | <b>3.10</b> |
| Less: Closing stock                      | (21,200)        | -           | (62,000)        | -           |
| <b>Cost of Goods Sold</b>                | <b>1,90,800</b> | <b>5.30</b> | <b>3,10,000</b> | <b>3.10</b> |
| Selling Expenses                         | 9,000           | 0.25        | 25,000          | 0.25        |
| <b>Cost of Sales</b>                     | <b>1,99,800</b> | <b>5.55</b> | <b>3,35,000</b> | <b>3.35</b> |
| Profit                                   | 52,200          | 1.45        | 1,65,000        | 1.65        |
| <b>Sales</b>                             | <b>2,52,000</b> | <b>7.00</b> | <b>5,00,000</b> | <b>5.00</b> |

**BQ 20**

Nilgiri Air-conditioning Company produces refrigerators and sells each for ₹2,000 during a certain accounting year. The direct material the direct labour and overhead costs are 60 per cent, 20 per cent, and 20 per cent respectively of the cost of sales. In a subsequent accounting year, the direct material cost has increased by 15 per cent and direct labour cost by 17.5 per cent. Due to these increases in costs, there would be a 50 per cent decrease in the amount of profit if the same selling price is to be maintained.

**Compute the new selling price to enable the Company to maintain the same percentage of profit as that earned during the preceding year.**

[Old Cost of Sales ₹1,600, New Cost of Sales ₹1,800; New Sales Price ₹2,250]

**BQ 21**

A company presently sells equipment for ₹35,000. Increase in price of material and rate of labour cost are anticipated to the extent of 15% and 10% respectively in the coming year. Material cost represents 40% of cost of sales and labour cost 30% of cost of sales and remaining relate to overheads. If the existing selling price is retained, despite the increase in labour and material prices, the company would face a 20% decrease in the existing amount of profit on the equipment.

*You are required to arrive at a selling price so as to give the same percentage of profit on increased cost of sales as before. Prepare a statement of profit/loss per unit, showing the new selling price and cost per unit in support of your answer.*

**Answer****Statement of Profit (Loss)**

| <b>Particulars</b>          | <b>Existing</b>            | <b>Anticipated</b>          |
|-----------------------------|----------------------------|-----------------------------|
| Materials                   | (24,138 × .40)<br>9,655.20 | (24,138 × .46)<br>11,103.48 |
| Labour                      | (24,138 × .30)<br>7,241.40 | (24,138 × .33)<br>7,965.54  |
| Overheads                   | (24,138 × .30)<br>7,241.40 | (24,138 × .30)<br>7,241.40  |
| Cost of Sales               | 24,138.00                  | 26,310.42                   |
| Profit @ 45% cost of sales  | 10,862.00                  | 11,839.68                   |
| <b>Sales Price per unit</b> | <b>35,000</b>              | <b>38,150.10</b>            |

**Working Notes:**

**Selling Price ₹35,000; Let us assume present total cost of sales as X**

|                      | <b>Existing situation</b> | <b>Anticipated Situation</b> |
|----------------------|---------------------------|------------------------------|
| Direct Material      | 0.40X                     | 0.46X                        |
| Labour               | 0.30X                     | 0.33X                        |
| Overhead             | 0.30X                     | 0.30X                        |
| <b>Cost of Sales</b> | <b>X</b>                  | <b>1.09X</b>                 |
| Profit               | ₹35,000-X                 | ₹35,000-1.09X                |

**From the above the following equation can be made:**

$$\begin{aligned}
 (35,000-X) - (35,000-1.09X) &= 20\% \text{ of } (35,000-X) && \text{or} \\
 X + 1.09X &= 7,000-0.20X && \text{or} \\
 0.29X &= 7,000 && \text{or} \\
 X \text{ (Present Total Cost)} &= ₹24,138
 \end{aligned}$$

**New selling price of the equipment should be (say) ₹38,150.**

**BQ 22**

XYZ Auto Ltd. is in the business of selling cars. It also sells insurance and finance as part of its overall business strategy.

**The following information is available for the company:**

|                    | <b>Physical units</b> | <b>Sales value</b> |
|--------------------|-----------------------|--------------------|
| Sales of Cars      | 10,000 Cars           | ₹30,000 lakhs      |
| Sales of Insurance | 6,000 Policies        | ₹1,500 lakhs       |
| Sales of Finance   | 8,000 Loans           | ₹19,200 lakhs      |

**The Revenue earnings from each line of business before expenses are as follow:**

|                   |                    |
|-------------------|--------------------|
| Sale of Cars      | 3% of Sales value  |
| Sale of Insurance | 20% of Sales value |
| Sale of Finance   | 2% of Sales value  |

*The expenses of the company are as follows:*

|                                         |            |
|-----------------------------------------|------------|
| Salesman salaries                       | ₹200 lakhs |
| Rent                                    | ₹100 lakhs |
| Electricity                             | ₹100 lakhs |
| Advertising                             | ₹200 lakhs |
| Documentation cost per insurance policy | ₹100       |
| Documentation cost for each loan        | ₹200       |
| Direct sales expenses per car           | ₹5,000     |

*Indirect costs have to be allocated in the ratio of physical units sold.*

**Required:**

- (i) Make a cost sheet for each product allocating the direct and indirect cost and also showing the product wise profit and total profit.  
(ii) Calculate the percentage of profit to revenue earned from each line of business.

**Answer**

**(i) Cost Sheet**

**(₹ in lakhs)**

| <b>Particular</b>                  | <b>Car<br/>(Amount)</b> | <b>Insurance<br/>(Amount)</b> | <b>Finance<br/>(Amount)</b> | <b>Total</b> |
|------------------------------------|-------------------------|-------------------------------|-----------------------------|--------------|
| A – Sales unit                     | 10,000                  | 6,000                         | 8,000                       | -            |
| B – Sales value                    | 30,000                  | 1,500                         | 19,200                      | -            |
| C – Revenue earning (in Rs.)       | 900                     | 300                           | 384                         | 1,584        |
| D – Expenses:                      |                         |                               |                             |              |
| <b>Direct expenses:</b>            |                         |                               |                             |              |
| Sales exp. Per car                 | 500                     | -                             | -                           | 500          |
| Document cost per insurance policy | -                       | 6                             | -                           | 6            |
| Document cost for each loan        | -                       | -                             | 16                          | 16           |
| <b>Indirect Expenses:</b>          |                         |                               |                             |              |
| Salesman Salaries (10 : 6 : 8)     | 83.33                   | 50                            | 66.67                       | 200          |
| Rent (10 : 6 : 8)                  | 41.67                   | 25                            | 33.33                       | 100          |
| Electricity (10 : 6 : 8)           | 41.67                   | 25                            | 33.33                       | 100          |
| Advertisement (10 : 6 : 8)         | 83.33                   | 50                            | 66.67                       | 200          |
| <b>Total</b>                       | <b>750</b>              | <b>156</b>                    | <b>216</b>                  | <b>1,122</b> |
| <b>Profit (C-D)</b>                | <b>150</b>              | <b>144</b>                    | <b>168</b>                  | <b>462</b>   |

**(ii) Percentage of profit to revenue from each of business:-**

- (a) Sale of car =  $\frac{150}{900} \times 100 = 16.67\%$   
(b) Sale of insurance =  $\frac{144}{300} \times 100 = 48.00\%$   
(c) Sale of finance =  $\frac{168}{384} \times 100 = 43.75\%$

**BQ 23**

A Re-roller produced 400 metric tonnes of M.S. bars spending ₹36,00,000 towards materials and ₹6,20,000 towards rolling charges. Ten percent of the output was found to be defective, which had to be sold at 10% less than the price for good production. If the sales realization should give the firm an overall profit of 12.5% on cost.

**Find the selling price per metric tonne of both the categories of bars. The scrap arising during the rolling process fetched a realization of ₹60,000.**

**Answer**

**(1) Calculation of sales value:**

|                                           |                   |
|-------------------------------------------|-------------------|
| Material consumed                         | ₹36,00,000        |
| Less: Realisation of Scrap                | (₹60,000)         |
| Add: Rolling Charges                      | ₹6,20,000         |
| Total Cost                                | ₹41,60,000        |
| Add: Overall Profit @ 12.5% on ₹41,60,000 | ₹5,20,000         |
| Total sales realisation required          | <b>₹46,80,000</b> |

**(2) Calculation of equivalent good production:**

|                                   |   |                                              |
|-----------------------------------|---|----------------------------------------------|
| Total production                  | = | 400 metric tonnes                            |
| Good production (90% of 400)      | = | 360 metric tonnes                            |
| Defective production (10% of 400) | = | 40 metric tonnes                             |
| Equivalent good production        | = | 360 + 40 × 90%                               |
|                                   |   | (10% less than the price of good production) |
|                                   | = | <b>396 metric tonnes</b>                     |

**(3) Selling price per metric tonne of both the categories of bars:**

|                                                   |                                                                  |                                        |
|---------------------------------------------------|------------------------------------------------------------------|----------------------------------------|
| Selling price per metric ton of good production = | $\frac{\text{Sales value}}{\text{Equivalent good production}} =$ | $\frac{46,80,000}{396 \text{ tonnes}}$ |
|                                                   | =                                                                | <b>₹11,818.18</b>                      |
| Selling price per metric ton of defective units = | $₹11,818.18 \times 90\%$                                         | = <b>₹10,636.36</b>                    |

**BQ 24**

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

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

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

**Answer**

Let we are going to produce quantity of product A be 1 kg

Now,

|                                   |   |                                                                            |   |         |
|-----------------------------------|---|----------------------------------------------------------------------------|---|---------|
| Required input of RM AXE & BXE    | = | 1 kg + 25%                                                                 | = | 1.25 kg |
| Cost of Raw materials AXE and BXE | = | $1.25 \times \frac{1}{2} \times ₹150 + 1.25 \times \frac{1}{2} \times ₹90$ | = | ₹150    |

**Since, company wants to maintain same selling price with present profit or in other words cost will remain same after introduction of material CXE:**

|                              |   |                              |   |      |
|------------------------------|---|------------------------------|---|------|
| Cost of material AXE and CXE | = | Cost of material AXE and BXE | = | ₹150 |
|------------------------------|---|------------------------------|---|------|

Let weight of material CXE be X

|                                         |   |                 |
|-----------------------------------------|---|-----------------|
| ∴ Proportion of material AXE            | = | 1.25 kg - X     |
| Cost of material AXE and CXE            | = | ₹150            |
| $(1.25 - X) \times ₹150 + X \times ₹75$ | = | ₹150            |
| $₹187.5 - 150X + 75X$                   | = | ₹150            |
| 75X                                     | = | 37.50           |
| X                                       | = | .5              |
| ∴ 1.25 - X                              | = | 1.25 - .5       |
| <b>AXE : CXE</b>                        | = | <b>.75 : .5</b> |
|                                         |   | = <b>3 : 2</b>  |

# PAST YEAR QUESTIONS

## PYQ 1

Following information relate to a manufacturing concern for the year ended 31<sup>st</sup> March, 2018:

|                                                  |                |
|--------------------------------------------------|----------------|
| Raw Materials (opening)                          | ₹2,28,000      |
| Raw Material (closing)                           | ₹3,05,000      |
| Purchase 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% prime cost |
| Work-in-progress (opening)                       | ₹1,92,500      |
| Work-in-progress (closing)                       | ₹1,40,700      |
| Administrative Overheads (related to production) | ₹1,73,000      |
| Distribution expenses                            | ₹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 the year is valued at cost of production. The firm sold 14,153 units at a price of ₹618 per unit during the year.

**Prepare cost sheet of the firm.**

**[(10 Marks) May 2018]**

## Answer

### Cost Sheet

| Particulars                                                       | Amount           |
|-------------------------------------------------------------------|------------------|
| Raw materials purchased                                           | 42,25,000        |
| Add: Opening stock of raw materials                               | 2,28,000         |
| Add: Freight Inward                                               | 1,00,000         |
| Less: Sale of scrap of materials                                  | (8,000)          |
| Less: Closing stock of raw materials                              | (3,05,000)       |
| Materials consumed                                                | 42,40,000        |
| Direct wages (12,56,000 + 1,50,000)                               | 14,06,000        |
| <b>Prime Cost</b>                                                 | <b>56,46,000</b> |
| Factory Overheads (20% of 56,46,000)                              | 11,29,200        |
| Add: Opening WIP                                                  | 1,92,500         |
| Less: Closing WIP                                                 | (1,40,700)       |
| <b>Works Cost</b>                                                 | <b>68,27,000</b> |
| Administrative Overheads                                          | 1,73,000         |
| <b>Cost of Production</b>                                         | <b>70,00,000</b> |
| Add: Opening Finished goods                                       | 6,08,500         |
| Less: Closing Finished Goods [(70,00,000 ÷ 14,000) × 1,064 units] | (5,32,000)       |
| <b>Cost of Goods Sold</b>                                         | <b>70,76,500</b> |
| Selling expenses (₹16 × 14,153)                                   | 2,26,448         |
| <b>Cost of Sales</b>                                              | <b>73,02,948</b> |
| Profit (b.f.)                                                     | 14,43,606        |
| <b>Sales (14,153 × 618)</b>                                       | <b>87,46,554</b> |

### Working Note:

|                                 |   |                                             |                      |
|---------------------------------|---|---------------------------------------------|----------------------|
| Units in closing finished goods | = | Opening units + Units produced – Units sold |                      |
|                                 | = | 1,217 + 14,000 – 14,153                     | = <b>1,064 units</b> |

**PYQ 2**

Following details are provided by M/s ZIA Private Limited for the quarter ended 30<sup>th</sup> 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 are 10% of Factory Overheads |            |

**Stock details as per Stock register:**

|                  | <b>30.06.2018</b> | <b>30.09.2018</b> |
|------------------|-------------------|-------------------|
| Raw Materials    | ₹2,45,600         | ₹2,08,000         |
| Work-in-progress | ₹1,70,800         | ₹1,90,000         |
| Finished Goods   | ₹3,10,000         | ₹2,75,000         |

**You are required to prepare a Cost Sheet showing:**

- (1) Raw Material Consumed
- (2) Prime Cost
- (3) Factory Cost
- (4) Cost of Goods Sold
- (5) Cost of Sales and Profit

**[(10 Marks) Nov 2018]**

**Answer****Cost Sheet**

| <b>Particulars</b>                         | <b>Amount</b>    |
|--------------------------------------------|------------------|
| Raw Materials Purchased (W.N.)             | 12,22,650        |
| Add: Opening stock of Raw Materials        | 2,45,600         |
| Less: Closing stock of Raw Materials       | (2,08,000)       |
| <b>Materials Consumed</b>                  | <b>12,60,250</b> |
| Direct Wages                               | 2,57,250         |
| Direct Expenses                            | 1,80,000         |
| <b>Prime Cost</b>                          | <b>16,97,500</b> |
| Factory Overheads (2,57,250 ÷ 175%)        | 1,47,000         |
| Add: Opening WIP                           | 1,70,800         |
| Less: Closing WIP                          | (1,90,000)       |
| <b>Factory Cost</b>                        | <b>18,25,300</b> |
| Administrative Overheads (10% of 1,47,000) | 14,700           |
| Add: Opening Finished Goods                | 3,10,000         |
| Less: Closing Finished Goods               | (2,75,000)       |
| <b>Cost of Goods Sold</b>                  | <b>18,75,000</b> |
| Selling and Distribution Overheads         | 60,000           |
| <b>Cost of Sales</b>                       | <b>19,35,000</b> |
| Profit (b.f.)                              | 2,75,000         |
| <b>Sales</b>                               | <b>22,10,000</b> |

**Working Note:****Statement Showing Material Purchased**

| <b>Particulars</b>             | <b>Amount</b>    |
|--------------------------------|------------------|
| <b>Cost of Goods Sold</b>      | <b>18,75,000</b> |
| Add: Closing Finished Goods    | 2,75,000         |
| Less: Opening Finished Goods   | (3,10,000)       |
| <b>Cost Of Production</b>      | <b>18,40,000</b> |
| Less: Administrative Overheads | (14,700)         |



|                            |                                |                  |
|----------------------------|--------------------------------|------------------|
|                            | <b>Factory Cost</b>            | <b>18,25,300</b> |
| Add: Closing WIP           |                                | 1,90,000         |
| Less: Opening WIP          |                                | (1,70,800)       |
|                            | <b>Gross Factory Cost</b>      | <b>18,44,500</b> |
| Less: Factory Overheads    |                                | (1,47,000)       |
|                            | <b>Prime Cost</b>              | <b>16,97,500</b> |
| Less: Direct Expenses      |                                | (1,80,000)       |
| Less Direct Wages          |                                | (2,57,250)       |
|                            | <b>Raw Material Consumed</b>   | <b>12,60,250</b> |
| Add: Closing Raw Materials |                                | 2,08,000         |
| Less Opening Raw Materials |                                | (2,45,600)       |
|                            | <b>Raw Materials Purchased</b> | <b>12,22,650</b> |

**PYQ 3**

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:

- (a) Direct material ₹40 per unit  
 (b) Direct labour ₹30 per unit (subject to a minimum of ₹48,000 p.m.)  
 (c) Factory overheads:  
     Fixed ₹3,60,000 per annum  
     Variable ₹10 per unit  
     Semi variable ₹1,08,000 per annum up to 50% capacity and additional ₹46,800 for every 20% increase in capacity or any part thereof.  
 (d) Administrative overheads ₹5,18,400 per annum (fixed)  
 (e) Selling overheads ₹8 per unit  
 (f) Each unit of raw material yields scrap which is sold at the rate of ₹5 per unit.  
 (g) In year 2019, the factory worked at 50% capacity for the first three month but it was expected that it would work at 80% capacity for the remaining nine month.  
 (h) During the first three months, the selling price per unit was ₹145.

**You are required to:**

- (1) Prepare a cost sheet showing prime cost, works cost, cost of production and cost of sales.  
 (2) Calculate the selling price per unit for remaining nine month to achieve the total annual profit of ₹8,76,600.

**[(10 Marks) May 2019]**

**Answer****(1) Cost Sheet**

| <b>Particulars</b>                            | <b>First 3 Months</b> | <b>Next 9 Months</b> | <b>Total</b>     |
|-----------------------------------------------|-----------------------|----------------------|------------------|
| <b>Number of Units (W.N. 1)</b>               | <b>4,500</b>          | <b>21,600</b>        | <b>26,100</b>    |
| Raw Materials @ ₹40 per unit                  | 1,80,000              | 8,64,000             | 10,44,000        |
| Less: Sale of Scrap of Material @ ₹5 per unit | (22,500)              | (1,08,000)           | (1,30,500)       |
| <b>Raw Materials Consumed</b>                 | <b>1,57,500</b>       | <b>7,56,000</b>      | <b>9,13,500</b>  |
| Direct Labour (W.N. 2)                        | 1,44,000              | 6,48,000             | 7,92,000         |
| <b>Prime Cost</b>                             | <b>3,01,500</b>       | <b>14,04,000</b>     | <b>17,05,500</b> |
| Factory Overheads:                            |                       |                      |                  |
| Fixed                                         | 90,000                | 2,70,000             | 3,60,000         |
| Variable @ ₹10 per unit                       | 45,000                | 2,16,000             | 2,61,000         |
| Semi Variable (W.N. 3)                        | 27,000                | 1,51,200             | 1,78,200         |
| <b>Works Cost</b>                             | <b>4,63,500</b>       | <b>20,41,200</b>     | <b>25,04,700</b> |
| Administrative Overheads                      | 1,29,600              | 3,88,800             | 5,18,400         |
| <b>Cost of Production</b>                     | <b>5,93,100</b>       | <b>24,30,000</b>     | <b>30,23,100</b> |
| Selling and Distribution OH @ ₹8 per unit     | 36,000                | 1,72,800             | 2,08,800         |
| <b>Cost of Sales</b>                          | <b>6,29,100</b>       | <b>26,02,800</b>     | <b>32,31,900</b> |

## (2) Statement Showing Selling Price Per Unit

| Particulars                                                   | Amount           |
|---------------------------------------------------------------|------------------|
| Sales Value for First Three Months ( $4,500 \times 145$ )     | 6,52,500         |
| Less: Cost of Sales for First Three Months                    | (6,29,100)       |
| <b>Profit for First Three Months</b>                          | <b>23,400</b>    |
| Required Profit from Next Nine Months ( $8,76,600 - 23,400$ ) | 8,53,200         |
| Cost of Sales for Next Nine Months                            | 26,02,800        |
| <b>Sales Value for Next Nine months</b>                       | <b>34,56,000</b> |
| ÷ Number of Units for Next Nine Months                        | ÷ 21,600         |
| <b>Selling Price Per Unit for Next Nine Months</b>            | <b>₹160.00</b>   |

## Working Notes:

## 1. Calculation of production per annum:

|                                                                     |   |                     |
|---------------------------------------------------------------------|---|---------------------|
| 50% for 3 months ( $36,000 \text{ units} \times 50\% \times 3/12$ ) | = | 4,500 units         |
| 80% for 9 months ( $36,000 \text{ units} \times 80\% \times 9/12$ ) | = | 21,600 units        |
| <b>Total production for the year</b>                                | = | <b>26,100 units</b> |

## 2. Calculation of Labour cost:

|                                                                                   |   |          |
|-----------------------------------------------------------------------------------|---|----------|
| First Three Months ( $4,500 \times 30$ or $48,000 \times 3$ ) whichever is higher | = | 1,44,000 |
| Next Nine Months ( $21,600 \times 30$ or $48,000 \times 9$ ) whichever is higher  | = | 6,48,000 |

## 3. Calculation of Semi-variable cost:

|                                                                 |   |          |
|-----------------------------------------------------------------|---|----------|
| First Three Months ( $1,08,000 \times 3/12$ )                   | = | 27,000   |
| Next Nine Months [ $(1,08,000 + 46,800 + 46,800) \times 9/12$ ] | = | 1,51,200 |

## Note:

1. Administrative overheads is assumed to be related to production.

## PYQ 4

XYZ a manufacturing firm, has revealed following information for September, 2019 :

|                   | 1 <sup>st</sup> September | 30 <sup>th</sup> September |
|-------------------|---------------------------|----------------------------|
| Raw Materials     | ₹2,42,000                 | ₹2,92,000                  |
| Works-in-progress | ₹2,00,000                 | ₹5,00,000                  |

## The firm incurred following expenses for a targeted production of 1,00,000 units during the month:

|                                                        |             |
|--------------------------------------------------------|-------------|
| Consumable stores and spares of factory                | ₹3,50,000   |
| Research and development cost for process improvements | ₹2,50,000   |
| Quality control cost                                   | ₹2,00,000   |
| Packing cost (secondary) per unit of goods sold        | ₹2.00       |
| Lease rent of production asset                         | ₹2,00,000   |
| Administrative expenses (general)                      | ₹2,24,000   |
| Selling and distribution expenses                      | ₹4,13,000   |
| Finished goods (opening)                               | Nil         |
| Finished goods (closing)                               | 5,000 units |

Defective output which is 4% of targeted production, realizes ₹61 per unit. Closing stock is valued at cost of production (excluding administrative expenses). Cost of goods sold, excluding administrative expenses amounts to ₹78,26,000. Direct employees cost is  $\frac{1}{2}$  of the cost of material consumed. Selling price of the output is ₹110 per unit.

## You are required to:

- (1) Calculate the value of material purchased
- (2) Prepare cost sheet showing the profit earned by the firm.

[(10 Marks) Nov 2019]

**Answer****(1) Statement Showing Value of Material Purchased**

| <b>Particulars</b>                                                        | <b>Amount</b>    |
|---------------------------------------------------------------------------|------------------|
| <b>Cost of Goods Sold (91,000 units)</b>                                  | <b>78,26,000</b> |
| Add: Closing Finished Goods [(78,26,000 ÷ 91,000 units) × 5,000 units]    | 4,30,000         |
| Less: Opening Finished Goods                                              | (Nil)            |
| <b>Cost of Production</b>                                                 | <b>82,56,000</b> |
| Add: Realizable Value from Sale of Defective Output (1,00,000 × 4% × ₹61) | 2,44,000         |
| Less: Research and Development Cost for Process Improvement               | (2,50,000)       |
| Less: Quality Control Cost                                                | (2,00,000)       |
| <b>Factory Cost</b>                                                       | <b>80,50,000</b> |
| Add: Closing WIP                                                          | 5,00,000         |
| Less: Opening WIP                                                         | (2,00,000)       |
| <b>Gross Factory Cost</b>                                                 | <b>83,50,000</b> |
| Less: Factory Overheads:                                                  |                  |
| Consumable Stores and Spares of Factory                                   | (3,50,000)       |
| Lease Rent of Production Asset                                            | (2,00,000)       |
| <b>Prime Cost</b>                                                         | <b>78,00,000</b> |
| Less Direct Employee Cost [(78,00,000 ÷ 1.5) × 0.5]                       | (26,00,000)      |
| <b>Raw Material Consumed</b>                                              | <b>52,00,000</b> |
| Add: Closing Raw Materials                                                | 2,92,000         |
| Less Opening Raw Materials                                                | (2,42,000)       |
| <b>Raw Materials Purchased</b>                                            | <b>52,50,000</b> |

**(2) Cost Sheet**

| <b>Particulars</b>                                         | <b>Amount</b>      |
|------------------------------------------------------------|--------------------|
| Raw Materials Purchased                                    | 52,50,000          |
| Add: Opening stock of Raw Materials                        | 2,42,000           |
| Less: Closing stock of Raw Materials                       | (2,92,000)         |
| <b>Materials Consumed</b>                                  | <b>52,00,000</b>   |
| Add: Direct Employee Cost                                  | 26,00,000          |
| <b>Prime Cost</b>                                          | <b>78,00,000</b>   |
| Add: Factory Overheads:                                    |                    |
| Consumable Stores and Spares of Factory                    | 3,50,000           |
| Lease Rent of Production Asset                             | 2,00,000           |
| <b>Gross Factory Cost</b>                                  | <b>83,50,000</b>   |
| Add: Opening WIP                                           | 2,00,000           |
| Less: Closing WIP                                          | (5,00,000)         |
| <b>Factory Cost</b>                                        | <b>80,50,000</b>   |
| Add: Quality Control Cost                                  | 2,00,000           |
| Add: Research and Development Cost for Process Improvement | 2,50,000           |
| Less: Realizable Value from Sale of Defective Output       | (2,44,000)         |
| <b>Cost of Production</b>                                  | <b>82,56,000</b>   |
| Add: Opening Finished Goods                                | Nil                |
| Less: Closing Finished Goods                               | (4,30,000)         |
| <b>Cost of Goods Sold</b>                                  | <b>78,26,000</b>   |
| Add: Administrative Expenses (General)                     | 2,24,000           |
| Add: Secondary Packing Cost (91,000 units × ₹2)            | 1,82,000           |
| Add: Selling and Distribution Expenses                     | 4,13,000           |
| <b>Cost of Sales</b>                                       | <b>86,45,000</b>   |
| Profit (b.f.)                                              | 13,65,000          |
| <b>Sales (91,000 units × ₹110)</b>                         | <b>1,00,10,000</b> |

**Working Note:****Calculation of number of units produced and sold:**

**COST SHEET & UNIT COSTING 4.25**

|                   |   |                                               |                |
|-------------------|---|-----------------------------------------------|----------------|
| Target Production | = | 1,00,000 units                                |                |
| Good Output       | = | Target Output – Defective Output              |                |
|                   | = | 1,00,000 units – 4% of 1,00,000               | = 96,000 units |
| Units Sold        | = | Good Output - Units in Closing Finished Goods |                |
|                   | = | 96,000 units – 5,000 units                    | = 91,000 units |

**PYQ 5**

X Ltd. manufactures two types of pens 'Super Pen' and 'Normal Pen'. The cost data for the year ended 30<sup>th</sup> September, 2019 is as follows:

|                     |                  |
|---------------------|------------------|
| Direct material     | 8,00,000         |
| Direct wages        | 4,48,000         |
| Production Overhead | 1,92,000         |
|                     | <b>14,40,000</b> |

**It is further ascertained that:**

- (i) Direct materials cost in Super Pen was twice as much as direct material in Normal Pen.
- (ii) The direct wages for Normal Pen were 60% of those for Super Pen.
- (iii) Production overhead was per unit was same rate for both the types.
- (iv) Administration overhead was 200% of direct labour for each.
- (v) Selling cost was ₹1 per Super Pen.
- (vi) Production and sales during the year were as follows:

| <b>Production</b> |              | <b>Sales</b> |              |
|-------------------|--------------|--------------|--------------|
|                   | No. of units |              | No. of units |
| Super Pen         | 40,000       | Super Pen    | 36,000       |
| Normal Pen        | 1,20,000     |              |              |

- (vii) Selling price was ₹30 per unit for Super Pen.

**Prepare a Cost Sheet for 'Super Pen' showing:**

- (i) Cost per unit and Total Cost
- (ii) Profit per unit and Total Profit

**[(10 Marks) Nov 2020]****Answer**

**X Ltd.**  
**Cost Sheet for the year ending 30.09.2019**

| <b>Particulars</b>                       |                                                                                 | <b>Super Pen</b> |                 |
|------------------------------------------|---------------------------------------------------------------------------------|------------------|-----------------|
|                                          |                                                                                 | <b>Total</b>     | <b>Per unit</b> |
| Direct Materials                         | $[(8,00,000 \div 40,000 \times 2 + 1,20,000 \times 1) \times 40,000 \times 2]$  | 3,20,000         | 8.00            |
| Direct Labour                            | $[(4,48,000 \div 40,000 \times 1 + 1,20,000 \times .6) \times 40,000 \times 1]$ | 1,60,000         | 4.00            |
|                                          | <b>Prime Cost</b>                                                               | <b>4,80,000</b>  | <b>12.00</b>    |
| Production OH                            | $[(1,92,000 \div 40,000 \times 1 + 1,20,000 \times 1) \times 40,000 \times 1]$  | 48,000           | 1.20            |
|                                          | <b>Factory Cost</b>                                                             | <b>5,28,000</b>  | <b>13.20</b>    |
| Administrative overheads @ 200% of wages |                                                                                 | 3,20,000         | 8.00            |
|                                          | <b>Cost of Production</b>                                                       | <b>8,48,000</b>  | <b>21.20</b>    |
| Less: Closing stock                      | $[(8,48,000 \div 40,000) \times 4,000]$                                         | (84,800)         | -               |
|                                          | <b>Cost of Goods Sold</b>                                                       | <b>7,63,200</b>  | <b>21.20</b>    |
| Selling Expenses                         | $(36,000 \times 1)$                                                             | 36,000           | 1.00            |
|                                          | <b>Cost of Sales</b>                                                            | <b>7,99,200</b>  | <b>22.20</b>    |
| Profit (b.f.)                            |                                                                                 | 2,80,800         | 7.80            |
|                                          | <b>Sales (36,000 × 30)</b>                                                      | <b>10,80,000</b> | <b>30.00</b>    |

**Note:** Administrative overhead is specific to the product as it is directly related to direct labour as mentioned in the question and hence to be considered in cost of production only.

**PYQ 6**

The following data are available from the books and records of Q Ltd. for the month of April 2020:

|                    |   |                                       |
|--------------------|---|---------------------------------------|
| Direct Labour Cost | = | ₹1,20,000 (120% of Factory Overheads) |
| Cost of Sales      | = | ₹4,00,000                             |
| Sales              | = | ₹5,00,000                             |

**Accounts show the following figures:**

|                   | <b>1<sup>st</sup> April 2020</b> | <b>30<sup>th</sup> April 2020</b> |
|-------------------|----------------------------------|-----------------------------------|
| Raw materials     | 20,000                           | 25,000                            |
| Works in progress | 20,000                           | 30,000                            |
| Finished Goods    | 50,000                           | 60,000                            |

**Other details:**

|                                     |        |
|-------------------------------------|--------|
| Selling expenses                    | 22,000 |
| General and administration expenses | 18,000 |

**You are required to prepare a cost sheet for the month of April 2020 showing:**

- (1)** Prime Cost
- (2)** Works Cost
- (3)** Cost of Production
- (4)** Cost of Goods Sold
- (5)** Cost of Sales and Profit earned.

**[(10 Marks) Jan 2021]**

**Answer**

**Cost Sheet for the Month of April 2020**

| <b>Particulars</b>                       | <b>Amount</b>   |
|------------------------------------------|-----------------|
| Raw Materials Purchased (W.N.)           | 1,65,000        |
| Add: Opening stock of Raw Materials      | 20,000          |
| Less: Closing stock of Raw Materials     | (25,000)        |
| <b>Materials Consumed</b>                | <b>1,60,000</b> |
| Add: Direct Wages                        | 1,20,000        |
| <b>Prime Cost</b>                        | <b>2,80,000</b> |
| Add: Factory Overheads (1,20,000 ÷ 120%) | 1,00,000        |
| Add: Opening WIP                         | 20,000          |
| Less: Closing WIP                        | (30,000)        |
| <b>Works Cost/Cost of Production</b>     | <b>3,70,000</b> |
| Add: Opening Finished Goods              | 50,000          |
| Less: Closing Finished Goods             | (60,000)        |
| <b>Cost of Goods Sold</b>                | <b>3,60,000</b> |
| Add: General Administrative Expenses     | 18,000          |
| Add: Selling Expenses                    | 22,000          |
| <b>Cost of Sales</b>                     | <b>4,00,000</b> |
| Profit (b.f.)                            | 1,00,000        |
| <b>Sales</b>                             | <b>5,00,000</b> |

**Working Note:**

**Statement Showing Material Purchased**

| <b>Particulars</b>                    | <b>Amount</b>   |
|---------------------------------------|-----------------|
| <b>Cost of Sales</b>                  | <b>4,00,000</b> |
| Less: Selling Expenses                | 22,000          |
| Less: General Administrative Expenses | 18,000          |
| <b>Cost of Goods Sold</b>             | <b>3,60,000</b> |
| Add: Closing Finished Goods           | 60,000          |
| Less: Opening Finished Goods          | (50,000)        |

|                                |  |                 |
|--------------------------------|--|-----------------|
| <b>Works Cost</b>              |  | <b>3,70,000</b> |
| Add: Closing WIP               |  | 30,000          |
| Less: Opening WIP              |  | (20,000)        |
| <b>Gross Works Cost</b>        |  | <b>3,80,000</b> |
| Less: Factory Overheads        |  | (1,00,000)      |
| <b>Prime Cost</b>              |  | <b>2,80,000</b> |
| Less Direct Wages              |  | (1,20,000)      |
| <b>Raw Material Consumed</b>   |  | <b>1,60,000</b> |
| Add: Closing Raw Materials     |  | 25,000          |
| Less Opening Raw Materials     |  | (20,000)        |
| <b>Raw Materials Purchased</b> |  | <b>1,65,000</b> |

**PYQ 7**

The following data relates to manufacturing of a standard product during the month of March, 2021:

| <b>Particulars</b>                                  | <b>Amount (in ₹)</b> |
|-----------------------------------------------------|----------------------|
| Stock of Raw materials as on 01.03.2021             | 80,000               |
| Work in Progress as on 01.03.2021                   | 50,000               |
| Purchase of Raw material                            | 2,00,000             |
| Carriage Inwards                                    | 20,000               |
| Direct Wages                                        | 1,20,000             |
| Cost of special drawing                             | 30,000               |
| Hire charges paid for plant                         | 24,000               |
| Return of Raw material                              | 40,000               |
| Carriage on return                                  | 6,000                |
| Expenses for participation in Industrial exhibition | 8,000                |
| Legal charges                                       | 2,500                |
| Salary to office staff                              | 25,000               |
| Maintenance of office building                      | 2,000                |
| Depreciation of Delivery van                        | 6,000                |
| Warehousing charges                                 | 1,500                |
| Stock of Raw material as on 31.03.2021              | 30,000               |
| Stock of Work in Progress as on 31.03.2021          | 24,000               |

**Additional information:**

- (a) Stores overheads on materials are 10% of material consumed
- (b) Factory overheads are 20% of the Prime cost.
- (c) 10% of the output was rejected and sum of 5,000 was realised on the sale of scrap.
- (d) 10% of finished product was found to be defective and the defective products were rectified at an additional expenditure which is equivalent to 20% of proportionate direct wages.
- (e) The total output was 8,000 units during the month.

**You are required to prepare a Cost Sheet for the above period showing the:**

- (1) Cost of Raw material consumed
- (2) Prime Cost
- (3) Work Cost
- (4) Cost of Production
- (5) Cost of Sales

**[(10 Marks) July 2021]**

**Answer**

**Cost Sheet**  
**(for the Month ended at 31<sup>st</sup> March, 2021)**

| <b>Particulars</b> | <b>Amount (₹)</b> |
|--------------------|-------------------|
| Material Consumed: |                   |

|                                                                          |                 |
|--------------------------------------------------------------------------|-----------------|
| Raw materials purchased                                                  | 2,00,000        |
| Add: Carriage inward                                                     | 20,000          |
| Add: Opening stock of raw materials                                      | 80,000          |
| Less: Closing stock of raw materials                                     | (30,000)        |
| Less: Return of raw material                                             | (40,000)        |
|                                                                          | <b>2,30,000</b> |
| Direct Wages                                                             | 1,20,000        |
| Direct Expenses:                                                         |                 |
| Cost of special drawing                                                  | 30,000          |
| Hire charges paid for plant                                              | 24,000          |
| <b>Prime Cost</b>                                                        | <b>4,04,000</b> |
| Carriage on return                                                       | 6,000           |
| Add: Factory Overheads @ 20% of 4,04,000                                 | 80,800          |
| Add: Stores overheads @ 10% of 2,30,000                                  | 23,000          |
| Add: Cost of rectification of defective product (720 units × 20% of ₹15) | 2,160           |
| <b>Gross Factory Cost</b>                                                | <b>5,15,960</b> |
| Add: Opening value of WIP                                                | 50,000          |
| Less: Closing value of WIP                                               | (24,000)        |
| <b>Factory Cost</b>                                                      | <b>5,41,960</b> |
| Less: Sales of scrap                                                     | (5,000)         |
| <b>Cost of Production</b>                                                | <b>5,36,960</b> |
| Administrative Overheads:                                                |                 |
| Legal charges                                                            | 2,500           |
| Salary to office staff                                                   | 25,000          |
| Maintenance of office building                                           | 2,000           |
| Selling and Distribution Overheads:                                      |                 |
| Expenses for participation in Industrial exhibition                      | 8,000           |
| Warehousing charges                                                      | 1,500           |
| Depreciation on Delivery van                                             | 6,000           |
| <b>Cost of Sales</b>                                                     | <b>5,81,960</b> |

**Working note:**

|                            |   |                            |   |             |
|----------------------------|---|----------------------------|---|-------------|
| Calculation finished goods | = | 8,000 units – 10% rejected | = | 7,200 units |
| Defective units            | = | 10% of 7,200 units         | = | 720 units   |
| Wages cost per unit        | = | 1,20,000 ÷ 8,000           | = | 15 per unit |

**Note:** Alternatively hire charges for plant can be treated as indirect expenses and solution will be change accordingly.

**PYQ 8**

G Ltd. manufactures leather bags for office and school purposes. The following information is related with the production of leather bags for the month of September 2021.

- (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 ₹3,20,000 and ₹15,000 respectively. Freight paid on purchases is ₹8,500.
- (ii) Stitching and finishing need 2,000 man hours at ₹80 per hour.
- (iii) Other direct cost of ₹10 per labour hour is incurred.
- (iv) G has 4 machines at a total cost of ₹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 ₹45,000 and ₹72,000 respectively. G Ltd. pays ₹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 ₹18,000.

(vii) During the month 35 kg. of scrap (cuttings of leather and cotton) are sold at ₹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.

**You are required to prepare a cost sheet in respect of above for the month of September 2021 showing:**

1. Cost of Raw Material Consumed
2. Prime Cost
3. Works/Factory Cost
4. Cost of Production
5. Cost of Goods Sold
6. Cost of Sales

**[(10 Marks) Dec 2021]**

**Answer**

**Cost Sheet for the month of September 2021**

| Particulars                                                 | Total Cost      | Cost Per Unit |
|-------------------------------------------------------------|-----------------|---------------|
| Direct materials consumed:                                  |                 |               |
| Leather sheets                                              | 3,20,000        | 320.00        |
| Cotton cloths                                               | 15,000          | 15.00         |
| Add: Freight paid on purchase                               | 8,500           | 8.50          |
| <b>Cost of Raw Material Consumed</b>                        | <b>3,43,500</b> | <b>343.50</b> |
| Direct wages (₹80 × 2,000 hours)                            | 1,60,000        | 160.00        |
| Direct expenses (₹10 × 2,000 hours)                         | 20,000          | 20.00         |
| <b>Prime Cost</b>                                           | <b>5,23,500</b> | <b>523.50</b> |
| Factory overheads:                                          |                 |               |
| Depreciation on machines {(₹22,00,000×90%)÷120 months}      | 16,500          | 16.50         |
| Apportion cost of factory rent {(1,20,000 ÷ 2,400) × 1,960} | 98,000          | 98.00         |
| <b>Works Cost</b>                                           | <b>6,38,000</b> | <b>638.00</b> |
| Less: Realisable value of cuttings (₹150×35 kg.)            | (5,250)         | (5.25)        |
| <b>Cost of Production</b>                                   | <b>6,32,750</b> | <b>632.75</b> |
| Less: Closing stock of bags (100 bags × ₹632.75)            | (63,275)        | -             |
| <b>Cost of Goods Sold</b>                                   | <b>5,69,475</b> | <b>632.75</b> |
| Administrative Overheads:                                   |                 |               |
| Staff salary                                                | 45,000          | 50.00         |
| Apportioned rent {(1,20,000 ÷ 2,400) × 240}                 | 12,000          | 13.33         |
| Selling and Distribution Overheads:                         |                 |               |
| Staff salary                                                | 72,000          | 80.00         |
| Apportioned rent {(1,20,000 ÷ 2,400) × 200}                 | 10,000          | 11.11         |
| Freight paid on delivery of bags                            | 18,000          | 20.00         |
| <b>Cost of Sales</b>                                        | <b>7,26,475</b> | <b>807.19</b> |

**Working Note:**

1. Factory space = Total space – space occupied by Administrative and Sales office  
= 2,400 - 240 - 200 = 1,960 sq. feet
2. Units Produced = Main input raw material used ÷ Main material consumption for 1 unit output  
= 2,000 meter leather ÷ 2 meter = 1,000 bags
3. Units sold = Units produced – Closing units  
= 1,000 – 100 = 900 bags

**PYQ 9**

**COST SHEET & UNIT COSTING 4.30**

The following data are available from the books and records of A Ltd. for the month of April 2022:

| <b>Particulars</b>                                                | <b>Amount</b> |
|-------------------------------------------------------------------|---------------|
| Stock of raw materials on 1 <sup>st</sup> April 2022              | 10,000        |
| Raw materials purchased                                           | 2,80,000      |
| Manufacturing wages                                               | 70,000        |
| Depreciation on plant                                             | 15,000        |
| Expenses paid for quality control check activities                | 4,000         |
| Lease Rent of Production Assets                                   | 10,000        |
| Administrative Overheads (Production)                             | 15,000        |
| Expenses paid for pollution control and engineering & maintenance | 1,000         |
| Stock of raw materials on 30 <sup>th</sup> April 2022             | 40,000        |
| Primary packing cost                                              | 8,000         |
| Research & development cost (Process related)                     | 5,000         |
| Packing cost for redistribution of finished goods                 | 1,500         |
| Advertisement expenses                                            | 1,300         |

Stock of finished goods as on 1<sup>st</sup> April 2022 was 200 units having a total cost of ₹28,000. The entire opening stock of finished goods has been sold during the month.

Production during the month of April, 2022 was 3,000 units. Closing stock of finished goods as on 30<sup>th</sup> April, 2022 was 400 units.

**You are required to:**

**(1) Prepare a Cost Sheet for the above period showing the:**

- (a)** Cost of Raw Material consumed
- (b)** Prime Cost
- (c)** Factory Cost
- (d)** Cost of Production
- (e)** Cost of goods sold
- (f)** Cost of Sales

**(2)** Calculate selling price per unit, if sale is made at a profit of 20% on sales.

**[(10 Marks) May 2022]**

**Answer**

**(1) Cost Sheet**

| <b>Particulars</b>                                                | <b>Amount</b>   |
|-------------------------------------------------------------------|-----------------|
| Raw Materials Purchased                                           | 2,80,000        |
| Add: Opening stock of Raw Materials                               | 10,000          |
| Less: Closing stock of Raw Materials                              | (40,000)        |
| <b>Materials Consumed</b>                                         | <b>2,50,000</b> |
| Add: Direct Wages                                                 | 70,000          |
| <b>Prime Cost</b>                                                 | <b>3,20,000</b> |
| Add: Factory Overheads:                                           |                 |
| Depreciation on plant                                             | 15,000          |
| Lease Rent of Production Assets                                   | 10,000          |
| Expenses paid for pollution control and engineering & maintenance | 1,000           |
| <b>Factory Cost</b>                                               | <b>3,46,000</b> |
| Add: Expenses paid for quality control check activities           | 4,000           |
| Add: Research and Development Cost                                | 5,000           |
| Add: Administration Overheads (Production)                        | 15,000          |
| Add: Primary Packing Cost                                         | 8,000           |
| <b>Cost of Production</b>                                         | <b>3,78,000</b> |
| Add: Opening Finished Goods                                       | 28,000          |
| Less: Closing Finished Goods [(3,78,000 ÷ 3,000) × 400]           | (50,400)        |

|                                                        |                 |
|--------------------------------------------------------|-----------------|
| <b>Cost of Goods Sold</b>                              | <b>3,55,600</b> |
| Add: Administrative Expenses                           | 1,300           |
| Add: Packing cost for redistribution of finished goods | 1,500           |
| <b>Cost of Sales</b>                                   | <b>3,58,400</b> |

**(2) Selling Price per unit:**

|                        |   |                                                          |   |            |
|------------------------|---|----------------------------------------------------------|---|------------|
| Cost per unit          | = | $3,58,400 \div 2,800 \text{ units } (200 + 3,000 - 400)$ | = | 128        |
| Selling price per unit | = | $128 \div 80\%$                                          | = | <b>160</b> |

**PYQ 10**

PNME Ltd. manufactures two types of masks- 'Disposable Masks' and 'Cloth Masks'. The cost data for the year ended 31<sup>st</sup> March, 2022 is as follows:

|                      |                   |
|----------------------|-------------------|
| Direct Materials     | ₹12,50,000        |
| Direct Wages         | ₹7,00,000         |
| Production Overheads | ₹4,00,000         |
| <b>Total</b>         | <b>₹23,50,000</b> |

**It is further ascertained that:**

- Direct materials cost per unit of Cloth Mask was twice as much of Direct materials cost per unit of Disposable Mask.
- Direct wages per unit for Disposable Mask were 60% of those for Cloth Mask.
- Production overhead per unit was at same rate for both the types of the masks.
- Administration overhead was 50% of Production overhead for each type of mask.
- Selling cost was ₹ 2 per Cloth Mask.
- Selling Price was ₹ 35 per unit Cloth Mask.
- No. of units of Cloth Masks sold - 45,000
- No. of units of Production of
 

|                  |   |          |
|------------------|---|----------|
| Cloth Masks      | : | 50,000   |
| Disposable Masks | : | 1,50,000 |

**You are required to prepare a cost sheet for Cloth Masks showing:**

- (a) Cost per unit and Total cost,  
 (b) Profit per unit and Total Profit.

**[(10 Marks) Nov 2022]**

**Answer**

**PNME Ltd.**  
**Cost Sheet for the year ending 31.03.2022**

| <b>Particulars</b>                                     |                                                                                 | <b>Cloth Mask</b> |                 |
|--------------------------------------------------------|---------------------------------------------------------------------------------|-------------------|-----------------|
|                                                        |                                                                                 | <b>Total</b>      | <b>Per unit</b> |
| Direct Materials                                       | $[(12,50,000 \div 50,000 \times 2 + 1,50,000 \times 1) \times 50,000 \times 2]$ | 5,00,000          | 10.00           |
| Direct Labour                                          | $[(7,00,000 \div 50,000 \times 1 + 1,50,000 \times .6) \times 50,000 \times 1]$ | 2,50,000          | 5.00            |
|                                                        | <b>Prime Cost</b>                                                               | <b>7,50,000</b>   | <b>15.00</b>    |
| Production OH                                          | $[(4,00,000 \div 50,000 \times 1 + 1,50,000 \times 1) \times 50,000 \times 1]$  | 1,00,000          | 2.00            |
|                                                        | <b>Factory Cost</b>                                                             | <b>8,50,000</b>   | <b>17.00</b>    |
| Administrative overheads @ 50% of production overheads |                                                                                 | 50,000            | 1.00            |
|                                                        | <b>Cost of Production</b>                                                       | <b>9,00,000</b>   | <b>18.00</b>    |
| Less: Closing stock                                    | $[(9,00,000 \div 50,000) \times 5,000]$                                         | (90,000)          | -               |
|                                                        | <b>Cost of Goods Sold</b>                                                       | <b>8,10,000</b>   | <b>18.00</b>    |
| Selling Expenses                                       | $(45,000 \times 2)$                                                             | 90,000            | 2.00            |
|                                                        | <b>Cost of Sales</b>                                                            | <b>9,00,000</b>   | <b>20.00</b>    |
| Profit (b.f.)                                          |                                                                                 | 6,75,000          | 15.00           |
|                                                        | <b>Sales (45,000 × 35)</b>                                                      | <b>15,75,000</b>  | <b>35.00</b>    |

**Note:** Administrative overhead is specific to the product as it is directly related to production overheads as mentioned in the question and hence to be considered in cost of production only.

**PYQ 11**

The following information is available from SN Manufacturing Limited's books for the month of April 2023.

|                                                                                        | April 1     | April 30  |
|----------------------------------------------------------------------------------------|-------------|-----------|
| <b>Opening and closing inventories data:</b>                                           |             |           |
| Stock of finished goods                                                                | 2,500 units | ?         |
| Stock of raw materials                                                                 | ₹42,500     | ₹38,600   |
| Work-in-progress                                                                       | ₹42,500     | ₹42,800   |
| <b>Other data are:</b>                                                                 |             |           |
| Raw materials purchased                                                                |             | ₹6,95,000 |
| Carriage inward                                                                        |             | ₹36,200   |
| Direct wages paid                                                                      |             | ₹3,22,800 |
| Royalty paid for production                                                            |             | ₹35,800   |
| Purchase of special designs, moulds and patterns (estimated life 12 production cycles) |             | ₹1,53,600 |
| Power, fuel and haulage (factory)                                                      |             | ₹70,600   |
| Research and development costs for improving the production process (amortized)        |             | ₹31,680   |
| Primary packing cost (necessary to maintain quality)                                   |             | ₹6,920    |
| Administrative overhead                                                                |             | ₹46,765   |
| Salary and wages for supervisor and foremen                                            |             | ₹28,000   |

**Other Information:**

- Opening stock of finished goods is to be valued at ₹8.05 per unit.
- During the month of April, 1,52,000 units were produced and 1,52,600 units were sold. The closing stock of finished goods is to be valued at the relevant month's cost of production. The company follows the FIFO method.
- Selling and distribution expenses are to be charged at 20 paisa per unit.
- Assume that one production cycle completed in one month.

**Required:**

- (1) Prepare a cost sheet for the month ended on April 30, 2023, showing the various elements of cost (raw material consumed, prime cost, factory cost, cost of production, cost of goods sold, and cost sales.)
- (2) Calculate the selling price per unit if profit is charged at 20 percent on sales.

**[(10 Marks) May 2023]**

**Answer****(1) Cost Sheet of SN Manufacturing Ltd.**

| Particulars                                            | Amount (₹) | Amount (₹)       |
|--------------------------------------------------------|------------|------------------|
| Raw material consumed:                                 |            |                  |
| Raw materials purchased                                | 6,95,000   |                  |
| Add: Carriage inward                                   | 36,200     |                  |
| Add: Opening stock of raw materials                    | 42,500     |                  |
| Less: Closing stock of raw materials                   | (38,600)   | 7,35,100         |
| Direct wages                                           |            | 3,22,800         |
| Direct expenses:                                       |            |                  |
| Royalty paid for production                            | 35,800     |                  |
| Special designs, moulds and patterns (1,53,600 × 1/12) | 12,800     |                  |
| Power, fuel and haulage                                | 70,600     | 1,19,200         |
| <b>Prime Cost</b>                                      |            | <b>11,77,100</b> |
| Factory overheads:                                     |            |                  |
| Salary and wages for supervisor and foremen            |            | 28,000           |
| Add: Opening value of WIP                              |            | 42,500           |

**COST SHEET & UNIT COSTING 4.33**

|                                                                       |        |                  |
|-----------------------------------------------------------------------|--------|------------------|
| Less: Closing value of WIP                                            |        | (42,800)         |
| <b>Factory Cost</b>                                                   |        | <b>12,04,800</b> |
| Research & development cost for improvement in production process     | 31,680 |                  |
| Primary packing cost                                                  | 6,920  | 38,600           |
| <b>Cost of Production</b>                                             |        | <b>12,43,400</b> |
| Add: Opening stock of finished goods (2,500 units × 8.05)             |        | 20,125           |
| Less: Closing stock of finished goods (12,43,400 ÷ 1,52,000) × *1,900 |        | (15,542)         |
| <b>Cost of Goods Sold</b>                                             |        | <b>12,47,983</b> |
| Administrative Overheads                                              |        | 46,765           |
| Selling and Distribution Overheads (1,52,600 × 0.20)                  |        | 30,520           |
| <b>Cost of Sales</b>                                                  |        | <b>13,25,268</b> |

$$\begin{aligned}
 \text{*Closing Stock Units} &= \text{Opening Units} + \text{Produced Units} - \text{Units Sold} \\
 &= 2,500 + 1,52,000 - 1,52,600 = 1,900 \text{ units}
 \end{aligned}$$

**(2) Sale Price Per unit:**

$$\begin{aligned}
 \text{Cost per unit} &= 13,25,268 \div 1,52,600 = 8.6846 \\
 \text{Sale Price per unit} &= 8.6846 \div 80\% = \text{₹10.86}
 \end{aligned}$$

# SUGGESTED REVISION

| <b>Ques. No.</b>                                                                                   | <b>Observations or KEY Points<br/>(Note down during revisions)</b> | <b>Page No. of<br/>Practical<br/>Register</b> | <b>1<sup>st</sup> &amp; 2<sup>nd</sup><br/>Revision</b> | <b>3<sup>rd</sup>, 4<sup>th</sup> &amp;<br/>5<sup>th</sup><br/>Revision</b> | <b>Revision<br/>during<br/>Exams</b> |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------|
| <b>BQ (Book Questions covering Study Module of ICAI, PM, RTP's, MTP's and Important Questions)</b> |                                                                    |                                               |                                                         |                                                                             |                                      |
| <b>1</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>2</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>3</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>4</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>5</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>6</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>7</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>8</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>9</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>10</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>11</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>12</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>13</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>14</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>15</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>16</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>17</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>18</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>19</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>20</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>21</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>22</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>23</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>24</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>PYQ (Past Year Questions)</b>                                                                   |                                                                    |                                               |                                                         |                                                                             |                                      |
| <b>1</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>2</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>3</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>4</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>5</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>6</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>7</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>8</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>9</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>10</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>11</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |

# ***CHAPTER - 5***

## ***JOB AND BATCH COSTING***

### ***LEARNING OUTCOMES***

***When you have finished studying this chapter, you should be able to:***

- ***Understand Job Costing methods and Batch Costing methods.***
- ***Understand the difference between job costing and batch costing.***
- ***Understand the concept of cost per job and cost per batch.***
- ***Understand the method of computation of sales price or quotation per job and per batch and per unit under the batch.***
- ***Understand the concept of Economic Batch Quantity.***



**JOB COSTING****BQ 1**

From the following particulars, prepare the Cost Sheet for Job No.75 and find out the value of the job:

|                              |        |
|------------------------------|--------|
| Materials issued for the job | ₹6,000 |
| Productive Wages             | ₹4,600 |
| Direct Expenses              | ₹500   |

Provide 60% on productive wages for works on cost (works overheads) and 12 ½% on works cost for office on cost (office overheads). Profit to be realised on the selling price 15%.

**Answer****Cost Sheet for Job No.75**

| Particulars                             | Amount           |
|-----------------------------------------|------------------|
| Materials                               | 6,000.00         |
| Productive Wages                        | 4,600.00         |
| Direct Expenses                         | 500.00           |
| <b>Prime Cost</b>                       | <b>11,100.00</b> |
| Works on cost (60% of productive wages) | 2,760.00         |
| <b>Works Cost</b>                       | <b>13,860.00</b> |
| Office on Cost (12½ % on works cost)    | 1,732.50         |
| <b>Cost of Production</b>               | <b>15,592.50</b> |
| Profit (15% on sales)                   | 2,751.62         |
| <b>Sales (15,592.50 ÷ 85%)</b>          | <b>18,344.12</b> |

**BQ 2**

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 10kg @ ₹10 per kg   |
| Direct labour 20 hours @ ₹5 per hour |

Variable production overheads are recovered at the rate of ₹2 per labour hour. Fixed production overheads for the company are budgeted to be ₹1,00,000 each year and are recovered on the basis of labour hours. There are 10,000 budgeted labour hours each year. Other cost in relation to selling, distribution and administration are recovered at the rate of ₹50 per job.

**Determine quote for the job by the company.**

**Answer****Budgeted Job Cost Sheet**

| Particulars                                        | Amount     |
|----------------------------------------------------|------------|
| Direct Materials (10 kg × ₹10)                     | 100        |
| Direct Labour (20 hours × ₹5)                      | 100        |
| <b>Prime Cost</b>                                  | <b>200</b> |
| Production Overheads:                              |            |
| Variable overheads (20 hours × ₹2)                 | 40         |
| Fixed Overheads [(1,00,000 ÷ 10,000) × 20]         | 200        |
| <b>Factory Cost</b>                                | <b>440</b> |
| Selling, Distribution and Administration Overheads | 50         |
| <b>Cost of Production</b>                          | <b>490</b> |
| Profit (30% on sales)                              | 210        |
| <b>Quoted Price for Job (490 ÷ 70%)</b>            | <b>700</b> |

**BQ 3**

Hancock receives an order to supply his local farmer with a delivery of cattle feed. The job passes through three departments and collecting costs as follows:

|                                     |                                                                                                                                 |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Mixing Department                   | 100 kg of Owen at ₹2 per kg<br>50 kg of Howe at ₹1 per kg<br>20 kg of Benn at ₹0.50 per kg<br>10 hours of labour at ₹4 per hour |
| Boiling Department                  | 20 hours of labour at ₹3 per hour<br>60 hours of the boiling machine                                                            |
| Cooling and skimming Department     | 50 hours of labour at ₹2 per hour                                                                                               |
| Hire of giant thermometer and scoop | ₹200                                                                                                                            |

**The job does not disrupt normal activity levels, which are as follows:**

| Department | Labour Hours | Machine Hours | Budgeted OH |
|------------|--------------|---------------|-------------|
| Mixing     | 200          | -             | ₹1,600      |
| Boiling    | 250          | 700           | ₹9,100      |
| Cooling    | 550          | -             | ₹4,950      |

**Basis of absorption:**

|                    |   |               |
|--------------------|---|---------------|
| Mixing Department  | : | Labour hours  |
| Boiling Department | : | Machine hours |
| Cooling Department | : | Labour hours  |

Selling and administrative expenses are 30% of factory cost.

**You are required to prepare a statement showing the profit or loss on the job, if the price agreed is ₹2,500.**

**[Loss ₹61]**

**BQ 4**

A factory used job costing. The following cost data is obtained from its books for the year ended 31<sup>st</sup> December 2022:

|                                  |          |
|----------------------------------|----------|
| Direct materials                 | 9,00,000 |
| Direct wages                     | 7,50,000 |
| Selling & distribution overheads | 5,25,000 |
| Administrative overheads         | 4,20,000 |
| Factory overheads                | 4,50,000 |
| Profit                           | 6,09,000 |

- (a) Prepare a job sheet indicating the Prime cost, Work cost, Cost of production, Cost of sales & the Sales value.
- (b) In 2023, the factory receives an order for a number of jobs. It is estimated that direct materials required will be ₹12,00,000 and direct labour will cost ₹7,50,000. What should be the price for the jobs if the factory intends to earn the same rate of profit on sales assuming that the selling and distribution overheads have gone by up by 15%? The factory recovers factory overheads as a percentage of direct wages and administration & selling and distribution overheads as a percentage of works cost, based on cost rates prevailing in the previous year.

**Answer**

**(a) Cost sheet for the year ending on 31.12.2022**

| Particulars     | Amount   |
|-----------------|----------|
| Direct material | 9,00,000 |
| Direct wages    | 7,50,000 |

|                                   |                                       |                  |
|-----------------------------------|---------------------------------------|------------------|
|                                   | <b>Prime cost</b>                     | <b>16,50,000</b> |
| Factory overhead                  |                                       | 4,50,000         |
|                                   | <b>Works cost/ Cost of production</b> | <b>21,00,000</b> |
| Administration overhead           |                                       | 4,20,000         |
| Selling and distribution overhead |                                       | 5,25,000         |
|                                   | <b>Cost of sales</b>                  | <b>30,45,000</b> |
| Profit                            |                                       | 6,09,000         |
|                                   | <b>Sales value</b>                    | <b>36,54,000</b> |

**Working Notes:**

1. % of Factory OH to direct wages =  $(4,50,000/7,50,000) \times 100 = 60\%$
2. % of Administration OH to works cost =  $(4,20,000/21,00,000) \times 100 = 20\%$
3. % of Selling & distribution OH to works cost =  $(5,25,000/21,00,000) \times 100 = 25\%$
4. % of Profit to sales =  $(6,09,000/36,54,000) \times 100 = 16.67\%$

**(b) Cost Sheet for the job order in 2023**

| <b>Particulars</b>                                          | <b>Amount</b>                           |
|-------------------------------------------------------------|-----------------------------------------|
| Direct material                                             | 12,00,000                               |
| Direct wages                                                | 7,50,000                                |
|                                                             | <b>Prime cost</b>                       |
| Factory overhead (60% on direct wages)                      | 4,50,000                                |
|                                                             | <b>Works cost/ Cost of production</b>   |
| Administration overhead (20% on works cost)                 | 4,80,000                                |
| Selling and distribution overhead (25% on works cost + 15%) | 6,90,000                                |
|                                                             | <b>Cost of sales</b>                    |
| Profit (16.6.7% on sales or 20% on cost of sales)           | 7,14,000                                |
|                                                             | <b>Sales value (35,70,000 ÷ 83.33%)</b> |
|                                                             | <b>42,84,000</b>                        |

**BQ 5**

A factory used job costing system. The following data are obtained from its books for the year ended 31<sup>st</sup> December 2022:

|                                  |           |
|----------------------------------|-----------|
| Direct materials                 | 18,00,000 |
| Direct wages                     | 15,00,000 |
| Selling & distribution overheads | 10,50,000 |
| Administrative overheads         | 8,40,000  |
| Factory overheads                | 9,00,000  |
| Profit                           | 12,18,000 |

- (a) Prepare a job sheet indicating the Prime cost, Work cost, Cost of production, Cost of sales & the Sales value.
- (b) In 2023, the factory receives an order for a number of jobs. It is estimated that direct materials required will be ₹4,80,000 and direct labour will cost ₹3,00,000. Determine what should be the price for the job if the factory intends to earn the same rate of profit on sales assuming that the selling and distribution overheads have gone by up by 15%. The factory recovers factory overheads as a percentage of direct wages paid, whereas other overheads as a percentage of cost of production, based on cost rates prevailing in the previous year.

**Answer**

**(a) Cost sheet for the year ending on 31.12.2022**

| <b>Particulars</b> | <b>Amount</b>     |
|--------------------|-------------------|
| Direct material    | 18,00,000         |
| Direct wages       | 15,00,000         |
|                    | <b>Prime cost</b> |
| Factory overhead   | 9,00,000          |

**JOB AND BATCH COSTING 5.4**

|                                   |                                       |                  |
|-----------------------------------|---------------------------------------|------------------|
|                                   | <b>Works cost/ Cost of production</b> | <b>42,00,000</b> |
| Administration overhead           |                                       | 8,40,000         |
| Selling and distribution overhead |                                       | 10,50,000        |
|                                   | <b>Cost of sales</b>                  | <b>60,90,000</b> |
| Profit                            |                                       | 12,18,000        |
|                                   | <b>Sales value</b>                    | <b>73,08,000</b> |

**Working Notes:**

1. % of Factory OH to direct wages =  $(9,00,000/15,00,000) \times 100 = 60\%$
2. % of Administration OH to Cost of production =  $(8,40,000/42,00,000) \times 100 = 20\%$
3. % of Selling & dist. OH to Cost of production =  $(10,50,000/42,00,000) \times 100 = 25\%$
4. % of Profit to sales =  $(12,18,000/73,08,000) \times 100 = 16.67\%$

**(b) Cost Sheet for the job order in 2023**

| <b>Particulars</b>                                                  | <b>Amount</b>                           |
|---------------------------------------------------------------------|-----------------------------------------|
| Direct material                                                     | 4,80,000                                |
| Direct wages                                                        | 3,00,000                                |
|                                                                     | <b>Prime cost</b>                       |
|                                                                     | <b>7,80,000</b>                         |
| Factory overhead (60% on direct wages)                              | 1,80,000                                |
|                                                                     | <b>Works cost/ Cost of production</b>   |
|                                                                     | <b>9,60,000</b>                         |
| Administration overhead (20% on Cost of production)                 | 1,92,000                                |
| Selling and distribution overhead (25% on Cost of production + 15%) | 2,76,000                                |
|                                                                     | <b>Cost of sales</b>                    |
|                                                                     | <b>14,28,000</b>                        |
| Profit (16.67% on sales or 20% on cost of sales)                    | 2,85,600                                |
|                                                                     | <b>Sales value (14,28,000 ÷ 83.33%)</b> |
|                                                                     | <b>17,13,600</b>                        |

**BQ 6**

A shop floor supervisor of a small factory presented the following cost for Job No. 303, to determine the selling price:

| <b>Particulars</b>                                                    | <b>Per Unit</b> |
|-----------------------------------------------------------------------|-----------------|
| Materials                                                             | 70              |
| Direct wages 18 hours @ 2.50 per hour                                 | 45              |
| (Department X 8 hours; department Y 6 hours and department Z 4 hours) |                 |
| Chargeable expenses (stores)                                          | 5               |
|                                                                       | 120             |
| Overheads @ 33⅓%                                                      | 40              |
|                                                                       | <b>160</b>      |
| <b>Cost</b>                                                           |                 |

**Analysis of the profit and loss account for the year 2022:**

| <b>Particulars</b>        | <b>Amount</b>   | <b>Particulars</b>   | <b>Amount</b>   |
|---------------------------|-----------------|----------------------|-----------------|
| Materials                 | 1,50,000        | Sales net of returns | 2,50,000        |
| Direct wages:             |                 |                      |                 |
| Department X 10,000       |                 |                      |                 |
| Department Y 12,000       |                 |                      |                 |
| Department Z <u>8,000</u> | 30,000          |                      |                 |
| Stores expenses           | 4,000           |                      |                 |
| Overheads:                |                 |                      |                 |
| Department X 5,000        |                 |                      |                 |
| Department Y 9,000        |                 |                      |                 |
| Department Z <u>2,000</u> | 16,000          |                      |                 |
| Selling expenses          | 20,000          |                      |                 |
| Gross profit              | 30,000          |                      |                 |
|                           | <b>2,50,000</b> |                      | <b>2,50,000</b> |

It is 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 showing revised cost using 2022 actual figures as basis and add 20% to total cost to determine selling price.**

**[Selling Price ₹189.76]**

### **BQ 7**

In a factory following the job costing method, an abstract from the work in process as at 30<sup>th</sup> September was prepared as under:

| <b>Job no.</b> | <b>Materials cost</b> | <b>Labour hours</b> | <b>Labour cost</b> | <b>Factory OH Applied</b> |
|----------------|-----------------------|---------------------|--------------------|---------------------------|
| 115            | 1,325                 | 400                 | 800                | 640                       |
| 118            | 810                   | 250                 | 500                | 400                       |
| 120            | 765                   | 300                 | 475                | 380                       |
| <b>Total</b>   | <b>2,900</b>          | <b>950</b>          | <b>1,775</b>       | <b>1,420</b>              |

**Materials used in October were as follows:**

| <b>Material Requisition</b> | <b>Job No.</b> | <b>Cost</b>  |
|-----------------------------|----------------|--------------|
| 54                          | 118            | 300          |
| 55                          | 118            | 425          |
| 56                          | 118            | 515          |
| 57                          | 120            | 665          |
| 58                          | 121            | 910          |
| 59                          | 124            | 720          |
|                             |                | <b>3,535</b> |

**A summary of Labour Hours deployed during October is as under:**

| <b>Job No.</b>       | <b>Numbers of hours</b> |               |
|----------------------|-------------------------|---------------|
|                      | <b>Shop A</b>           | <b>Shop B</b> |
| 115                  | 25                      | 25            |
| 118                  | 90                      | 30            |
| 120                  | 75                      | 10            |
| 121                  | 65                      | -             |
| 124                  | 20                      | 10            |
| Indirect labour:     |                         |               |
| Waiting for Material | 120                     | 10            |
| Machine breakdown    | 10                      | 5             |
| Idle time            | 5                       | 6             |
| Overtime Premium     | 6                       | 5             |

A shop credit slip was issued in October that material issued under requisition no. 54 was returned back to stores as being not suitable. A material transfer note issued in October indicated that material issued under requisition no. 55 for Job 118 was directed to Job 124.

The hourly rate in Shop A per labour is ₹3 per hour while at Shop B it is ₹2 per hour. The factory overhead is applied at the same rate as in September. Jobs 115, 118 and 120 were completed in October.

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?

**You are asked to compute the factory cost of the completed jobs.**

**[Job 115: ₹3,946.80; Job 118: ₹3,721.08; Job 120: ₹3,598.32]**

**BQ 8**

A Ltd. is an engineering manufacturing company producing job orders on the basis of specifications provided by the customers. During the last month it has completed three jobs namely A, B and C. The following are the items of expenditure which are included in addition to direct material and direct employee cost:

- (a) Office and administration cost: ₹6,00,000
- (b) Product blueprint cost for job A: ₹2,80,000
- (c) Hire charges paid for machinery used in job work B: ₹80,000
- (d) Salary to office attendants: ₹1,00,000
- (e) One time license fee paid for software used to make computerized graphics for job C: ₹1,00,000
- (f) Salary paid to marketing manager: ₹2,40,000

**Calculate direct expenses related to each Job.**

**Answer**

**Calculation of Direct Expenses**

| <b>Particulars</b>              | <b>Job A (₹)</b> | <b>Job B (₹)</b> | <b>Job C (₹)</b> |
|---------------------------------|------------------|------------------|------------------|
| Product blueprint cost          | 2,80,000         | -                | -                |
| Hire charges paid for machinery | -                | 80,000           | -                |
| License fee paid for software   | -                | -                | 1,00,000         |
| <b>Total Direct Expenses</b>    | <b>2,80,000</b>  | <b>80,000</b>    | <b>1,00,000</b>  |

**BQ 9**

Mayur Engineering engaged in job work, has completed all jobs in hand on 30<sup>th</sup> December, 2022 except Job No. 447, showed direct materials and direct labour costs of ₹40,000 and ₹30,000 respectively as having been incurred on Job No.447.

The costs incurred by the business on 31<sup>st</sup> December, 2022, the last day of the accounting year, were as follows:

|                            |        |                                |        |
|----------------------------|--------|--------------------------------|--------|
| Direct Materials (Job 447) | ₹2,000 | Direct Labour (Job 447)        | ₹8,000 |
| Indirect Labour            | ₹2,000 | Miscellaneous Factory Overhead | ₹3,000 |

It is the practice of business to make the jobs absorb factory overheads on the basis of 120% of direct labour cost.

**Calculate the value of work-in-progress of Job No.447 on 31<sup>st</sup> December, 2022.**

**Answer**

**Value of Work-In-Progress of Job No.447 as on 31<sup>st</sup> December, 2022:**

|                                   |                  |
|-----------------------------------|------------------|
| Direct Materials (40,000 + 2,000) | ₹42,000          |
| Direct Labour (30,000 + 8,000)    | ₹38,000          |
| Factory Overhead (120% of 38,000) | ₹45,600          |
| <b>Value of closing WIP</b>       | <b>₹1,25,600</b> |

**BQ 10**

Job No. 198 was commenced on October 10, 2022 and completed on November 1, 2022. Materials used were ₹600 and labour charged directly to the job was ₹400.

**Other information is as follows:**

|                                                           |   |                                        |
|-----------------------------------------------------------|---|----------------------------------------|
| Machine No. 215 used for 40 hours                         | : | machine hour rate being ₹3.50          |
| Machine No. 160 used for 30 hours                         | : | machine hour rate being ₹4.00          |
| 6 welders worked on the job for five days of 8 hours each | : | Direct labour hour per welder is ₹0.20 |

Expenses not included for calculating the machine hour or direct labour hour rate totalled ₹2,000, total direct wages for the period being ₹20,000.

**Ascertain the works costs of job No. 198.**

**Answer****Statement Showing Works Cost of Job No. 198**

| <b>Particulars</b>                    | <b>Amount</b> |
|---------------------------------------|---------------|
| Material                              | 600           |
| Direct labour                         | 400           |
| <b>Prime cost</b>                     | <b>1,000</b>  |
| Factory overhead:                     |               |
| Machine No. 215 : 40 hours @ ₹3.50    | 140           |
| Machine No. 160 : 30 hours @ ₹4.00    | 120           |
| 240 hours of welders @ ₹0.20 per hour | 48            |
| General 10% of wages                  | 40            |
| <b>Works Cost</b>                     | <b>1,348</b>  |

**Working notes:**

- 6 welders × 5 days × 8 hours = 240 hours
- Unapportioned expenses (General overheads) ₹2,000 which works out at 10% of direct wages.

**BQ 11**

AP Ltd. received a job order for supply and fitting of plumbing materials. Following are the details related with the job work:

**Direct Materials:**

AP Ltd. uses a weighted average method for the pricing of materials issues.

Opening stock of materials as on 12<sup>th</sup> August 2020:

15mm GI Pipe, 12 units of (15 feet size) @ ₹600 each  
 20mm GI Pipe, 10 units of (15 feet size) @ ₹ 660 each  
 Other fitting materials, 60 units @ ₹ 26 each  
 Stainless Steel Faucet, 6 units @ ₹ 204 each  
 Valve, 8 units @ ₹ 404 each

**Purchases:**

On 16<sup>th</sup> August 2020:

20mm GI Pipe, 30 units of (15 feet size) @ ₹ 610 each  
 10 units of Valve @ ₹ 402 each

On 18<sup>th</sup> August 2020:

Other fitting materials, 150 units @ ₹ 28 each  
 Stainless Steel Faucet, 15 units @ ₹ 209 each

On 27<sup>th</sup> August 2020:

15mm GI Pipe, 35 units of (15 feet size) @ ₹ 628 each  
 20mm GI Pipe, 20 units of (15 feet size) @ ₹ 660 each  
 Valve, 14 units @ ₹ 424 each

**Issues for the hostel job:**

On 12<sup>th</sup> August 2020:

20mm GI Pipe, 2 units of (15 feet size)  
 Other fitting materials, 18 units

On 17<sup>th</sup> August 2020:

15mm GI Pipe, 8 units of (15 feet size)  
 Other fitting materials, 30 units

On 28<sup>th</sup> August 2020:

20mm GI Pipe, 2 units of (15 feet size)  
 15mm GI Pipe, 10 units of (15 feet size)



Other fitting materials, 34 units  
Valve, 6 units

On 30<sup>th</sup> August 2020:

Other fitting materials, 60 units  
Stainless Steel Faucet, 15 units

**Direct Labour:**

Plumber: 180 hours @ ₹100 per hour (includes 12 hours overtime)  
Helper: 192 hours @ ₹70 per hour (includes 24 hours overtime)  
Overtimes are paid at 1.5 times of the normal wage rate.

**Overheads:** Overheads are applied @ ₹26 per labour hour.

**Pricing policy:** It is company's policy to price all orders based on achieving a profit margin of 25% on sales price.

**You are required to:**

- (a) Calculate the total cost of the job.  
(b) Calculate the price to be charged from the customer.

**Answer**

**(a) Statement Showing Total Cost of the Job**

| Particulars                                                                                             | Amount           |
|---------------------------------------------------------------------------------------------------------|------------------|
| Direct material cost:                                                                                   |                  |
| 15mm GI Pipe (WN 1)                                                                                     | 11,051.28        |
| 20mm GI Pipe (WN 2)                                                                                     | 2,588.28         |
| Other fitting materials (WN 3)                                                                          | 3,866.07         |
| Stainless steel faucet $[(6 \times 204 + 15 \times 209) \div 21 \text{ units}] \times 15 \text{ units}$ | 3,113.57         |
| Valve $[(8 \times 404 + 10 \times 402 + 14 \times 424) \div 32 \text{ units}] \times 6 \text{ units}$   | 2,472.75         |
| Direct wages                                                                                            |                  |
| Plumber $[(180 \text{ hours} \times ₹100) + (12 \text{ hours} \times ₹50)]$                             | 18,600           |
| Helper $[(192 \text{ hours} \times ₹70) + (24 \text{ hours} \times ₹35)]$                               | 14,280           |
| Overheads $[₹26 \times (180 + 192) \text{ hours}]$                                                      | 9,672            |
| <b>Total Cost</b>                                                                                       | <b>65,643.95</b> |

(b) **Price to be charged** = Total Cost + 25% Profit on Job Price  
=  $65,643.95 \div 75\%$  = **₹87,525.27**

**Working Notes:**

**1. Cost of 15mm GI Pipe:**

| Date     | Calculation                                                                                                      | Amount (₹)       |
|----------|------------------------------------------------------------------------------------------------------------------|------------------|
| 17.08.20 | 8 units $\times$ ₹600                                                                                            | 4,800            |
| 28.07.20 | $\{(4 \text{ units} \times ₹600 + 35 \text{ units} \times ₹628) \div 39 \text{ units}\} \times 10 \text{ units}$ | 6,251.28         |
|          |                                                                                                                  | <b>11,051.28</b> |

**2. Cost of 20mm GI Pipe:**

| Date     | Calculation                                                                                                                                    | Amount (₹)      |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 12.08.20 | 2 units $\times$ ₹660                                                                                                                          | 1,320           |
| 28.08.20 | $\{(8 \text{ units} \times ₹660 + 30 \text{ units} \times ₹610 + 20 \text{ units} \times ₹660) \div 58 \text{ units}\} \times 2 \text{ units}$ | 1,268.28        |
|          |                                                                                                                                                | <b>2,588.28</b> |

**3. Cost of Other fitting materials:**

| <b>Date</b> | <b>Calculation</b>                                          | <b>Amount (₹)</b> |
|-------------|-------------------------------------------------------------|-------------------|
| 12.08.20    | 18 units × ₹26                                              | 468               |
| 17.08.20    | 30 units × ₹26                                              | 780               |
| 28.08.20    | {(12 units × ₹26 + 150 units × ₹28) ÷ 162 units} × 34 units | 946.96            |
| 30.08.20    | {(12 units × ₹26 + 150 units × ₹28) ÷ 162 units} × 60 units | 1,671.11          |
|             |                                                             | <b>3,866.07</b>   |

**BATCH COSTING**

**BQ 12**

Arnav Confectioners (AC) owns a bakery which is used to make bakery items like pastries, cakes and muffins. AC use 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  | ₹500 |
| Direct wages      | ₹50  |
| Oven set- up cost | ₹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**

**Statement of Cost per Batch and per Order**

| <b>Particulars</b>                                                    | <b>Cost per Batch</b> | <b>Total Cost</b> |
|-----------------------------------------------------------------------|-----------------------|-------------------|
| Direct material cost                                                  | 500.00                | 6,000.00          |
| Direct wages                                                          | 50.00                 | 600.00            |
| Oven set-up cost                                                      | 150.00                | 1,800.00          |
| <b>Prime cost</b>                                                     | <b>700.00</b>         | <b>8,400.00</b>   |
| Add: Production overhead (20% on direct wages)                        | 10.00                 | 120.00            |
| <b>Total Production Cost</b>                                          | <b>710.00</b>         | <b>8,520.00</b>   |
| Add: S & D and Administration overhead (10% of Total Production Cost) | 71.00                 | 852.00            |
| <b>Total Cost</b>                                                     | <b>781.00</b>         | <b>9,372.00</b>   |
| Add : Profit (1/3 of Total Cost)                                      | 260.33                | 3,124             |
| <b>Selling Price</b>                                                  | <b>1,041.33</b>       | <b>12,496.00</b>  |

No. of batch = 600 units ÷ 50 units = **12 batches**

**BQ 13**

Component SW-10X is made entirely in machine shop No. ASW-11. Materials cost ₹20 per component. Each component takes 6 minutes to produce & the machine operator is paid ₹15 per hour. Machine hour rate is ₹72 per hour. The setting up of the machine to produce the component takes 3 hours for the operator.

**You are required to prepare cost sheet showing the setting up costs & production costs both in total (i.e. for the batch) & per component, assuming a batch size of (a)100 components, (b) 150 components, and (c) 200 components.**

**[(a) ₹3,131, ₹31.31; (b) ₹4,566, ₹30.44; ₹6,001, ₹30.005]**

**BQ 14**

Leo Limited undertaking to supply 1,000 units of a component per month for the months of January, February, March, 2023. Every month a batch order is opened against which materials and labour cost are booked at actual cost. Overheads are levied at a rate per labour hour. The selling price is contracted at ₹15 per unit.

**From the following data, present the cost and profit per unit of each batch order and the overall position of the order for the 3,000 units.**

| <b>Month</b> | <b>Batch output</b> | <b>Material cost</b> | <b>Labour cost</b> |
|--------------|---------------------|----------------------|--------------------|
| January      | 1,250               | 6,250                | 2,500              |
| February     | 1,500               | 9,000                | 3,000              |
| March        | 1,000               | 5,000                | 2,000              |

**Labour is paid at the rate of ₹2 per hour the other details are:**

| <b>Month</b> | <b>Overheads</b> | <b>Labour hours</b> |
|--------------|------------------|---------------------|
| January      | 12,000           | 4,000               |
| February     | 9,000            | 4,500               |
| March        | 15,000           | 5,000               |

**[Cost ₹10 per unit; Profit ₹5 per unit, Overall profit on order is ₹15,000]**

**BQ 15**

A jobbing factory has undertaken to supply 200 pieces of a component per month for the ensuing six months. Every month a batch order is opened against which materials and labour hours are booked at actual. Overheads are levied at a rate per labour hour. The selling price contracted for is ₹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.

| <b>Month</b> | <b>Batch output</b> | <b>Material cost<br/>(₹)</b> | <b>Direct wages<br/>(₹)</b> | <b>Direct labour<br/>hours</b> |
|--------------|---------------------|------------------------------|-----------------------------|--------------------------------|
| January      | 210                 | 650                          | 120                         | 240                            |
| February     | 200                 | 640                          | 140                         | 280                            |
| March        | 220                 | 680                          | 150                         | 280                            |
| April        | 180                 | 630                          | 140                         | 270                            |
| May          | 200                 | 700                          | 150                         | 300                            |
| June         | 220                 | 720                          | 160                         | 320                            |

**The other details are:**

| <b>Month</b> | <b>Chargeable<br/>expenses</b> | <b>Direct labour hours</b> |
|--------------|--------------------------------|----------------------------|
| January      | 12,000                         | 4,800                      |
| February     | 10,560                         | 4,400                      |
| March        | 12,000                         | 5,000                      |
| April        | 10,580                         | 4,600                      |
| May          | 13,000                         | 5,000                      |
| June         | 12,000                         | 4,800                      |

**Answer**

**Statement Showing Cost and Profit**

| <b>Particulars</b>      | <b>Jan.</b>  | <b>Feb.</b>  | <b>March</b> | <b>April</b> | <b>May</b>   | <b>June</b>  | <b>Total</b> |
|-------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Batch output (in units) | 210          | 200          | 220          | 180          | 200          | 220          | 1,230        |
| Sales value (₹)         | <b>1,680</b> | <b>1,600</b> | <b>1,760</b> | <b>1,440</b> | <b>1,600</b> | <b>1,760</b> | <b>9,840</b> |
| Material cost (₹)       | 650          | 640          | 680          | 630          | 700          | 720          | 4,020        |
| Direct wages (₹)        | 120          | 140          | 150          | 140          | 150          | 160          | 860          |
| Chargeable expenses (₹) | 600          | 672          | 672          | 621          | 780          | 800          | 4,145        |
| <b>Total cost</b>       | <b>1,370</b> | <b>1,452</b> | <b>1,502</b> | <b>1,391</b> | <b>1,630</b> | <b>1,680</b> | <b>9,025</b> |
| Profit per batch (₹)    | <b>310</b>   | <b>148</b>   | <b>258</b>   | <b>49</b>    | <b>(30)</b>  | <b>80</b>    | <b>815</b>   |
| Total cost per unit (₹) | 6.52         | 7.26         | 6.83         | 7.73         | 8.15         | 7.64         | 7.34         |
| Profit per unit (₹)     | 1.48         | 0.74         | 1.17         | 0.27         | (0.15)       | 0.36         | 0.66         |

**Overall position of the order for 1,200 units:**

|                                            |   |        |
|--------------------------------------------|---|--------|
| Sales value of 1,200 units @ ₹8 per unit   | = | ₹9,600 |
| Total cost of 1,200 units @ ₹7.34 per unit | = | ₹8,808 |
| Profit                                     | = | ₹792   |

**Note:**

$$\text{Chargeable expenses} = \frac{\text{Chargeable expenses}}{\text{Direct labour hour for the month}} \times \text{Direct labour hours for batch}$$

**ECONOMIC/OPTIMUM BATCH QUANTITY****BQ 16**

|                                |           |
|--------------------------------|-----------|
| Monthly demand for a product   | 500 units |
| Setting-up cost per batch      | ₹60       |
| Cost of manufacturing per unit | ₹20       |
| Rate of interest               | 10% p.a.  |

**Determine economic batch quantity.****Answer**

$$\text{EBQ/ Optimum Run size} = \sqrt{\frac{2 \text{ DS}}{\text{C}}} = \sqrt{\frac{2 \times 6,000 \times 60}{10\% \text{ of } 20}} = 600 \text{ units}$$

**BQ 17**

M/s. KBC Bearings Ltd. 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 ₹1 as inventory holding cost per bearing per month and that the set up cost per run of bearing manufacture is ₹3,200

- (i) Determine the optimum run size of bearing manufacture?
- (ii) State what would be the interval between two consecutive optimum runs?
- (iii) Find out minimum inventory holding cost.

**Answer**

$$(i) \text{ EBQ/ Optimum Run size} = \sqrt{\frac{2 \text{ DS}}{\text{C}}} = \sqrt{\frac{2 \times 48,000 \times 3,200}{12}} = 5,060 \text{ bearings}$$

**(ii) Interval between two consecutive optimum runs.**

$$= 365 \div \text{Number of runs} = 365 \div 10 = 36.5 \text{ days}$$

**(iii) Minimum inventory holding cost:**

$$= \frac{1}{2} \times \text{EBQ} \times \text{C} = \frac{1}{2} \times 5,060 \times 12 = ₹30,360$$

**Working Notes:**

$$\text{Number of optimum runs} = 48,000 \div 5,060 = 9.49 \text{ or } 10 \text{ runs}$$

**BQ 18**

A customer has been ordering 90,000 special design metal columns at the rate of 18,000 columns per order during the past years. The production cost comprises ₹2,120 for material, ₹60 for labour and ₹20 for fixed overheads. It costs ₹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**

$$(i) \text{ Economic Run size} = \sqrt{\frac{2 DS}{C}} = \sqrt{\frac{2 \times 90,000 \times 1,500}{5\% \text{ of } 2,200}} = \mathbf{1,567 \text{ bearings}}$$

**(ii) Calculation of Extra Cost at Run Size 6,000 bearings:**

| Particulars                                         | At EBQ 1,567                                         | At RBQ 18,000                                     |
|-----------------------------------------------------|------------------------------------------------------|---------------------------------------------------|
| Set up Cost ( $\frac{D}{RBQ} \times S$ )            | (90,000 ÷ 1,567) 57.4 or 58 set ups × 1,500 = 87,000 | (90,000 ÷ 18,000) 5 set ups × 1,500 = 7,500       |
| Carrying cost ( $RBQ \times \frac{1}{2} \times C$ ) | $\frac{1}{2} \times 1,567 \times 110 = 86,185$       | $\frac{1}{2} \times 18,000 \times 110 = 9,90,000$ |
| <b>Total Cost</b>                                   | <b>1,73,185</b>                                      | <b>9,97,500</b>                                   |
| <b>Extra Cost</b>                                   | <b>-</b>                                             | <b>8,24,315</b>                                   |

**BQ 19**

X Ltd. is committed to supply 24,000 bearings per annum to Y Ltd. 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 ₹324.

- (i) What should be the optimum run size for bearing manufacture?
- (ii) 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 in (a) above?
- (iii) Calculate the inventory holding cost at optimum level?

**Answer**

$$(a) \text{ EBQ/ Optimum Run size} = \sqrt{\frac{2 DS}{C}} = \sqrt{\frac{2 \times 24,000 \times 324}{1.2}} = \mathbf{3,600 \text{ bearings}}$$

|          |   |                                            |   |                       |
|----------|---|--------------------------------------------|---|-----------------------|
| <b>D</b> | = | Bearing to be manufactured/supplied p.a.   | = | 24,000 bearings       |
| <b>S</b> | = | Set-up cost per run of bearing manufacture | = | ₹324                  |
| <b>C</b> | = | Carrying cost per bearing p.a.             | = | ₹0.10 × 12 months     |
|          |   |                                            | = | ₹1.2 per bearing p.a. |

**(b) Calculation of Extra Cost at Run Size 6,000 bearings:**

| Particulars                                         | At EBQ 3,600                                    | At RBQ 6,000                                  |
|-----------------------------------------------------|-------------------------------------------------|-----------------------------------------------|
| Set up Cost ( $\frac{D}{RBQ} \times S$ )            | (24,000 ÷ 3,600) 6.6 or 7 set ups × 324 = 2,268 | (24,000 ÷ 6,000) 4 set ups × 324 = 1,296      |
| Carrying cost ( $RBQ \times \frac{1}{2} \times C$ ) | $\frac{1}{2} \times 3,600 \times 1.2 = 2,160$   | $\frac{1}{2} \times 6,000 \times 1.2 = 3,600$ |
| <b>Total Cost</b>                                   | <b>4,428</b>                                    | <b>4,896</b>                                  |
| <b>Extra Cost</b>                                   | <b>-</b>                                        | <b>468</b>                                    |

**(c) Inventory holding cost at optimum level is ₹2,160**

**BQ 20**

BTL LLP. manufactures glass bottles for HDL Ltd., a pharmaceutical company, which is in ayurvedic medicines business. BTL can produce 2,00,000 bottles in a month. Set-up cost of each production run is ₹5,200 and the cost of holding one bottle for a year is ₹1.50.

As per an estimate HDL Ltd. can order as much as 19,00,000 bottles in a year spreading evenly throughout the year. At present the BTL manufactures 1,60,000 bottles in a batch.

**Required:**

- (a) Compute the Economic Batch Quantity for bottle production.
- (b) Compute the annual cost saving to BTL by adopting the EBQ of a production.

**Answer**

(a) **Economic Batch Quantity** =  $\sqrt{\frac{2DS}{C}}$  =  $\sqrt{\frac{2 \times 19,00,000 \times 5,200}{1.5}}$  = **1,14,775 bottles**

**(b) Calculation of saving in cost by adopting EBQ:**

| Particulars                              | At EBQ 1,14,775                                                   | At RBQ 1,60,000                                                   |
|------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| Set up Cost ( $\frac{D}{RBQ} \times S$ ) | (19,00,000 ÷ 1,14,775) 16.55<br>or 17 set ups × 5,200<br>= 88,400 | (19,00,000 ÷ 1,60,000) 11.87<br>or 12 set ups × 5,200<br>= 62,400 |
| Carrying cost (RBQ × $\frac{1}{2}$ × C)  | $\frac{1}{2} \times 1,14,775 \times 1.5 = 86,082$                 | $\frac{1}{2} \times 1,60,000 \times 1.5 = 1,20,000$               |
| <b>Total Cost</b>                        | <b>1,74,482</b>                                                   | <b>1,82,400</b>                                                   |
| <b>Saving in Cost</b>                    | <b>-</b>                                                          | <b>7,918</b>                                                      |

**BQ 21**

A Company has an annual demand from a single customer for 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 production of the next colour commences.

The Set up costs are ₹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 ₹50 per sq. meter 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 minimise total cost.

**Answer**

**(i) Statement Showing Total Cost Per Year Where Batches May Range from 4,000 to 10,000 Litres in Multiples of 1,000 Litres**

| Production Size (Lt.) | Set-up Cost Per Annum (₹)<br>[(D/RBQ) × 100] | Holding Cost Per Annum (₹)<br>[ $\frac{1}{2}$ × RBQ × C] | Total Cost Per Annum (₹) |
|-----------------------|----------------------------------------------|----------------------------------------------------------|--------------------------|
| 4,000                 | 12.5 set up × 100 = 1,250                    | 400                                                      | 1,650                    |
| 5,000                 | 10 set up × 100 = 1,000                      | 500                                                      | 1,500                    |
| 6,000                 | 8.33 set up × 100 = 833                      | 600                                                      | 1,433                    |
| 7,000                 | 7.14 set up × 100 = 714                      | 700                                                      | 1,414                    |
| 8,000                 | 6.25 set up × 100 = 625                      | 800                                                      | 1,425                    |
| 9,000                 | 5.56 set up × 100 = 556                      | 900                                                      | 1,456                    |
| 10,000                | 5 set up × 100 = 500                         | 1,000                                                    | 1,500                    |

As the total cost is minimum at 7,000 ltr. i.e. ₹1,414, thus economic production lot would be 7,000 Litres.

**(ii) Economic Batch Quantity (EBQ):**

EBQ =  $\sqrt{\frac{2DS}{C}}$  =  $\sqrt{\frac{2 \times 50,000 \times 100}{.20 \times 1}}$  = **7,071 Litres**

# PAST YEAR QUESTIONS

## PYQ 1

In the current quarter, a company has undertaken two jobs. The data relating to these jobs are as under:

|                              | <b>Job 1102</b> | <b>Job 1108</b> |
|------------------------------|-----------------|-----------------|
| Selling price                | ₹1,07,325       | ₹1,57,920       |
| Profit as percentage on cost | 8%              | 12%             |
| Direct Materials             | ₹37,500         | ₹54,000         |
| Direct Wages                 | ₹30,000         | ₹42,000         |

It is the policy of the company to charge factory overheads as percentage on direct wages and selling and administration overheads as percentage on factory cost.

The company has received a new order for manufacturing of a similar job. The estimate of direct materials and direct wages relating to the new order is ₹64,000 and ₹50,000 respectively. A profit of 20% on sales is required.

**You are required to compute:**

- (i) The rates of Factory overheads and Selling and Administration overheads to be charged;
- (ii) The Selling price of the new order.

**[[9 Marks] Nov 2002]**

## Answer

**(i) Computation of rates of factory overheads and selling and administration overheads to be charged:**

Let % of factory overheads to direct wages be F and % of selling and administrative overheads to factory cost be A

### Jobs Cost Sheet

| <b>Particulars</b>                   | <b>Job 1102</b>              | <b>Job 1108</b>              |
|--------------------------------------|------------------------------|------------------------------|
| Direct materials                     | 37,500                       | 54,000                       |
| Direct wages                         | 30,000                       | 42,000                       |
| <b>Prime cost</b>                    | <b>67,500</b>                | <b>96,000</b>                |
| Factory overheads                    | 30,000F                      | 42,000F                      |
| <b>Factory cost</b>                  | <b>67,500+30,000F</b>        | <b>96,000+42,000F</b>        |
| Selling and Administration overheads | (67,500+30,000F)A            | (96,000+42,000F)A            |
| <b>Total cost</b>                    | <b>(67,500+30,000F)(1+A)</b> | <b>(96,000+42,000F)(1+A)</b> |

**\* Computation of total cost of jobs:**

$$\text{Total cost of Job 1102 when 8\% is the profit on cost} = \frac{1,07,325}{108\%} \times 100 = \text{₹99,375}$$

$$\text{Total cost of Job 1108 when 12\% is the profit on cost} = \frac{1,57,920}{112\%} \times 100 = \text{₹1,41,000}$$

Since the total cost of jobs 1102 and 1108 are equal to ₹99,375 and ₹1,41,000 respectively, therefore, we have the following equations:

$$(67,500 + 30,000F)(1 + A) = \text{₹99,375} \quad (1)$$

$$(96,000 + 42,000F)(1 + A) = \text{₹1,41,000} \quad (2)$$

Or

$$67,500 + 30,000F + 67,500A + 30,000FA = \text{₹99,375}$$

$$96,000 + 42,000F + 96,000A + 42,000FA = \text{₹1,41,000}$$

Or

$$30,000F + 67,500A + 30,000FA = \text{₹31,875} \quad (3)$$



$$42,000F + 96,000A + 42,000FA = ₹45,000 \quad (4)$$

On solving (3) and (4) we get:

$$\begin{array}{lcl} A & = & 0.25 \text{ or } 25\% \text{ on factory cost} \\ F & = & 0.40 \text{ or } 40\% \text{ on direct wages} \end{array}$$

**(ii) Selling Price of the New Order:**

| Particulars                                   | Amount          |
|-----------------------------------------------|-----------------|
| Materials                                     | 64,000          |
| Productive Wages                              | 50,000          |
| <b>Prime Cost</b>                             | <b>1,14,000</b> |
| Factory Overheads (40% Of 50,000)             | 20,000          |
| <b>Factory Cost</b>                           | <b>1,34,000</b> |
| Selling And Admin Overheads (25% Of 1,34,000) | 33,500          |
| <b>Total Cost</b>                             | <b>1,67,500</b> |
| Profit (20% On Sales Or 25% On Cost)          | 41,875          |
| <b>Sale Price</b>                             | <b>2,09,375</b> |

**PYQ 2**

M.L. Auto Ltd. is a manufacturer of auto components and the details of its expenses for the year 2014 are given below:

|                            |            |
|----------------------------|------------|
| Opening stock of materials | ₹1,50,000  |
| Closing stock of materials | ₹2,00,000  |
| Purchase of materials      | ₹18,50,000 |
| Direct labour              | ₹9,50,000  |
| Factory overheads          | ₹3,80,000  |
| Administrative overheads   | ₹2,50,400  |

During 2015, the company has received an order from a car manufacturer where it estimates the cost of materials and labour will be ₹8,00,000 and ₹4,50,000 respectively.

M.L. Auto Ltd. charges factory overhead as a percentage of direct labour and administrative overheads as a percentage of factory cost based on previous year's cost.

Cost of delivery of the components at customer's premises is estimated at ₹45,000.

**You are required to:**

1. Calculate the overhead recovery rates based on actual cost of 2014.
2. Prepared a detailed cost statement for the order received in 2015 and the price to be quoted if company wants to earn a profit of 10% on sales.

**[(8 Marks) Nov 2015]**

**Answer**

**1. Calculation of overhead recovery rates based on actual cost of 2014:**

$$\text{Factory overhead rate} = \frac{\text{Factory overhead}}{\text{Direct labour cost}} \times 100 = \frac{3,80,000}{9,50,000} \times 100 = 40\%$$

$$\text{Admin overhead rate} = \frac{\text{Admin overhead}}{\text{Factory cost}} \times 100 = \frac{2,50,400}{31,30,000} \times 100 = 8\%$$

**Working Note:**

$$\begin{aligned} \text{Factory cost} &= \text{Opening stock of materials} + \text{Purchase of materials} - \text{Closing of materials} + \text{Labour} + \text{Factory overhead} \\ &= 1,50,000 + 18,50,000 - 2,00,000 + 9,50,000 + 3,80,000 \\ &= \mathbf{31,30,000} \end{aligned}$$

**2. Statement of Cost and Price**

| Particulars                                | ₹                |
|--------------------------------------------|------------------|
| Direct materials                           | 8,00,000         |
| Direct wages                               | 4,50,000         |
| <b>Prime cost</b>                          | <b>12,50,000</b> |
| Factory overheads @ 40% of 4,50,000        | 1,80,000         |
| <b>Factory cost</b>                        | <b>14,30,000</b> |
| Administration overheads @ 8% of 14,30,000 | 1,14,400         |
| <b>Cost of goods sold</b>                  | <b>15,44,400</b> |
| Cost of delivery                           | 45,000           |
| <b>Cost of sales</b>                       | <b>15,89,400</b> |
| Profit @ 10% of sales                      | 1,76,600         |
| <b>Sales (15,89,400/90%)</b>               | <b>17,66,000</b> |

**PYQ 3**

XYZ has obtained an order to supply 48,000 bearings per year from a concern on a steady basis. It is estimated that it costs ₹.20 as inventory holding cost per bearing per month and that the set up cost per run of bearing manufacture is ₹384.

**You are required to:**

- (1) Compute optimum run size and number of runs for bearing manufacture.
- (2) Compute the interval between two consecutive runs.
- (3) Find out the extra cost incurred, if company adopts a policy to manufacture 8,000 bearings per run as compared to optimum run size.
- (4) Give your opinion regarding run size of bearing manufacture.

Assume 365 days in a year.

**[(10 Marks) Nov 2018]**

**Answer**

$$(1) \text{ Optimum Run size} = \sqrt{\frac{2 \text{ DS}}{C}} = \sqrt{\frac{2 \times 48,000 \times 384}{12 \times .20}} = \text{3,919 bearings}$$

$$\begin{aligned} \text{Number of runs} &= \text{Annual demand} \div \text{EBQ} = 48,000 \div 3,919 \\ &= \text{12.24 or 13 runs} \end{aligned}$$

$$\begin{aligned} (2) \text{ Interval between two runs} &= 365 \div \text{Number of Runs} = 365 \div 13 \\ &= \text{28 days appx.} \end{aligned}$$

**(3) Computation of Extra Cost:**

| Particulars                                         | At EBQ 3,919                                                          | At RBQ 8,000                                       |
|-----------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------|
| Set up Cost ( $\frac{D}{RBQ} \times S$ )            | $(48,000 \div 3,919) 12.24 \text{ or } 13 \text{ set ups} \times 384$ | $(48,000 \div 8,000) 6 \text{ set ups} \times 384$ |
| Carrying cost ( $RBQ \times \frac{1}{2} \times C$ ) | $= 4,992$                                                             | $= 2,304$                                          |
| <b>Total Cost</b>                                   | $\frac{1}{2} \times 3,919 \times 2.4 = 4,703$                         | $\frac{1}{2} \times 8,000 \times 2.4 = 9,600$      |
|                                                     | <b>9,695</b>                                                          | <b>11,904</b>                                      |
| <b>Extra Cost</b>                                   | <b>-</b>                                                              | <b>2,209</b>                                       |

- (4) **Opinion:** Company should go with the EBQ (i.e. 3,919 bearings) having lower cost than RBQ 8,000 units.

**PYQ 4**

The following data presented by the supervisor of a factory for a job.

|                 | ₹ per unit |
|-----------------|------------|
| Direct Material | 120        |

|                                                             |            |
|-------------------------------------------------------------|------------|
| Direct Wages @ ₹4 per hour                                  | 60         |
| (Departments A - 4 hrs., B - 7 hrs., C - 2 hrs & D - 2 hrs) |            |
| Chargeable Expenses                                         | 20         |
| <b>Total</b>                                                | <b>200</b> |

**Analysis of the profit and loss account for the year ended 31<sup>st</sup> March, 2019:**

| <b>Particulars</b>  | <b>₹</b>        | <b>Particulars</b> | <b>₹</b>        |
|---------------------|-----------------|--------------------|-----------------|
| Material            | 2,00,000        | Sales              | 4,30,000        |
| Direct Wages        |                 |                    |                 |
| Dept. A             | 12,000          |                    |                 |
| Dept. B             | 8,000           |                    |                 |
| Dept. C             | 10,000          |                    |                 |
| Dept. D             | 20,000          |                    |                 |
| Special store items | 6,000           |                    |                 |
| Overheads           |                 |                    |                 |
| Dept. A             | 12,000          |                    |                 |
| Dept. B             | 6,000           |                    |                 |
| Dept. C             | 9,000           |                    |                 |
| Dept. D             | 17,000          |                    |                 |
| Gross profit c/d    | 1,30,000        |                    |                 |
|                     | <b>4,30,000</b> |                    | <b>4,30,000</b> |
| Selling expenses    | 90,000          | Gross profit b/d   | 1,30,000        |
| Net profit          | 40,000          |                    |                 |
|                     | <b>1,30,000</b> |                    | <b>1,30,000</b> |

It is also to be noted that average hourly rates for all the four departments are similar.

**Required:**

- Prepare a job cost sheet.
- Calculate the entire revised cost using the above figures as the base.
- Add 20% profit on selling price to determine the selling price.

**[(5 Marks) Nov 2019]**

**Answer**

**Job Cost Sheet**

| <b>Particulars</b>                           | <b>Amount</b>  |
|----------------------------------------------|----------------|
| Direct Materials                             | 120.00         |
| Direct Wages:                                |                |
| Department A (4 hours × ₹4)                  | 16.00          |
| Department B (7 hours × ₹4)                  | 28.00          |
| Department C (2 hours × ₹4)                  | 8.00           |
| Department D (2 hours × ₹4)                  | 8.00           |
| Chargeable Expenses                          | 20.00          |
| <b>Prime Cost</b>                            | <b>200.00</b>  |
| Overheads:                                   |                |
| Department A @ 100% of direct wages          | 16.00          |
| Department B @ 75% of direct wages           | 21.00          |
| Department C @ 90% of direct wages           | 7.20           |
| Department D @ 85% of direct wages           | 6.80           |
| <b>Works Cost</b>                            | <b>251.00</b>  |
| Selling Expenses @ 30% on works cost         | 75.30          |
| <b>Total Cost</b>                            | <b>326.30</b>  |
| Profit @ 20% on selling price or 25% on cost | 81.575         |
| <b>Sales</b>                                 | <b>407.875</b> |

**Working note:**

**(1) Calculation of recovery rate of Overheads:**

|                            |   |                                                           |                        |
|----------------------------|---|-----------------------------------------------------------|------------------------|
| Recovery rate of overheads | = | $\frac{\text{Overheads}}{\text{Direct Wages}} \times 100$ |                        |
| Department A               | = | $\frac{12,000}{12,000} \times 100$                        | = 100% of direct wages |
| Department B               | = | $\frac{6,000}{8,000} \times 100$                          | = 75% of direct wages  |
| Department C               | = | $\frac{9,000}{10,000} \times 100$                         | = 90% of direct wages  |
| Department D               | = | $\frac{17,000}{20,000} \times 100$                        | = 85% of direct wages  |

**(2) Calculation of recovery rate of Selling Expenses:**

|                                    |   |                                                                |   |                                                 |
|------------------------------------|---|----------------------------------------------------------------|---|-------------------------------------------------|
| Recovery rate of selling overheads | = | $\frac{\text{Selling Expenses}}{\text{Works Cost}} \times 100$ | = | $\frac{90,000}{4,30,000 - 1,30,000} \times 100$ |
|                                    | = | <b>30% of works cost</b>                                       |   |                                                 |

**PYQ 5**

GHI Ltd. manufactures 'Stent' that is used by hospitals in heart surgery. As per the estimates provided by Pharmaceutical Industry Bureau, there will be a demand of 40 Million 'Stents' in the coming year. GHI Ltd. is expected to have a market share of 2.5% of the total market demand of the Stents in the coming year. It is estimated that it costs ₹1.50 as inventory holding cost per stent per month and that the set-up cost per run of stent manufacture is ₹225.

**Required:**

- What would be the optimum run size for Stent manufacture?
- What is the minimum inventory holding cost?
- Assuming that the company has a policy of manufacturing 4,000 stents per run, how much extra costs the company would be incurring as compared to the optimum run suggested in (i) above?

**[(5 Marks) Jan 2021]**

**Answer**

**(a) Optimum Run Size** =  $\sqrt{\frac{2 \text{ DS}}{\text{C}}} = \sqrt{\frac{2 \times 4,00,00,000 \times 2.5\% \times 225}{1.5 \times 12}} = \mathbf{5,000 \text{ Stents}}$

**(b) Minimum Inventory Holding Cost:**

Minimum Inventory Holding Cost =  $\frac{1}{2} \times \text{EBQ} \times \text{C}$   
 =  $\frac{1}{2} \times 5,000 \times ₹18 = \mathbf{₹45,000}$

**(c) Calculation of Extra Cost:**

| Particulars                                                       | At EBQ 5,000                                     | At RBQ 4,000                                     |
|-------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Set up Cost ( $\frac{\text{P}}{\text{RBQ}} \times \text{S}$ )     | $(10,00,000 \div 5,000) \times 225$<br>= 45,000  | $(10,00,000 \div 4,000) \times 225$<br>= 56,250  |
| Carrying cost ( $\frac{1}{2} \times \text{RBQ} \times \text{C}$ ) | $\frac{1}{2} \times 5,000 \times 18$<br>= 45,000 | $\frac{1}{2} \times 4,000 \times 18$<br>= 36,000 |
| <b>Total Cost</b>                                                 | <b>90,000</b>                                    | <b>92,250</b>                                    |
| <b>Extra Cost</b>                                                 | <b>-</b>                                         | <b>2,250</b>                                     |

**PYQ 6**

AUX Ltd. has an Annual demand from a single customer for 60,000 Covid-19 vaccines. The customer prefers to order in the lot of 15,000 vaccines per order. The production cost of vaccine is ₹5,000 per vaccine. The set-up cost per production run of Covid-19 vaccines is ₹4,800. The carrying cost is ₹12 per vaccine per month.

**Required:**

- (a) Find out most Economical Production Run.  
 (b) Calculate the extra cost that company incurs due to production of 15,000 vaccines in a batch.

**[(5 Marks) July 2021]**

**Answer**

(a) **Economic Production Run** =  $\sqrt{\frac{2DS}{C}}$  =  $\sqrt{\frac{2 \times 60,000 \times 4,800}{12 \times 12}}$  = **2,000 vaccines**

(b) **Calculation of Extra Cost:**

| Particulars                                         | At EBQ 2,000    | At RBQ 15,000    |
|-----------------------------------------------------|-----------------|------------------|
| Set up Cost ( $\frac{D}{RBQ} \times S$ )            | 1,44,000        | 19,200           |
| Carrying cost ( $RBQ \times \frac{1}{2} \times C$ ) | 1,44,000        | 10,80,000        |
| <b>Total Cost</b>                                   | <b>2,88,000</b> | <b>10,99,200</b> |
| <b>Extra Cost</b>                                   | <b>-</b>        | <b>8,11,200</b>  |

**PYQ 7**

In a manufacturing company, the overhead is recovered as follows:

Factory Overheads: a fixed percentage basis on direct wages and  
 Administrative overheads: 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 1 (₹) | Job 2 (₹) |
|---------------------------------|-----------|-----------|
| Direct Materials                | 1,08,000  | 75,000    |
| Direct Wages                    | 84,000    | 60,000    |
| Selling Price                   | 3,33,312  | 2,52,000  |
| Profit percentage on total cost | 12%       | 20%       |

**You are required to:**

- (a) Compute the percentage recovery rates of factory overheads and administrative overheads.  
 (b) Calculate the amount of factory overheads, administrative overheads and profit for each of the two jobs.  
 (c) Using the above recovery rates, determine the selling price to be quoted for job 3. Additional data pertaining to Job 3 is as follows:

|                                    |         |
|------------------------------------|---------|
| Direct Materials                   | ₹68,750 |
| Direct Wages                       | ₹22,500 |
| Profit percentage on selling price | 15%     |

**[(10 Marks) May 2022]**

**Answer**

**(a) Computation of percentage recovery rates of factory overheads and administration overheads:**

Let % of factory overheads to direct wages be F and % of administrative overheads to factory cost be A

**Jobs Cost Sheet**

| Particulars         | Job 1                   | Job 2                   |
|---------------------|-------------------------|-------------------------|
| Direct materials    | 1,08,000                | 75,000                  |
| Direct wages        | 84,000                  | 60,000                  |
| <b>Prime cost</b>   | <b>1,92,000</b>         | <b>1,35,000</b>         |
| Factory overheads   | 84,000F                 | 60,000F                 |
| <b>Factory cost</b> | <b>1,92,000+84,000F</b> | <b>1,35,000+60,000F</b> |

## JOB AND BATCH COSTING 5.20

|                          |                                                                 |                                                                 |
|--------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|
| Administration overheads | (1,92,000+84,000F)A                                             | (1,35,000+60,000F)A                                             |
| <b>Total cost</b>        | (1,92,000+84,000F)+<br>(1,92,000+84,000F)A<br><b>= 2,97,600</b> | (1,35,000+60,000F)+<br>(1,35,000+60,000F)A<br><b>= 2,10,000</b> |

### \* Computation of total cost of jobs:

|                                                    |   |                          |   |                  |
|----------------------------------------------------|---|--------------------------|---|------------------|
| Total cost of Job 1 when 12% is the profit on cost | = | $\frac{3,33,312}{112\%}$ | = | <b>₹2,97,600</b> |
| Total cost of Job 2 when 20% is the profit on cost | = | $\frac{2,52,000}{120\%}$ | = | <b>₹2,10,000</b> |

Now, we have the following equations:

$$\begin{aligned}
 1,92,000 + 84,000 F + 1,92,000A + 84,000 FA &= 2,97,600 & (1) \\
 1,35,000 + 60,000F + 1,35,000A + 60,000FA &= 2,10,000 & (2)
 \end{aligned}$$

Multiply equation (1) by 5 and equation (2) by 7

$$\begin{aligned}
 9,60,000 + 4,20,000 F + 9,60,000A + 4,20,000 FA &= 14,88,000 & (3) \\
 9,45,000 + 4,20,000F + 9,45,000A + 4,20,000FA &= 14,70,000 & (4)
 \end{aligned}$$

By subtracting equation (4) from (3):

$$\begin{aligned}
 15,000 + 15,000 A &= 18,000 \\
 15,000A &= 3,000 \\
 A &= \mathbf{0.2 \text{ or } 20\%}
 \end{aligned}$$

Now putting the value of A in equation (1) to find the value of F:

$$\begin{aligned}
 1,92,000 + 84,000F + 1,92,000 \times 0.2 + (84,000F \times .2 &= 2,97,600 \\
 84,000 F + 16,800 F &= 67,200 \\
 F &= \mathbf{0.6667 \text{ or } 66.67\%}
 \end{aligned}$$

### (b) Statement Showing Amount of Factory Overheads, Administrative Overheads and Profit

| Particulars                                    | Job 1           | Job 2           |
|------------------------------------------------|-----------------|-----------------|
| Direct materials                               | 1,08,000        | 75,000          |
| Direct wages                                   | 84,000          | 60,000          |
| <b>Prime cost</b>                              | <b>1,92,000</b> | <b>1,35,000</b> |
| Factory overheads (66.67% of wages)            | 56,000          | 40,000          |
| <b>Factory cost</b>                            | <b>2,48,000</b> | <b>1,75,000</b> |
| Administration overheads (20% of factory cost) | 49,600          | 35,000          |
| <b>Total cost</b>                              | <b>2,97,600</b> | <b>2,10,000</b> |
| Profit                                         | 35,712          | 42,000          |
| <b>Selling Price</b>                           | <b>3,33,312</b> | <b>2,52,000</b> |

### (c) Selling Price of the Job 3

| Particulars                          | Amount          |
|--------------------------------------|-----------------|
| Materials                            | 68,750          |
| Productive Wages                     | 22,500          |
| <b>Prime Cost</b>                    | <b>91,250</b>   |
| Factory Overheads (66.67% of 22,500) | 15,000          |
| <b>Factory Cost</b>                  | <b>1,06,250</b> |
| Admin Overheads (20% of 1,06,250)    | 21,250          |
| <b>Total Cost</b>                    | <b>1,27,500</b> |

|                                    |                 |
|------------------------------------|-----------------|
| Profit                             | 22,500          |
| <b>Sale Price (1,27,500 ÷ 85%)</b> | <b>1,50,000</b> |

**PYQ 8**

A Ltd. is a pharmaceutical company which produces vaccines for diseases like Monkey Pox, Covid-19 and Chickenpox. A distributor has given an order for 1,600 Monkey pox vaccines. The company can produce 80 vaccines at a time. To process a batch of 80 Monkey Pox vaccines, the following costs would be incurred:

|                  |        |
|------------------|--------|
| Direct materials | ₹4,250 |
| Direct wages     | ₹500   |
| Lab set-up cost  | ₹1,400 |

The production overheads are absorbed at a rate of 20% of direct wages and 20% of total production cost is charged in each batch for selling, distribution and administration overheads. The company is willing to earn profit of 25% on sales value.

**You are required to determine:**

- (a) Total sales value for 1,600 Monkey Pox vaccines
- (b) Selling price per unit of vaccine.

**[(5 Marks) Nov 2022]**

**Answer**

**(a) Statement Showing Sales Value of 1,600 Vaccines**

| Particulars                                                     | Amount          |
|-----------------------------------------------------------------|-----------------|
| Direct materials (4,250 × 20 batches)                           | 85,000          |
| Direct wages (500 × 20 batches)                                 | 10,000          |
| Lab set-up cost (1,400 × 20 batches)                            | 28,000          |
| <b>Prime cost</b>                                               | <b>1,23,000</b> |
| Add: Production overhead (20% on direct wages)                  | 2,000           |
| <b>Total Production Cost</b>                                    | <b>1,25,000</b> |
| Add: S & D and Administration overhead (20% of production Cost) | 25,000          |
| <b>Total Cost</b>                                               | <b>1,50,000</b> |
| Add : Profit                                                    | 50,000          |
| <b>Selling Price (1,50,000 ÷ 75%)</b>                           | <b>2,00,000</b> |

No. of batch = 1,600 units ÷ 80 units = **20 batches**

(b) Selling price per vaccine = 2,00,000 ÷ 1,600 = **₹125**

**PYQ 9**

TSK Limited manufactures a variety of products. The annual demand for one of its products 'X' is estimated as 1,35,000 units. Product 'X' is to be manufactured done in batches. Set up cost of each batch is ₹3,375 and inventory holding cost is ₹5 per unit. It is expected that demand of product 'X' would be uniform throughout the year.

**Required:**

- (a) Calculate the Economic Batch Quantity (EBQ) for Product 'X'.
- (b) Assuming that the company has a policy of manufacturing 7,500 units of Product 'X' per batch, calculate the additional cost incurred as compared to the cost incurred as per Economic Batch Quantity (EBQ) as computed in (a) above.

**[(5 Marks) May 2023]**

**Answer**



(a) **Economic Batch Quantity** =  $\sqrt{\frac{2DS}{C}}$  =  $\sqrt{\frac{2 \times 1,35,000 \times 3,375}{5}}$  = **13,500 units**

(b) **Calculation of Additional Cost:**

| <b>Particulars</b>                                  | <b>At EBQ 13,500</b> | <b>At RBQ 7,500</b> |
|-----------------------------------------------------|----------------------|---------------------|
| Set up Cost ( $\frac{D}{RBQ} \times S$ )            | 33,750               | 60,750              |
| Carrying cost ( $RBQ \times \frac{1}{2} \times C$ ) | 33,750               | 18,750              |
| <b>Total Cost</b>                                   | <b>67,500</b>        | <b>79,500</b>       |
| <b>Additional Cost</b>                              | <b>-</b>             | <b>12,000</b>       |

# SUGGESTED REVISION

| <b>Ques. No.</b>                                                                                   | <b>Observations or KEY Points<br/>(Note down during revisions)</b> | <b>Page No. of<br/>Practical<br/>Register</b> | <b>1<sup>st</sup> &amp; 2<sup>nd</sup><br/>Revision</b> | <b>3<sup>rd</sup>, 4<sup>th</sup> &amp;<br/>5<sup>th</sup><br/>Revision</b> | <b>Revision<br/>during<br/>Exams</b> |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------|
| <b>BQ (Book Questions covering Study Module of ICAI, PM, RTP's, MTP's and Important Questions)</b> |                                                                    |                                               |                                                         |                                                                             |                                      |
| <b>1</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>2</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>3</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>4</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>5</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>6</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>7</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>8</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>9</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>10</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>11</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>12</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>13</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>14</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>15</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>16</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>17</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>18</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>19</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>20</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>21</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>PYQ (Past Year Questions)</b>                                                                   |                                                                    |                                               |                                                         |                                                                             |                                      |
| <b>1</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>2</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>3</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>4</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>5</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>6</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>7</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>8</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |
| <b>9</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>-</b>                                                                    | <b>-</b>                             |

# ***CHAPTER - 6***

## ***ACTIVITY BASED COSTING***

### ***LEARNING OUTCOMES***

***After studying this chapter you will be able to:***

- ***Discuss problem of traditional costing system.***
- ***Discuss usefulness of Activity Based Costing (ABC).***
- ***Discuss Cost Allocation under ABC.***
- ***Discuss Different level of activities under ABC.***
- ***Understand stages, advantages, and limitations of ABC.***
- ***Discuss various requirements in ABC implementation.***
- ***Explain the concept of Activity Based Management (ABM).***
- ***Explain the concept of Activity Based Budgeting (ABB).***

**BQ 1**

G-2020 Ltd. is a manufacturer of a range of goods. The cost structure of its different products is as follows:

| <b>Particulars</b>                    | <b>A</b> | <b>B</b> | <b>C</b> |
|---------------------------------------|----------|----------|----------|
| Direct Material per unit              | 50       | 40       | 40       |
| Direct Labour per unit (₹10 per hour) | 30       | 40       | 50       |
| Production Overheads                  | 30       | 40       | 50       |
| Total Cost per unit                   | 110      | 120      | 140      |
| Quantity Produced (in units)          | 10,000   | 20,000   | 30,000   |

G-2020 Ltd. was absorbing overheads on the basis of direct labour hours. A newly appointed management accountant has suggested that the company should introduce ABC system and has identified cost drivers and cost pools as follows:

| <b>Activity Cost Pool</b> | <b>Cost Driver</b>        | <b>Associated Cost</b> |
|---------------------------|---------------------------|------------------------|
| Stores Receiving          | Purchase Requisitions     | ₹2,96,000              |
| Inspection                | Number of Production Runs | ₹8,94,000              |
| Dispatch                  | Orders Executed           | ₹2,10,000              |
| Machine Setup             | Number of Setups          | ₹12,00,000             |

**The following information is also supplied:**

| <b>Particulars</b>           | <b>A</b> | <b>B</b> | <b>C</b> |
|------------------------------|----------|----------|----------|
| No. of Setups                | 360      | 390      | 450      |
| No. of Orders Executed       | 180      | 270      | 300      |
| No. of Production Runs       | 750      | 1,050    | 1,200    |
| No. of Purchase Requisitions | 300      | 450      | 500      |

**You are required to calculate activity based production cost of all the three products.**

**Answer**

**Statement Showing Production Cost Using ABC Method**

| <b>Particulars</b>                        | <b>A (₹)</b>              | <b>B (₹)</b>              | <b>C (₹)</b>              |
|-------------------------------------------|---------------------------|---------------------------|---------------------------|
| Number of units                           | 10,000                    | 20,000                    | 30,000                    |
| Direct Material @ ₹50/40/40 per unit      | 5,00,000                  | 8,00,000                  | 12,00,000                 |
| Direct Labour @ ₹30/40/50 per unit        | 3,00,000                  | 8,00,000                  | 15,00,000                 |
| <b>Production Overhead:</b>               |                           |                           |                           |
| Stores receiving @ ₹236.8 per requisition | 71,040<br>(236.8 × 300)   | 1,06,560<br>(236.8 × 450) | 1,18,400<br>(236.8 × 500) |
| Inspection @ ₹298 per production run      | 2,23,500<br>(298 × 750)   | 3,12,900<br>(298 × 1,050) | 3,57,600<br>(298 × 1,200) |
| Dispatch @ ₹280 per order                 | 50,400<br>(280 × 180)     | 75,600<br>(280 × 270)     | 84,000<br>(280 × 300)     |
| Machine setup @ ₹1,000 per setup          | 3,60,000<br>(1,000 × 360) | 3,90,000<br>(1,000 × 390) | 4,50,000<br>(1,000 × 450) |
| <b>Total Production Cost</b>              | <b>15,04,940</b>          | <b>24,85,060</b>          | <b>37,10,000</b>          |
| <b>Production Cost Per Unit</b>           | <b>150.49</b>             | <b>124.25</b>             | <b>123.67</b>             |

**Calculation of Activity rate:**

| <b>Activity Cost Pool</b> | <b>Amount</b> | <b>Cost Driver</b>        | <b>Volume</b> | <b>Cost Driver Rate</b> |
|---------------------------|---------------|---------------------------|---------------|-------------------------|
| Stores Receiving          | ₹2,96,000     | Purchase requisitions     | 1,250         | ₹236.80 per requisition |
| Inspection                | ₹8,94,000     | Number of production runs | 3,000         | ₹298 per production run |
| Dispatch                  | ₹2,10,000     | Orders executed           | 750           | ₹280 per order          |
| Machine Setup             | ₹12,00,000    | Number of setups          | 1,200         | ₹1,000 per setup        |

**BQ 2**

KD Ltd. is following Activity Based Costing. Budgeted overheads, cost drivers and volume are as follows:

| <b>Cost Pool</b>     | <b>Budgeted OH</b> | <b>Cost Driver</b> | <b>Budgeted Volume</b> |
|----------------------|--------------------|--------------------|------------------------|
| 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 ₹24,62,000 and wages ₹4,68,500. Usage activity of the said batch are as follows:

| <b>Activity Driver</b> | <b>Activity Volume</b> |
|------------------------|------------------------|
| Material orders        | 56                     |
| Material movement      | 84                     |
| Maintenance hours      | 1,420 hours            |
| No. of set-ups         | 60                     |
| No. of inspections     | 18                     |

**Required:**

- (1) Calculate cost driver rates.
- (2) Calculate the total and unit cost for the batch.

**Answer**

**(1) Statement Showing Cost Driver Rate**

| <b>Cost Pool</b>     | <b>Budgeted OH</b> | <b>Cost Driver</b> | <b>Volume</b> | <b>Cost Driver Rate</b> |
|----------------------|--------------------|--------------------|---------------|-------------------------|
| Material procurement | ₹18,42,000         | No. of orders      | 1,200         | ₹1,535 per order        |
| Material handling    | ₹8,50,000          | No. of movement    | 1,240         | ₹685.48 per movement    |
| Maintenance          | ₹24,56,000         | Maintenance hours  | 17,550        | ₹139.94 per hour        |
| Set-up               | ₹9,12,000          | No. of set-ups     | 1,450         | ₹628.97 per set-up      |
| Quality control      | ₹4,42,000          | No. of inspection  | 1,820         | ₹242.86 per inspection  |

**(2) Statement Showing Unit Cost and Total Cost for the Batch**

| <b>Particulars</b>                         | <b>(₹)</b>       |
|--------------------------------------------|------------------|
| Direct Material                            | 24,62,000        |
| Direct Labour                              | 4,68,500         |
| <b>Prime Cost</b>                          | <b>29,30,500</b> |
| Production Overhead:                       |                  |
| Material procurement (₹1,535 × 56 orders)  | 85,960           |
| Material handling (₹685.48 × 84 movements) | 57,580           |
| Maintenance (₹139.94 × 1,420 hours)        | 1,98,715         |
| Set-up (₹628.97 × 60 set-ups)              | 37,738           |
| Quality control (₹242.86 × 18 inspections) | 4,371            |
| <b>Total Cost for the Batch</b>            | <b>33,14,864</b> |
| ÷ Number of units                          | ÷ 7,600          |
| <b>Cost Per Unit</b>                       | <b>₹436.17</b>   |

**BQ 3**

SMP Pvt. Ltd. manufactures three products using three different machines. At present the overheads are charged to products using labour hours. The following statement for the month of September 2022, using the absorption costing method has been prepared:

| <b>Particulars</b> | <b>Product X<br/>(Using Machine A)</b> | <b>Product Y<br/>(Using Machine B)</b> | <b>Product Z<br/>(Using Machine C)</b> |
|--------------------|----------------------------------------|----------------------------------------|----------------------------------------|
|--------------------|----------------------------------------|----------------------------------------|----------------------------------------|

**ACTIVITY BASED COSTING 6.3**

|                               |          |        |          |
|-------------------------------|----------|--------|----------|
| Production units              | 45,000   | 52,500 | 30,000   |
| Material cost per unit (₹)    | 350      | 460    | 410      |
| Wages per unit @ ₹80 per hour | 240      | 400    | 560      |
| Overhead cost per unit (₹)    | 240      | 400    | 560      |
| Total cost per unit (₹)       | 830      | 1,260  | 1,530    |
| Selling price (₹)             | 1,037.50 | 1,575  | 1,912.50 |

**The following additional information is available relating to overhead cost drivers:**

| Particulars            | Product X | Product Y | Product Z | Total |
|------------------------|-----------|-----------|-----------|-------|
| No. of machine set-ups | 40        | 160       | 400       | 600   |
| No. of purchase orders | 400       | 800       | 1,200     | 2,400 |
| No. of customers       | 1,000     | 2,200     | 4,800     | 8,000 |

Actual production and budgeted production for the month is same. Workers are paid at standard rate. Out of total overhead costs, 30% related to machine set-ups, 30% related to customer order processing while the balance proportion related to customer complaint management.

**Required:**

- (1) Compute overhead cost per unit using activity based costing method.
- (2) Determine the selling price of each product based on activity based costing with the same profit mark-up on cost.

**Answer**

**(1) Statement Showing Overheads Cost per Unit  
(Using Activity based Costing)**

| Activity Cost Pool             | Cost Driver            | Ratio        | Amount      | Product X           | Product Y             | Product Z             |
|--------------------------------|------------------------|--------------|-------------|---------------------|-----------------------|-----------------------|
| Machine set ups                | No. of machine set ups | 4 : 16 : 40  | 1,45,80,000 | 9,72,000            | 38,88,000             | 97,20,000             |
| Customer order processing      | No. of purchase orders | 4 : 8 : 12   | 1,45,80,000 | 24,30,000           | 48,60,000             | 72,90,000             |
| Customer complaint mgt         | No of customers        | 10 : 22 : 48 | 1,94,40,000 | 24,30,000           | 53,46,000             | 1,16,64,000           |
| Total Cost<br>÷ Total Units    |                        |              |             | 58,32,000<br>45,000 | 1,40,94,000<br>52,500 | 2,86,74,000<br>30,000 |
| <b>Overheads Cost Per Unit</b> |                        |              |             | <b>₹129.60</b>      | <b>₹268.46</b>        | <b>₹955.80</b>        |

**(2) Statement Showing Selling Price of Each Product With same Profit on Cost  
(Based on ABC Method)**

| Particulars                      | Product X      | Product Y        | Product Z        |
|----------------------------------|----------------|------------------|------------------|
| Material cost per unit           | 350            | 460              | 410              |
| Wages per unit                   | 240            | 400              | 560              |
| Overhead cost per unit under ABC | 129.60         | 268.46           | 955.80           |
| Total cost per unit              | 719.60         | 1,128.46         | 1,925.80         |
| Add: Profit @ 25% on cost        | 179.90         | 282.12           | 481.45           |
| Selling price per unit           | <b>₹899.50</b> | <b>₹1,410.58</b> | <b>₹2,407.25</b> |

**Working Note:**

(a) Total overheads = 45,000 units of X × ₹240 + 52,500 units of Y × ₹400 + 30,000 units of Z × ₹560 = ₹4,86,00,000

(b) **Cost related to activities:**

Machine set up cost = ₹4,86,00,000 × 30% = ₹1,45,80,000  
Customer order processing cost = ₹4,86,00,000 × 30% = ₹1,45,80,000

**ACTIVITY BASED COSTING 6.4**

Customer complaint management cost = ₹4,86,00,000 × 40% = ₹1,94,40,000

|                                          |   |                                          |
|------------------------------------------|---|------------------------------------------|
| <b>(c) Calculation of profit on cost</b> | = | Profit per unit ÷ Cost per unit          |
| Product X                                | = | (1,037.50 – 830) ÷ 830 = 25% on cost     |
| Product Y                                | = | (1,575 – 1,260) ÷ 1,260 = 25% on cost    |
| Product Z                                | = | (1,912.50 – 1,530) ÷ 1,530 = 25% on cost |

**BQ 4**

ABC Ltd. is a multiproduct company, manufacturing three products A, B and C. The budgeted costs and production for the year ending 31<sup>st</sup> March, 2023 are as follows:

| <b>Particulars</b>             | <b>A</b> | <b>B</b> | <b>C</b> |
|--------------------------------|----------|----------|----------|
| Production quantity (in units) | 4,000    | 3,000    | 1,600    |
| Resources per unit:            |          |          |          |
| Direct materials (kg.)         | 4        | 6        | 3        |
| Direct labour (minutes)        | 30       | 45       | 60       |

The budgeted direct labour rate was ₹10 per hour, and the budgeted material cost was ₹2 per kg. Production overheads were budgeted at ₹99,450 and were absorbed to products using the direct labour hour rate. ABC Ltd. followed an Absorption Costing System.

ABC Ltd. is now considering to adopt an Activity Based Costing system. The following additional information is made available for this purpose.

**1. Budgeted overheads were analysed into the following:**

| <b>Particulars</b> | <b>(₹)</b> |
|--------------------|------------|
| Material handling  | 29,100     |
| Storage costs      | 31,200     |
| Electricity        | 39,150     |

**2. The cost drivers identified were as follows:**

|                   |                               |
|-------------------|-------------------------------|
| Material handling | Weight of material handled    |
| Storage costs     | Number of batches of material |
| Electricity       | Number of Machine operations  |

**3. The cost drivers identified were as follows:**

| <b>Particulars</b>           | <b>A</b> | <b>B</b> | <b>C</b> |
|------------------------------|----------|----------|----------|
| For complete production:     |          |          |          |
| Batches of material          | 10       | 5        | 15       |
| Per unit of production:      |          |          |          |
| Number of Machine operations | 6        | 3        | 2        |

**You are requested to:**

- (1) Prepare a statement for management showing the unit costs and total costs of each product using the absorption costing method.
- (2) Prepare a statement for management showing the product costs of each product using the ABC approach.
- (3) What are the reasons for the different product costs under the two approaches?

**Answer****(1) Statement Showing Unit Cost and Total Cost Using Absorption Costing Method**

| <b>Particulars</b> | <b>A (₹)</b> | <b>B (₹)</b> | <b>C (₹)</b> |
|--------------------|--------------|--------------|--------------|
| Direct Material    | 8.00         | 12.00        | 6.00         |
| Direct Labour      | 5.00         | 7.50         | 10.00        |



**ACTIVITY BASED COSTING 6.5**

|                                                       |                      |                       |                       |
|-------------------------------------------------------|----------------------|-----------------------|-----------------------|
| Production Overhead @ ₹17.00 per hour                 | 8.50<br>(17 × 30/60) | 12.75<br>(17 × 45/60) | 17.00<br>(17 × 60/60) |
| <b>Total Unit Cost</b>                                | <b>21.50</b>         | <b>32.25</b>          | <b>33.00</b>          |
| Number of units                                       | 4,000                | 3,000                 | 1,600                 |
| <b>Total Cost (total unit cost × number of units)</b> | <b>86,000</b>        | <b>96,750</b>         | <b>52,800</b>         |

**Calculation of overhead rate per direct labour hour:**

$$\begin{aligned} \text{Overhead recovery rate} &= \text{Budgeted overheads} \div \text{Budgeted labour hours} \\ &= ₹99,450 \div 5,850 \text{ hours} = ₹17 \text{ per hour} \end{aligned}$$

$$\begin{aligned} \text{Budgeted labour hours} &= 4,000 \text{ A} \times 30/60 + 3,000 \text{ B} \times 45/60 + 1,600 \text{ C} \times 60/60 \\ &= 5,850 \text{ hours} \end{aligned}$$

**(2) Statement Showing Unit Cost and Total Cost Using ABC Method**

| Particulars                                           | A (₹)                                 | B (₹)                                | C (₹)                                 |
|-------------------------------------------------------|---------------------------------------|--------------------------------------|---------------------------------------|
| Direct Material                                       | 8.00                                  | 12.00                                | 6.00                                  |
| Direct Labour                                         | 5.00                                  | 7.50                                 | 10.00                                 |
| Production Overhead:                                  |                                       |                                      |                                       |
| Material handling @ ₹0.75 per kg                      | 3.00<br>(4 × 0.75)                    | 4.50<br>(6 × 0.75)                   | 2.25<br>(3 × 0.75)                    |
| Electricity @ ₹1.082 per operation                    | 6.49<br>(6 × 1.082)                   | 3.25<br>(3 × 1.082)                  | 2.16<br>(2 × 1.082)                   |
| Storage @ ₹1,040 per batch                            | 2.60<br>(10 × $\frac{1,040}{4,000}$ ) | 1.73<br>(5 × $\frac{1,040}{3,000}$ ) | 9.75<br>(15 × $\frac{1,040}{1,600}$ ) |
| <b>Total Unit Cost</b>                                | <b>25.09</b>                          | <b>28.98</b>                         | <b>30.16</b>                          |
| Number of units                                       | 4,000                                 | 3,000                                | 1,600                                 |
| <b>Total Cost (total unit cost × number of units)</b> | <b>1,00,360</b>                       | <b>86,940</b>                        | <b>48,256</b>                         |

**Calculation of Activity rate:**

| Activity Cost Pool | Amount  | Cost Driver                | Volume | Cost Driver Rate     |
|--------------------|---------|----------------------------|--------|----------------------|
| Material handling  | ₹29,100 | Weight of material handled | 38,800 | ₹0.75 per kg         |
| Storage costs      | ₹31,200 | No. of batches of material | 30     | ₹1,040 per batch     |
| Electricity        | ₹39,150 | No. of Machine operations  | 36,200 | ₹1.082 per operation |

$$\text{Total weight} = 4,000 \times 4 \text{ kg} + 3,000 \times 6 \text{ kg} + 1,600 \times 3 \text{ kg} = 38,800 \text{ kgs}$$

$$\text{Total machine operations} = 4,000 \times 6 + 3,000 \times 3 + 1,600 \times 2 = 36,200 \text{ oper.}$$

$$\text{Total batches} = 10 + 5 + 15 = 30 \text{ batches}$$

**(3) Comment:** The difference in the total costs under the two systems is due to the differences in the overheads borne by each of the products. The Activity Based Costs appear to be more precise.

**BQ 5**

Woolmark Ltd. 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 | 4     | 12    | 8      |
| Direct Material per unit (₹) | 90    | 80    | 120    |
| Production (units)           | 3,000 | 5,000 | 20,000 |

**ACTIVITY BASED COSTING 6.6**

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 ₹6 per hour. Direct labour hour rate is ₹20 per hour. The company proposes to use activity based costing system and the activity analysis is as under:

| <b>Particulars</b>                  | <b>P</b> | <b>Q</b> | <b>R</b> |
|-------------------------------------|----------|----------|----------|
| 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 analysed as under:

|                                    |     |
|------------------------------------|-----|
| Machine set up costs               | 20% |
| Machine operation costs            | 30% |
| Inspection costs                   | 40% |
| Material procurement related costs | 10% |

**Required:**

1. Calculate the cost per unit of each product using traditional method of absorbing all production overheads on the basis of machine hours.
2. Calculate the cost per unit of each product using activity based costing principles.

**Answer****1. Statement Showing "Cost per unit as per Traditional Method"**

| <b>Particulars</b>                             | <b>P (₹)</b> | <b>Q (₹)</b> | <b>R (₹)</b> |
|------------------------------------------------|--------------|--------------|--------------|
| Direct Materials                               | 90           | 80           | 120          |
| Direct Labour [(4, 12, 8 hours) × ₹20]         | 80           | 240          | 160          |
| Production Overheads [(10, 18, 14 hours) × ₹6] | 60           | 108          | 84           |
| <b>Cost per unit</b>                           | <b>230</b>   | <b>428</b>   | <b>364</b>   |

**2. Statement Showing "Cost per unit as per ABC Method"**

| <b>Particulars</b>                                                     | <b>P (₹)</b>     | <b>Q (₹)</b>     | <b>R (₹)</b>     |
|------------------------------------------------------------------------|------------------|------------------|------------------|
| Production (units)                                                     | 3,000            | 5,000            | 20,000           |
| Direct Materials @ ₹90/₹80/₹120 per unit                               | 2,70,000         | 4,00,000         | 24,00,000        |
| Direct Labour @ ₹80/₹240/₹160 per unit                                 | 2,40,000         | 12,00,000        | 32,00,000        |
| Production Overhead:                                                   |                  |                  |                  |
| Machine Related Costs @ ₹1.80 per hour of 30,000/90,000/2,80,000 hours | 54,000           | 1,62,000         | 5,04,000         |
| Setup Costs @ ₹9,600 per setup of 20/10/20 set ups                     | 1,92,000         | 96,000           | 1,92,000         |
| Inspection Costs @ ₹4,800 per inspection of 100/40/60 inspection       | 4,80,000         | 1,92,000         | 2,88,000         |
| Purchase Related Costs @ ₹750 per purchase of 60/100/160 purchases     | 45,000           | 75,000           | 1,20,000         |
| <b>Total Costs</b>                                                     | <b>12,81,000</b> | <b>21,25,000</b> | <b>67,04,000</b> |
| <b>Cost per unit (Total Cost ÷ Units)</b>                              | <b>427.00</b>    | <b>425.00</b>    | <b>335.20</b>    |

**Working Notes:**

- (a) Total Machine Hours =  $3,000 \times 10 + 5,000 \times 18 + 20,000 \times 14 = 4,00,000 \text{ hours}$
- (b) Total Production OH =  $4,00,000 \text{ machine hours} \times ₹6 = ₹24,00,000$
- (c) Total no. of Batches =  $(3,000 \div 150) + (5,000 \div 500) + (20,000 \div 1,000)$   
= 20 batches + 10 batches + 20 batches = **50 batches**
- (d) Total no. of Inspections =  $5 \times 20 \text{ batches} + 4 \times 10 \text{ batches} + 3 \times 20 \text{ batches}$   
= **200 inspections**

**ACTIVITY BASED COSTING 6.7**

(e) Total no. of Purchase Order =  $3 \times 20 \text{ batches} + 10 \times 10 \text{ batches} + 8 \times 20 \text{ batches}$   
 = **320 orders**

(f) **Statement Showing Cost Driver Rate:**

| Cost Pool     | %   | Overheads | Cost Driver Basis     | Cost Driver Units | Cost Driver Rate  |
|---------------|-----|-----------|-----------------------|-------------------|-------------------|
| Setup         | 20% | 4,80,000  | Number of batches     | 50                | 9,600/Setup       |
| Inspection    | 40% | 9,60,000  | Number of inspections | 200               | 4,800/Inspection  |
| Purchases     | 10% | 2,40,000  | Number of purchases   | 320               | 750/Purchase      |
| Machine Hours | 30% | 7,20,000  | Machine Hours         | 4,00,000          | 1.80/Machine Hour |
| Total         | -   | 24,00,000 | -                     | -                 | -                 |

**BQ 6**

The following budgeted information relates to N Ltd. for the year 2023:

| Particulars                                        | Products |        |        |
|----------------------------------------------------|----------|--------|--------|
|                                                    | X        | Y      | Z      |
| Production and Sales (units)                       | 1,00,000 | 80,000 | 60,000 |
| Selling price per unit                             | ₹90      | ₹180   | ₹140   |
| Direct cost per unit                               | ₹50      | ₹90    | ₹95    |
| Machine department (machine hours per unit)        | 3        | 4      | 5      |
| Assembly department (direct labour hours per unit) | 6        | 4      | 3      |

The estimated overhead expenses for the year 2023 will be as below:

|                     |            |
|---------------------|------------|
| Machine Department  | ₹73,60,000 |
| Assembly Department | ₹55,00,000 |

Overhead expenses are apportioned to the products on the following basis:

|                     |                               |
|---------------------|-------------------------------|
| Machine Department  | On the basis of machine hours |
| Assembly Department | On the basis of labour hours  |

After a detailed study of the activities the following cost pools and their respective cost drivers are found:

| Cost Pool          | Amount     | Cost Driver         | Quantity        |
|--------------------|------------|---------------------|-----------------|
| Machining services | ₹64,40,000 | Machine hours       | 9,20,000 hours  |
| Assembly services  | ₹44,00,000 | Direct labour hours | 11,00,000 hours |
| Set-up costs       | ₹9,00,000  | Machine set-ups     | 9,000 set-ups   |
| Order processing   | ₹7,20,000  | Customer orders     | 7,200 orders    |
| Purchasing         | ₹4,00,000  | Purchase orders     | 800 orders      |

As per an estimate the activities will be used by the three products:

| Particulars     | Products |       |       |
|-----------------|----------|-------|-------|
|                 | X        | Y     | Z     |
| Machine set-ups | 4,500    | 3,000 | 1,500 |
| Customer orders | 2,200    | 2,400 | 2,600 |
| Purchase orders | 300      | 350   | 150   |

You are required to prepare a product-wise profit statement using:

- (1) Absorption costing method;
- (2) Activity-based method.

**Answer**

**ACTIVITY BASED COSTING 6.8****(1) Statement of Profit Using Absorption Costing Method**

| <b>Particulars</b>  | <b>X (₹)</b>                    | <b>Y (₹)</b>                  | <b>Z (₹)</b>                  |
|---------------------|---------------------------------|-------------------------------|-------------------------------|
| Sales Value         | 90,00,000<br>(1,00,000 × 90)    | 1,44,00,000<br>(80,000 × 180) | 84,00,000<br>(60,000 × 140)   |
| Less: Direct Cost   | 50,00,000<br>(1,00,000 × 50)    | 72,00,000<br>(80,000 × 90)    | 57,00,000<br>(60,000 × 95)    |
| Less: Overhead:     |                                 |                               |                               |
| Machine Department  | 24,00,000<br>(1,00,000 × 3 × 8) | 25,60,000<br>(80,000 × 4 × 8) | 24,00,000<br>(60,000 × 5 × 8) |
| Assembly Department | 30,00,000<br>(1,00,000 × 6 × 5) | 16,00,000<br>(80,000 × 4 × 5) | 9,00,000<br>(60,000 × 3 × 5)  |
| <b>Profit</b>       | <b>(14,00,000)</b>              | <b>30,40,000</b>              | <b>(6,00,000)</b>             |

**(2) Statement of Profit Using ABC Method**

| <b>Particulars</b> | <b>X (₹)</b>                    | <b>Y (₹)</b>                  | <b>Z (₹)</b>                  |
|--------------------|---------------------------------|-------------------------------|-------------------------------|
| Sales Value        | 90,00,000<br>(1,00,000 × 90)    | 1,44,00,000<br>(80,000 × 180) | 84,00,000<br>(60,000 × 140)   |
| Less: Direct Cost  | 50,00,000<br>(1,00,000 × 50)    | 72,00,000<br>(80,000 × 90)    | 57,00,000<br>(60,000 × 95)    |
| Less: Overhead:    |                                 |                               |                               |
| Machining services | 21,00,000<br>(1,00,000 × 3 × 7) | 22,40,000<br>(80,000 × 4 × 7) | 21,00,000<br>(60,000 × 5 × 7) |
| Assembly services  | 24,00,000<br>(1,00,000 × 6 × 4) | 12,80,000<br>(80,000 × 4 × 4) | 7,20,000<br>(60,000 × 3 × 4)  |
| Set-up costs       | 4,50,000<br>(4,500 × 100)       | 3,00,000<br>(3,000 × 100)     | 1,50,000<br>(1,500 × 100)     |
| Order processing   | 2,20,000<br>(2,200 × 100)       | 2,40,000<br>(2,400 × 100)     | 2,60,000<br>(2,600 × 100)     |
| Purchasing         | 1,50,000<br>(300 × 500)         | 1,75,000<br>(350 × 500)       | 75,000<br>(150 × 500)         |
| <b>Profit</b>      | <b>(13,20,000)</b>              | <b>29,65,000</b>              | <b>(6,05,000)</b>             |

**Working Note:****1. Calculation of overhead rate:**

$$\begin{aligned} \text{Machine Department} &= \text{Budgeted overheads} \div \text{Budgeted machine hours} \\ &= ₹73,60,000 \div 9,20,000 = ₹8 \text{ per hour} \end{aligned}$$

$$\begin{aligned} \text{Assembly Department} &= \text{Budgeted overheads} \div \text{Budgeted labour hours} \\ &= ₹55,00,000 \div 11,00,000 = ₹5 \text{ per hour} \end{aligned}$$

**2. Calculation of Cost driver rate:**

| <b>Cost Pool</b>   | <b>Amount</b> | <b>Cost Driver</b>  | <b>Volume</b>   | <b>Cost Driver Rate</b> |
|--------------------|---------------|---------------------|-----------------|-------------------------|
| Machining services | ₹64,40,000    | Machine hours       | 9,20,000 hours  | ₹7 per hour             |
| Assembly services  | ₹44,00,000    | Direct labour hours | 11,00,000 hours | ₹4 per hour             |
| Set-up costs       | ₹9,00,000     | Machine set-ups     | 9,000 set-ups   | ₹100 per set-up         |
| Order processing   | ₹7,20,000     | Customer orders     | 7,200 orders    | ₹100 per order          |
| Purchasing         | ₹4,00,000     | Purchase orders     | 800 orders      | ₹500 per order          |

**BQ 7**

BABYSOFT is a global brand created by Bio-organic Ltd. The company manufactures three ranges of beauty soaps i.e. BABYSOFT- Gold, BABYSOFT- Pearl, and BABYSOFT- Diamond. The budgeted costs and production for the month of December, 2022 are as follows:

**ACTIVITY BASED COSTING 6.9**

|                            | <b>BABYSOFT- Gold</b> |             | <b>BABYSOFT- Pearl</b> |             | <b>BABYSOFT- Diamond</b> |             |
|----------------------------|-----------------------|-------------|------------------------|-------------|--------------------------|-------------|
| <b>Production (Units)</b>  | <b>4,000</b>          |             | <b>3,000</b>           |             | <b>2,000</b>             |             |
| <b>Resources per Unit:</b> | <b>Qty</b>            | <b>Rate</b> | <b>Qty</b>             | <b>Rate</b> | <b>Qty</b>               | <b>Rate</b> |
| Essential Oils             | 60 ml                 | ₹200/100 ml | 55 ml                  | ₹300/100 ml | 65 ml                    | ₹300/100 ml |
| Cocoa Butter               | 20 g                  | ₹200/100 g  | 20 g                   | ₹200/100 g  | 20 g                     | ₹200/100 g  |
| Filtered Water             | 30 ml                 | ₹15/100 ml  | 30 ml                  | ₹15/100 ml  | 30 ml                    | ₹15/100 ml  |
| Chemicals                  | 10 g                  | ₹30/100 g   | 12 g                   | ₹50/100 g   | 15 g                     | ₹60/100 g   |
| Direct Labour              | 30 minutes            | ₹10/hour    | 40 minutes             | ₹10/hour    | 60 minutes               | ₹10/hour    |

Bio-organic Ltd. followed an Absorption Costing System and absorbed its production overheads, to its products using direct labour hour rate, which were budgeted at ₹1,98,000.

Now, Bio-organic Ltd. is considering adopting an Activity Based Costing system. For this, additional information regarding budgeted overheads and their cost drivers is provided below:

| <b>Particulars</b> | <b>(₹)</b> | <b>Cost drivers</b>          |
|--------------------|------------|------------------------------|
| Forklifting cost   | 58,000     | Weight of material lifted    |
| Supervising cost   | 60,000     | Direct labour hours          |
| Utilities          | 80,000     | Number of Machine operations |

The number of machine operations per unit of production are 5, 5, and 6 for BABYSOFT- Gold, BABYSOFT- Pearl, and BABYSOFT- Diamond respectively.

(Consider (i) Mass of 1 litre of Essential Oils and Filtered Water equivalent to 0.8 kg and 1 kg respectively (ii) Mass of output produced is equivalent to the mass of input materials taken together.)

**You are requested to:**

1. Prepare a statement showing the unit costs and total costs of each product using the absorption costing method.
2. Prepare a statement showing the product costs of each product using the ABC approach.
3. State what are the reasons for the different product costs under the two approaches?

**Answer**

**1. Statement Showing "Unit Cost and Total Cost as per Absorption Costing"**

| <b>Particulars</b>                                  | <b>BABYSOFT- Gold</b> | <b>BABYSOFT- Pearl</b> | <b>BABYSOFT- Diamond</b> |
|-----------------------------------------------------|-----------------------|------------------------|--------------------------|
| Number of units                                     | 4,000                 | 3,000                  | 2,000                    |
| Direct Materials                                    | 167.50                | 215.50                 | 248.50                   |
| Direct Labour [(30, 40, 60 minutes) @ ₹10 per hour  | 5.00                  | 6.67                   | 10.00                    |
| Production OH [(30, 40, 60 minutes) @ ₹33 per hour  | 16.50                 | 22.00                  | 33.00                    |
| <b>Cost per unit</b>                                | <b>189.00</b>         | <b>244.17</b>          | <b>291.50</b>            |
| <b>Total cost (Cost per unit × number of units)</b> | <b>7,56,000</b>       | <b>7,32,510</b>        | <b>5,83,000</b>          |

**Working notes:**

- (a) Total Direct labour hours =  $4,000 \text{ units} \times 30/60 + 3,000 \times 40/60 + 2,000 \times 1 \text{ hour}$   
=  $2,000 \text{ hours} + 2,000 \text{ hours} + 2,000 \text{ hours} = \text{6,000 hours}$
- (b) Overhead rate =  $\text{Budgeted overheads} \div \text{Budgeted labour hours}$   
=  $\text{₹1,98,000} \div 6,000 \text{ hours} = \text{₹33/direct labour hour}$

**(c) Calculation of Direct material cost**

|                | <b>BABYSOFT- Gold (₹)</b>                               | <b>BABYSOFT- Pearl (₹)</b>                              | <b>BABYSOFT- Diamond (₹)</b>                            |
|----------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| Essential oils | $\frac{120.00}{\left(\frac{200 \times 60}{100}\right)}$ | $\frac{165.00}{\left(\frac{300 \times 55}{100}\right)}$ | $\frac{195.00}{\left(\frac{300 \times 65}{100}\right)}$ |

**ACTIVITY BASED COSTING 6.10**

|                   |                                                        |                                                        |                                                        |
|-------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| Cocoa Butter      | $\frac{40.00}{\left(\frac{200 \times 20}{100}\right)}$ | $\frac{40.00}{\left(\frac{200 \times 20}{100}\right)}$ | $\frac{40.00}{\left(\frac{200 \times 20}{100}\right)}$ |
| Filtered water    | $\frac{4.50}{\left(\frac{30 \times 15}{100}\right)}$   | $\frac{4.50}{\left(\frac{30 \times 15}{100}\right)}$   | $\frac{4.50}{\left(\frac{30 \times 15}{100}\right)}$   |
| Chemicals         | $\frac{3.00}{\left(\frac{30 \times 10}{100}\right)}$   | $\frac{6.00}{\left(\frac{50 \times 12}{100}\right)}$   | $\frac{9.00}{\left(\frac{60 \times 15}{100}\right)}$   |
| <b>Total cost</b> | <b>167.50</b>                                          | <b>215.50</b>                                          | <b>248.50</b>                                          |

**2. Statement Showing "Unit Cost and Total Cost as per ABC Costing"**

| <b>Particulars</b>   | <b>BABYSOFT- Gold</b> | <b>BABYSOFT- Pearl</b> | <b>BABYSOFT- Diamond</b> |
|----------------------|-----------------------|------------------------|--------------------------|
| Number of units      | 4,000                 | 3,000                  | 2,000                    |
| Direct Materials     | 167.50                | 215.50                 | 248.50                   |
| Direct Labour        | 5.00                  | 6.67                   | 10.00                    |
| Production OH:       |                       |                        |                          |
| Forklifting cost     | 6.48<br>(0.06 × 108)  | 6.36<br>(0.06 × 106)   | 7.02<br>(0.06 × 117)     |
| Supervising cost     | 5.00<br>(10 × 30/60)  | 6.67<br>(10 × 40/60)   | 10.00<br>(10 × 60/60)    |
| Utilities            | 8.50<br>(1.70 × 5)    | 8.50<br>(1.70 × 5)     | 10.20<br>(1.70 × 6)      |
| <b>Cost per unit</b> | <b>192.48</b>         | <b>243.70</b>          | <b>285.72</b>            |
| <b>Total cost</b>    | <b>7,69,920</b>       | <b>7,31,100</b>        | <b>5,71,440</b>          |

**Working notes:**

- (a) Forklifting rate = ₹58,000 ÷ 9,84,000 grams = **₹0.06 per gram**
- (b) Supervising rate = ₹60,000 ÷ 6,000 hours labour hour = **₹10 labour hour**
- (c) Utilities rate = ₹80,000 ÷ 47,000 machine operations = **₹1.70 per machine operations**
- (d) Calculation of Total Weight and Total Operations:

|                         | <b>BABYSOFT- Gold</b>     | <b>BABYSOFT- Pearl</b>    | <b>BABYSOFT- Diamond</b>  | <b>Total</b> |
|-------------------------|---------------------------|---------------------------|---------------------------|--------------|
| Quantity (units)        | 4,000                     | 3,000                     | 2,000                     | -            |
| Weight per unit (grams) | 108                       | 106                       | 117                       | -            |
|                         | {(60×0.8)+20+30+10}       | {(55×0.8)+20+30+12}       | {(65×0.8)+20+30+15}       |              |
| Total weight (grams)    | 4,32,000<br>(4,000 × 108) | 3,18,000<br>(3,000 × 106) | 2,34,000<br>(2,000 × 117) | 9,84,000     |
| Total operations        | 20,000<br>(4,000 × 5)     | 15,000<br>(3,000 × 5)     | 12,000<br>(2,000 × 6)     | 47,000       |

- 3. Comments:** The difference in the total costs under the two systems is due to the differences in the overheads borne by each of the products. The Activity Based Costs appear to be more accurate.

**BQ 8**

RST Limited specializes in the distribution of pharmaceutical products. It buys from the pharmaceutical companies and resells to each of the three different markets.

- (1) General Supermarket Chains
- (2) Drugstore Chains
- (3) Chemist Shops

**The following data for the month of April, 2023 in respect of RST Limited has been reported:**

**ACTIVITY BASED COSTING 6.11**

| <b>Particulars</b>                      | <b>General Supermarket Chains (₹)</b> | <b>Drugstore Chains (₹)</b> | <b>Chemist Shops (₹)</b> |
|-----------------------------------------|---------------------------------------|-----------------------------|--------------------------|
| Average revenue per delivery            | 84,975                                | 28,875                      | 5,445                    |
| Average cost of goods sold per delivery | 82,500                                | 27,500                      | 4,950                    |
| Number of deliveries                    | 330                                   | 825                         | 2,750                    |

In the past, RST Limited has used gross margin percentage to evaluate the relative profitability of its distribution channels. The company plans to use activity based costing for analysing the profitability of its distribution channels.

**The Activity analysis of RST Limited is as under:**

| <b>Activity Area</b>               | <b>Cost Driver</b>                         |
|------------------------------------|--------------------------------------------|
| Customer purchase order processing | Purchase orders by customers               |
| Line-item ordering                 | Line-items per purchase order              |
| Store delivery                     | Store deliveries                           |
| Cartons dispatched to stores       | Cartons dispatched to a store per delivery |
| Shelf-stocking at customer store   | Hours of shelf-stocking                    |

The April, 2023 operating costs (other than cost of goods sold) of RST Limited are ₹8,27,970. These operating costs are assigned to five activity areas. The cost in each area and the quantity of the cost allocation basis used in that area for April, 2023 are as follows:

| <b>Activity Area</b>               | <b>Total costs in April, 2023 (₹)</b> | <b>Total Units of Cost Allocation Base used in April, 2023</b> |
|------------------------------------|---------------------------------------|----------------------------------------------------------------|
| Customer purchase order processing | 2,20,000                              | 5,500 orders                                                   |
| Line-item ordering                 | 1,75,560                              | 58,520 line items                                              |
| Store delivery                     | 1,95,250                              | 3,905 store deliveries                                         |
| Cartons dispatched to store        | 2,09,000                              | 2,09,000 cartons dispatched                                    |
| Shelf-stocking at customer store   | 28,160                                | 1,760 hours                                                    |

**Other data for April, 2023 include the following:**

| <b>Particulars</b>                                        | <b>Supermarket Chains</b> | <b>Drugstore Chains</b> | <b>Chemist Shops</b> |
|-----------------------------------------------------------|---------------------------|-------------------------|----------------------|
| Total number of orders                                    | 385                       | 990                     | 4,125                |
| Average number of line items per order                    | 14                        | 12                      | 10                   |
| Total number of store deliveries                          | 330                       | 825                     | 2,750                |
| Average no. of cartons shipped per store delivery         | 300                       | 80                      | 16                   |
| Average no. of hours of shelf stocking per store delivery | 3                         | 0.6                     | 0.1                  |

**Required:**

- (1) Compute for April, 2023 gross-margin percentage for each of its three distribution channels and compute RST Limited's operating income.
- (2) Compute the April, 2023 rate per unit of the cost-allocation base for each of the five activity areas.
- (3) Compute the operating income of each distribution channel in April, 2023 using the activity based costing information. Comment on the results. What new insights are available with the activity based cost information?
- (4) Describe four challenges one would face in assigning the total April, 2023 operating costs of ₹8,27,970 to five activity areas.

**Answer**

**(1) Statement of Operating Income and Gross Margin % for Each of its Three Distribution Channel**

| <b>Particulars</b>               | <b>General Supermarket</b> | <b>Drugstore Chains</b> | <b>Chemist Shops</b> | <b>Total</b> |
|----------------------------------|----------------------------|-------------------------|----------------------|--------------|
| Number of deliveries             | 330                        | 825                     | 2,750                | -            |
| Average revenue per delivery (₹) | 84,975                     | 28,875                  | 5,445                | -            |



**ACTIVITY BASED COSTING 6.12**

|                                |             |             |             |             |
|--------------------------------|-------------|-------------|-------------|-------------|
| Average COGS per delivery (₹)  | 82,500      | 27,500      | 4,950       | -           |
| Revenue (₹)                    | 2,80,41,750 | 2,38,21,875 | 1,49,73,750 | 6,68,37,375 |
| Less: Cost of goods sold (₹)   | 2,72,25,000 | 2,26,87,500 | 1,36,12,500 | 6,35,25,000 |
| Gross Margin (₹)               | 8,16,750    | 11,34,375   | 13,61,250   | 33,12,375   |
| Less: Other operating cost (₹) | -           | -           | -           | 8,27,970    |
| Operating income (₹)           | -           | -           | -           | 24,84,405   |
| Gross Margin (%)               | 2.91%       | 4.76%       | 9.09%       | 4.96%       |
| Operating income (%)           | -           | -           | -           | 3.72%       |

**(2) Computation of rate per unit of the cost allocation base for each of the five activity areas**

| Activity Area                      | Calculation                        | Rate per Unit of the Cost Allocation Base (₹) |
|------------------------------------|------------------------------------|-----------------------------------------------|
| Customer purchase order processing | ₹2,20,000 ÷ 5,500 orders           | ₹40 per order                                 |
| Line-item ordering                 | ₹1,75,560 ÷ 58,520 line items      | ₹3 per line item                              |
| Store delivery                     | ₹1,95,250 ÷ 3,905 store deliveries | ₹50 per delivery                              |
| Cartons dispatched to store        | ₹2,09,000 ÷ 2,09,000 cartons       | ₹1 per carton dispatched                      |
| Shelf-stocking at customer store   | ₹28,160 ÷ 1,760 hours              | ₹16 per hour                                  |

**(3) Statement of Operating Income of Each Distribution Channel Using ABC Method**

| Particulars                                     | General Supermarket Chains | Drugstore Chains | Chemist Shops |
|-------------------------------------------------|----------------------------|------------------|---------------|
| Gross Margin (₹)                                | 8,16,750                   | 11,34,375        | 13,61,250     |
| Less: Other operating cost (₹) (WN)             | 1,62,910                   | 1,90,410         | 4,74,650      |
| Operating income (₹)                            | 6,53,840                   | 9,43,965         | 8,86,600      |
| Operating income (%) (Operating income ÷ Sales) | 2.33%                      | 3.96%            | 5.92%         |

**Comments and new insights:** The activity-based cost information highlights, how the 'Chemist Shops' uses a larger amount of RST Ltd's resources per revenue than do the other two distribution channels. Ratio of operating costs to revenues, across these markets is:

| Markets                    | Calculation                              | Operating cost ratio |
|----------------------------|------------------------------------------|----------------------|
| General supermarket chains | $(1,62,910 \div 2,80,41,750) \times 100$ | 0.58%                |
| Drug store chains          | $(1,90,410 \div 2,38,21,875) \times 100$ | 0.80%                |
| Chemist shops              | $(4,74,650 \div 1,49,73,750) \times 100$ | 3.17%                |

**Working note:****Computation of operating cost of each distribution channel:**

| Activities                      | General Supermarket Chains | Drugstore Chains           | Chemist Shops                 |
|---------------------------------|----------------------------|----------------------------|-------------------------------|
| Customer purchase order process | 15,400<br>(385 × ₹40)      | 39,600<br>(990 × ₹40)      | 1,65,000<br>(4,125 × ₹40)     |
| Line item ordering              | 16,170<br>(385 × 14 × ₹3)  | 35,640<br>(990 × 12 × ₹3)  | 1,23,750<br>(4,125 × 10 × ₹3) |
| Store delivery                  | 16,500<br>(330 × ₹50)      | 41,250<br>(825 × ₹50)      | 1,37,500<br>(2,750 × ₹50)     |
| Cartons dispatched              | 99,000<br>(330 × 300 × ₹1) | 66,000<br>(825 × 80 × ₹1)  | 44,000<br>(2,750 × 16 × ₹1)   |
| Shelf-stocking                  | 15,840<br>(330 × 3 × ₹16)  | 7,920<br>(825 × 0.6 × ₹16) | 4,400<br>(2,750 × 0.1 × ₹16)  |
| <b>Operating cost</b>           | <b>1,62,910</b>            | <b>1,90,410</b>            | <b>4,74,650</b>               |

**(4) Challenges faced in assigning total operating cost of ₹8,27,970:**

- Choosing an appropriate cost driver for activity area.
- Developing a reliable data base for the chosen cost driver.
- Deciding, how to handle costs that may be common across several activities.

- Choice of the time period to compute cost rates per cost driver.
- Behavioural factors.

**BQ 9**

Family Store wants information about the profitability of individual product lines: Soft drinks, Fresh produce and Packaged food. Family store provides the following data for the year 2022-23 for each product line:

|                                  | <b>Soft drinks</b> | <b>Fresh produce</b> | <b>Packaged food</b> |
|----------------------------------|--------------------|----------------------|----------------------|
| Revenues                         | ₹39,67,500         | ₹1,05,03,000         | ₹60,49,500           |
| Cost of goods sold               | ₹30,00,000         | ₹75,00,000           | ₹45,00,000           |
| Cost of bottles returned         | ₹60,000            | ₹0                   | ₹0                   |
| Number of purchase orders placed | 360                | 840                  | 360                  |
| Number of deliveries received    | 300                | 2,190                | 660                  |
| Hours of shelf-stocking time     | 540                | 5,400                | 2,700                |
| Items sold                       | 1,26,000           | 11,04,000            | 3,06,000             |

Family store also provides the following information for the year 2022-23:

| <b>Activity</b>  | <b>Description of activity</b>                            | <b>Total Cost</b> | <b>Cost-allocation base</b>        |
|------------------|-----------------------------------------------------------|-------------------|------------------------------------|
| Bottles returns  | Returning of empty bottles                                | ₹60,000           | Direct tracing to soft drink line  |
| Ordering         | Placing of orders for purchases                           | ₹7,80,000         | 1,560 purchase orders              |
| Delivery         | Physical delivery and receipt of goods                    | ₹12,60,000        | 3,150 deliveries                   |
| Shelf stocking   | Stocking of goods on store shelves and ongoing restocking | ₹8,64,000         | 8,640 hours of shelf-stocking time |
| Customer Support | Assistance provided to customers including check-out      | ₹15,36,000        | 15,36,000 items sold               |

**Required:**

1. Family store currently allocates support cost (all cost other than cost of goods sold) to product lines on the basis of cost of goods sold of each product line. Calculate the operating income and operating income as a % of revenues for each product line.
2. If Family Store allocates support costs (all costs other than cost of goods sold) to product lines using an activity-based costing system, Calculate the operating income and operating income as a % of revenues for each product line.

**Answer**

1. **Statement of Operating income and Operating income as a % of revenues for each product line (When support costs are allocated to product lines on the basis of cost of goods sold of each product)**

|                                       | <b>Soft Drinks (₹)</b> | <b>Fresh Produce (₹)</b> | <b>Packaged Foods (₹)</b> | <b>Total (₹)</b> |
|---------------------------------------|------------------------|--------------------------|---------------------------|------------------|
| Revenues                              | 39,67,500              | 1,05,03,000              | 60,49,500                 | 2,05,20,000      |
| Cost of Goods sold (COGS)             | 30,00,000              | 75,00,000                | 45,00,000                 | 1,50,00,000      |
| Support cost (30% of COGS)            | 9,00,000               | 22,50,000                | 13,50,000                 | 45,00,000        |
| Total cost                            | 39,00,000              | 97,50,000                | 58,50,000                 | 1,95,00,000      |
| Operating income (Sales – Total cost) | 67,500                 | 7,53,000                 | 1,99,500                  | 10,20,000        |
| <b>% of Operating income to Sales</b> | <b>1.70%</b>           | <b>7.17%</b>             | <b>3.30%</b>              | <b>4.97%</b>     |

**Working notes:**

**(a) Calculation of Cost Driver Rate**

| <b>Activity (1)</b> | <b>Total cost (₹) (2)</b> | <b>Cost allocation base (3)</b> | <b>Cost driver rate (4) = [(2)÷(3)]</b> |
|---------------------|---------------------------|---------------------------------|-----------------------------------------|
| Ordering            | 7,80,000                  | 1,560 purchase orders           | ₹500 per purchase order                 |
| Delivery            | 12,60,000                 | 3,150 deliveries                | ₹400 per delivery                       |
| Shelf-stocking      | 8,64,000                  | 8,640 hours                     | ₹100 per stocking hour                  |
| Customer support    | 15,36,000                 | 15,36,000 items sold            | ₹1 per item sold                        |

**ACTIVITY BASED COSTING 6.14**

$$(b) \text{ Total support cost} = 60,000 + 7,80,000 + 12,60,000 + 8,64,000 + 15,36,000 = \mathbf{45,00,000}$$

$$(c) \text{ Percentage of support cost to COGS} = \frac{45,00,000}{1,50,00,000} \times 100 = \mathbf{30\%}$$

**2. Statement of Operating income and Operating income as a % of revenues for each product line**  
**(When support costs are allocated to product lines using an activity based costing system)**

|                                                         | <b>Soft Drinks<br/>(₹)</b> | <b>Fresh<br/>Produce (₹)</b> | <b>Packaged<br/>Foods (₹)</b> | <b>Total (₹)</b> |
|---------------------------------------------------------|----------------------------|------------------------------|-------------------------------|------------------|
| Revenues                                                | 39,67,500                  | 1,05,03,000                  | 60,49,500                     | 2,05,20,000      |
| Cost of Goods sold (COGS)                               | 30,00,000                  | 75,00,000                    | 45,00,000                     | 1,50,00,000      |
| Bottle return costs                                     | 60,000                     | -                            | -                             | 60,000           |
| Ordering cost (360 : 840 : 360)                         | 1,80,000                   | 4,20,000                     | 1,80,000                      | 7,80,000         |
| Delivery cost (300 : 2190 : 660)                        | 1,20,000                   | 8,76,000                     | 2,64,000                      | 12,60,000        |
| Shelf stocking cost (540 : 5400 : 2700)                 | 54,000                     | 5,40,000                     | 2,70,000                      | 8,64,000         |
| Customer Support cost (1,26,000 : 11,04,000 : 3,06,000) | 1,26,000                   | 11,04,000                    | 3,06,000                      | 15,36,000        |
| Total cost                                              | 35,54,000                  | 1,04,40,000                  | 55,20,000                     | 1,95,00,000      |
| Operating income (Sales – Total cost)                   | 4,27,500                   | 63,000                       | 5,29,500                      | 10,20,000        |
| <b>% of Operating income to Sales</b>                   | <b>10.78%</b>              | <b>0.60%</b>                 | <b>8.75%</b>                  | <b>4.97%</b>     |

**BQ 10**

Asian manufacturing company has decided to increase the size of the store. It wants the information about the probability of the individual product lines: Lemon, Grapes and Papaya. It provides the following data for the 2023 for each product line:

| <b>Particulars</b>              | <b>Lemon</b> | <b>Grapes</b> | <b>Papaya</b> |
|---------------------------------|--------------|---------------|---------------|
| Revenue (₹)                     | 79,350       | 2,10,060      | 1,20,990      |
| Cost of goods sold (₹)          | 60,000       | 1,50,000      | 90,000        |
| Cost of bottles returned (₹)    | 1,200        | 0             | 0             |
| Number of purchase order 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 manufacturing company also provides the following information for the year 2023:

| <b>Activity</b>  | <b>Description of Activity</b>                                  | <b>Total Cost</b> | <b>Cost Allocation Basis</b>   |
|------------------|-----------------------------------------------------------------|-------------------|--------------------------------|
| 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                 |
| Shelf- 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**

- (1) Asian manufacturing company 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.
- (2) If Asian manufacturing company allocates store support costs (all costs other than the cost of goods sold) to the product lines on the basis of ABC system, Calculate the operating income and operating income as the percentage of revenue of each product line.
- (3) Show a comparison statement.

**Answer****(1) Statement of Operating Income and Percentage of Operating Income for each Product Line  
(Allocation of Store Support Cost on the basis of COGS)**

| Particulars                                  | Lemon  | Grapes   | Papaya   | Total    |
|----------------------------------------------|--------|----------|----------|----------|
| Revenue                                      | 79,350 | 2,10,060 | 1,20,990 | 4,10,400 |
| Less: Cost of goods sold                     | 60,000 | 1,50,000 | 90,000   | 3,00,000 |
| Less: Store support cost (₹90,000 in 6:15:9) | 18,000 | 45,000   | 27,000   | 90,000   |
| Operating income (₹)                         | 1,350  | 15,060   | 3,990    | 20,400   |
| Operating income (%)                         | 1.70%  | 7.17%    | 3.30%    | 4.97%    |

**(2) Statement of Operating Income and Percentage of Operating Income for each Product Line  
(Allocation of Store Support Cost on the basis of ABC)**

| Particulars                        | Lemon  | Grapes   | Papaya   | Total    |
|------------------------------------|--------|----------|----------|----------|
| Revenue                            | 79,350 | 2,10,060 | 1,20,990 | 4,10,400 |
| Less: Cost of goods sold           | 60,000 | 1,50,000 | 90,000   | 3,00,000 |
| Less: Store support cost:          |        |          |          |          |
| Bottle return                      | 1,200  | -        | -        | 1,200    |
| Ordering @ ₹100 per purchase order | 3,600  | 8,400    | 3,600    | 15,600   |
| Delivery @ ₹80 per delivery        | 2,400  | 17,520   | 5,280    | 25,200   |
| Shelf stocking @ ₹20 per hour      | 1,080  | 10,800   | 5,400    | 17,280   |
| Customer support @ ₹0.20/item sold | 2,520  | 22,080   | 6,120    | 30,720   |
| Operating income (₹)               | 8,550  | 1,260    | 10,590   | 20,400   |
| Operating income (%)               | 10.78% | 0.60%    | 8.75%    | 4.97%    |

**Calculation of Store Support Cost rate:**

| Activity Cost Pool | Amount  | Cost Driver                    | Volume   | Cost Driver Rate        |
|--------------------|---------|--------------------------------|----------|-------------------------|
| Bottle returns     | ₹1,200  | Direct tracing to product line | 1        | ₹1,200                  |
| Ordering           | ₹15,600 | Number of purchase orders      | 156      | ₹100 per purchase order |
| Delivery           | ₹25,200 | Number of deliveries           | 315      | ₹80 per delivery        |
| Shelf- stocking    | ₹17,280 | Shelf stocking hours           | 864      | ₹20 per hour            |
| Customer support   | ₹30,720 | Number of items sold           | 1,53,600 | ₹0.20 per item sold     |

**(3) Statement Showing Comparison**

| Particulars                      | Lemon  | Grapes | Papaya | Total |
|----------------------------------|--------|--------|--------|-------|
| Under Traditional Costing System | 1.70%  | 7.17%  | 3.30%  | 4.97% |
| Under ABC System                 | 10.78% | 0.60%  | 8.75%  | 4.97% |

**BQ 11**

RVP Cinema provides the following data for the year 2022-23:

| Particulars                        | Premium Hall | Recliner Hall | 7D Hall  | Cafeteria |
|------------------------------------|--------------|---------------|----------|-----------|
| Revenue (₹)                        | 11,55,000    | 18,75,000     | 9,30,000 | 5,25,000  |
| Cost of goods sold (₹)             | -            | -             | -        | 4,51,125  |
| Digital media cost (₹)             | 6,19,800     | 9,46,875      | 4,02,900 | -         |
| Number of Credit Card transactions | 75,000       | 90,000        | 60,000   | 45,000    |
| Number of Tests                    | 12,000       | 18,000        | 15,000   | 7,500     |
| Number of Setups                   | 225          | 450           | 150      | 75        |
| Area in Square feet                | 3,000        | 4,500         | 2,250    | 750       |
| Number of Customer contacts        | 2,62,500     | 3,00,000      | 1,50,000 | 37,500    |
| Number of Customer online orders   | 2,10,000     | 2,47,500      | 1,20,000 | 22,500    |

**Cost analysis has revealed the following:**

**ACTIVITY BASED COSTING 6.16**

| <b>Activity</b>              | <b>Activity Cost</b> | <b>Activity Driver</b>            | <b>Activity Capacity</b> |
|------------------------------|----------------------|-----------------------------------|--------------------------|
| Marketing Expenses           | ₹2,25,000            | Number of Customer contacts       | 7,50,000                 |
| Website Maintenance Expense  | ₹1,50,000            | Number of Customer online orders  | 6,00,000                 |
| Credit Card Processing Fees  | ₹1,35,000            | Number of Credit Card transaction | 2,70,000                 |
| Cleaning Equipment Cost      | ₹3,15,000            | Number of square feet             | 10,500                   |
| Inspecting and testing costs | ₹2,62,500            | Number of tests                   | 52,500                   |
| Setting up machine's costs   | ₹4,50,000            | Number of set-ups                 | 900                      |

**Required:**

- (1) If RVP Cinema allocates all costs (other than the cost of goods sold and digital media costs) to the departments on the basis of Activity Based Costing system, Calculate the operating income and percentage of operating income of each department.
- (2) RVP Cinema operated for years under the assumption that profitability can be increased by increasing net revenue from Cafeteria. However, the supervisor of RVP Cinema wants to shut down Cafeteria. On the basis of (1) above, State whether the contention of the Supervisor is valid or not.

**Answer****(1) Statement of Operating Income and Percentage of Operating Income for each Department**

| <b>Particulars</b>           | <b>Premium Hall</b>        | <b>Recliner Hall</b>       | <b>7D Hall</b>             | <b>Cafeteria</b>         |
|------------------------------|----------------------------|----------------------------|----------------------------|--------------------------|
| Revenue                      | 11,55,000                  | 18,75,000                  | 9,30,000                   | 5,25,000                 |
| Less: Cost of Goods Sold     | -                          | -                          | -                          | 4,51,125                 |
| Less: Digital Media Costs    | 6,19,800                   | 9,46,875                   | 4,02,900                   | -                        |
| Less: Other Costs:           |                            |                            |                            |                          |
| Marketing Expenses           | 78,750<br>(2,62,500 × .30) | 90,000<br>(3,00,000 × .30) | 45,000<br>(1,50,000 × .30) | 11,250<br>(37,500 × .30) |
| Website Maintenance Exps.    | 52,500<br>(2,10,000 × .25) | 61,875<br>(2,47,500 × .25) | 30,000<br>(1,20,000 × .25) | 5,625<br>(22,500 × .25)  |
| Credit Card Processing Fees  | 37,500<br>(75,000 × .50)   | 45,000<br>(90,000 × .50)   | 30,000<br>(60,000 × .50)   | 22,500<br>(45,000 × .50) |
| Cleaning Equipment Cost      | 90,000<br>(3,000 × 30)     | 1,35,000<br>(4,500 × 30)   | 67,500<br>(2,250 × 30)     | 22,500<br>(750 × 30)     |
| Inspecting and testing costs | 60,000<br>(12,000 × 5)     | 90,000<br>(18,000 × 5)     | 75,000<br>(15,000 × 5)     | 37,500<br>(7,500 × 5)    |
| Setting up machine's costs   | 1,12,500<br>(225 × 500)    | 2,25,000<br>(450 × 500)    | 75,000<br>(150 × 500)      | 37,500<br>(75 × 500)     |
| <b>Operating Income (₹)</b>  | <b>1,03,950</b>            | <b>2,81,250</b>            | <b>2,04,600</b>            | <b>(63,000)</b>          |
| <b>Operating Income (%)</b>  | <b>9%</b>                  | <b>15%</b>                 | <b>22%</b>                 | <b>(12%)</b>             |

**Calculation of Activity rate:**

| <b>Activity Cost Pool</b>    | <b>Amount</b> | <b>Activity Driver</b>            | <b>Volume</b> | <b>Activity Rate</b> |
|------------------------------|---------------|-----------------------------------|---------------|----------------------|
| Marketing Expenses           | ₹2,25,000     | Number of Customer contacts       | 7,50,000      | ₹0.30                |
| Website Maintenance Expense  | ₹1,50,000     | Number of Customer online orders  | 6,00,000      | ₹0.25                |
| Credit Card Processing Fees  | ₹1,35,000     | Number of Credit Card transaction | 2,70,000      | ₹0.50                |
| Cleaning Equipment Cost      | ₹3,15,000     | Number of square feet             | 10,500        | ₹30.00               |
| Inspecting and testing costs | ₹2,62,500     | Number of tests                   | 52,500        | ₹5.00                |
| Setting up machine's costs   | ₹4,50,000     | Number of set-ups                 | 900           | ₹500.00              |

- (2) Contention of Supervisor is valid as operating income of Cafeteria is negative i.e. (₹63,000) or percentage of loss is 12%.

**BQ 12**

MST Limited has collected the following data for its two activities. It calculates activity cost rates based on cost driver capacity.

**ACTIVITY BASED COSTING 6.17**

| Activity           | Cost Driver           | Capacity              | Cost      |
|--------------------|-----------------------|-----------------------|-----------|
| Power              | Kilowatt hours        | 50,000 kilowatt hours | ₹2,00,000 |
| Quality inspection | Number of inspections | 10,000 inspections    | ₹3,00,000 |

The company makes three products M, S and T. For the year ended March 31, 2023, 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:**

- (1) Compute the costs allocated to each product from each activity.
- (2) Calculate the cost of unused capacity for each activity.
- (3) Discuss the factors the management considers in choosing a capacity level to compute the budgeted fixed overhead cost rate.

**Answer****(1) Statement of Cost Allocation to Each Product from Each Activity**

| Activity                                | Product                   |                         |                         |           |
|-----------------------------------------|---------------------------|-------------------------|-------------------------|-----------|
|                                         | M (₹)                     | S (₹)                   | T (₹)                   | Total (₹) |
| Power @ ₹4 per kwh                      | 40,000<br>(10,000 × ₹4)   | 80,000<br>(20,000 × ₹4) | 60,000<br>(15,000 × ₹4) | 1,80,000  |
| Quality inspection @ ₹30 per inspection | 1,05,000<br>(3,500 × ₹30) | 75,000<br>(2,500 × ₹30) | 90,000<br>(3,000 × ₹30) | 2,70,000  |

**Working note:****Cost driver rate/Activity rate:**

|                    |   |                                |   |                    |
|--------------------|---|--------------------------------|---|--------------------|
| Power              | = | ₹2,00,000 ÷ 50,000 kwh         | = | ₹4 per kwh         |
| Quality inspection | = | ₹3,00,000 ÷ 10,000 inspections | = | ₹30 per inspection |

**(2) Computation of cost of unused capacity for each activity:**

|                    |   |                       |   |         |
|--------------------|---|-----------------------|---|---------|
| Power              | = | ₹2,00,000 - ₹1,80,000 | = | ₹20,000 |
| Quality inspection | = | ₹3,00,000 - ₹2,70,000 | = | ₹30,000 |

**Total cost of unused capacity is ₹50,000.**

**(3) Factors management consider in choosing a capacity level to compute the budgeted fixed overhead cost rate:**

- Effect on product costing & capacity management
- Effect on pricing decisions.
- Effect on performance evaluation
- Effect on financial statements
- Regulatory requirements.
- Difficulties in forecasting chosen capacity level concepts.

**BQ 13**

ABC Ltd. manufactures two types of machinery equipment Y and Z and applies/absorbs overheads on the basis of direct labour hours. The budgeted overheads and direct labour hours for the month of December, 2023 are ₹12,42,500 and 20,000 hours respectively.

**The information about Company's products is as follows:**



**ACTIVITY BASED COSTING 6.18**

| <b>Particulars</b>          | <b>Equipment Y</b> | <b>Equipment Z</b> |
|-----------------------------|--------------------|--------------------|
| Budgeted Production volume  | 2,500 units        | 3,125 units        |
| Direct material cost        | ₹300 per unit      | ₹450 per unit      |
| Direct labour cost:         |                    |                    |
| Y : 3 hours @ ₹150 per hour | ₹450               | -                  |
| Z : 4 hours @ ₹150 per hour | -                  | ₹600               |

ABC Ltd.'s overheads of ₹12,42,500 can be identified with three major activities:

Order Processing (₹2,10,000), machine processing (₹8,75,000), and product inspection (₹1,57,500). These activities are driven by number of orders processed, machine hours worked, and inspection hours, respectively. The data relevant to these activities is as follows:

| <b>Equipments</b> | <b>Orders processed</b> | <b>Machine hours worked</b> | <b>Inspection hours</b> |
|-------------------|-------------------------|-----------------------------|-------------------------|
| Y                 | 350                     | 23,000                      | 4,000                   |
| Z                 | 250                     | 27,000                      | 11,000                  |
| Total             | 600                     | 50,000                      | 15,000                  |

**Required:**

- (1) Assuming use of direct labour hours to absorb/apply overheads to production, compute the unit manufacturing cost of the equipment Y and Z, if the budgeted manufacturing volume is attained.
- (2) Assuming use of activity based costing, compute the unit manufacturing costs of the equipment Y and Z, if the budgeted manufacturing volume is achieved.
- (3) ABC Ltd.'s selling prices are based heavily on cost. By using direct labour hours as an application base, calculate the amount of cost distortion (under-costed or overcosted) for each equipment.

**Answer****(1) Statement Showing Unit Manufacturing Cost Using Absorption Costing Method**

| <b>Particulars</b>                                   | <b>Equipment Y</b> | <b>Equipment Z</b> |
|------------------------------------------------------|--------------------|--------------------|
| Direct material cost                                 | ₹300               | ₹450               |
| Direct labour cost                                   | ₹450               | ₹600               |
| Overheads @ ₹62.125 per hour for 3 hours and 4 hours | ₹186.38            | ₹248.50            |
| <b>Manufacturing cost per unit</b>                   | <b>₹936.38</b>     | <b>₹1,298.50</b>   |

$$\begin{aligned} \text{Predetermined overhead rate} &= \text{Budgeted overheads} \div \text{Budgeted labour hours} \\ &= ₹12,42,500 \div 20,000 \text{ hours} = ₹62.125/\text{hour} \end{aligned}$$

$$\begin{aligned} \text{Total labour hours} &= 2,500 \text{ units of Y} \times 3 \text{ hours} + 3,125 \text{ units of Y} \times 4 \text{ hours} \\ &= 20,000 \text{ hours} \end{aligned}$$

**(2) Statement Showing Unit Manufacturing Cost Using ABC Method**

| <b>Particulars</b>                 | <b>Equipment Y</b> | <b>Equipment Z</b> |
|------------------------------------|--------------------|--------------------|
| Direct material cost               | ₹300               | ₹450               |
| Direct labour cost                 | ₹450               | ₹600               |
| Overheads per unit (W.N.)          | ₹226.80            | ₹216.16            |
| <b>Manufacturing cost per unit</b> | <b>₹976.80</b>     | <b>₹1,266.16</b>   |

**(3) Statement Showing Cost Distortion**

| <b>Particulars</b>                               | <b>Equipment Y</b> | <b>Equipment Z</b> |
|--------------------------------------------------|--------------------|--------------------|
| Unit manufacturing cost:                         |                    |                    |
| Using direct labour hours as an application base | 936.38             | 1298.50            |
| Using activity based costing                     | 976.80             | 1,266.16           |
| <b>Cost distortion</b>                           | <b>(-) 40.42</b>   | <b>+ 32.34</b>     |

Low volume product Y is under-costed and high volume product Z is over-costed using direct labour hours for overhead absorption.



**Working note:****Calculation of overheads cost per unit under ABC costing**

| Activity                 | Overhead cost | Cost driver      | Ratio           | Overheads      |                |
|--------------------------|---------------|------------------|-----------------|----------------|----------------|
|                          |               |                  |                 | Y              | Z              |
| Order processing         | ₹2,10,000     | Orders processed | 350 : 250       | ₹1,22,500      | ₹87,500        |
| Machine processing       | ₹8,75,000     | Machine hours    | 23,000 : 27,000 | ₹4,02,500      | ₹4,72,500      |
| Inspection               | ₹1,57,500     | Inspection hours | 4,000 : 11,000  | ₹42,000        | ₹1,15,500      |
| Total overheads          |               |                  |                 | ₹5,67,000      | ₹6,75,500      |
| ÷ Number of units        |               |                  |                 | ÷ 2,500        | ÷ 3,125        |
| <b>Overhead per unit</b> |               |                  |                 | <b>₹226.80</b> | <b>₹216.16</b> |

**BQ 14**

Alpha Limited has decided to analyse the profitability of its five new customers. It buys bottled water at ₹90 per case and sells to retail customers at a list price of ₹108 per case. The data pertaining to five customers are:

| Particulars                       | Customers |        |          |        |       |
|-----------------------------------|-----------|--------|----------|--------|-------|
|                                   | 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    |
| Kilometres travelled per delivery | 20        | 6      | 5        | 10     | 30    |
| Number of expedited deliveries    | 0         | 0      | 0        | 0      | 1     |

**Its five activities and their cost drivers are:**

| Activity             | Cost Driver Rate                |
|----------------------|---------------------------------|
| Order taking         | ₹750 per purchase order         |
| Customer visits      | ₹600 per customer visit         |
| Deliveries           | ₹5.75 per delivery Km travelled |
| Product handling     | ₹3.75 per case sold             |
| Expedited deliveries | ₹2,250 per expedited delivery   |

**Required:**

- (1) 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.
- (2) What insights are gained by reporting both the list selling price and the actual selling price for each customer?

**Answer****(1) Computation of Customer Level Operating Income**

| Particulars                                           | Customers     |                 |                 |                 |            |
|-------------------------------------------------------|---------------|-----------------|-----------------|-----------------|------------|
|                                                       | A (₹)         | B (₹)           | C (₹)           | D (₹)           | E (₹)      |
| Cases sold                                            | 4,680         | 19,688          | 1,36,800        | 71,550          | 8,775      |
| Revenue at list price @ ₹108 p.u.                     | 5,05,440      | 21,26,304       | 1,47,74,400     | 77,27,400       | 9,47,700   |
| Less: Discount                                        | -             | 35,438          | 12,31,200       | 2,57,580        | 94,770     |
| Revenue net of discount                               | 5,05,440      | 20,90,866       | 1,35,43,200     | 74,69,820       | 8,52,930   |
| Less: COGS @ ₹90 p.u.                                 | 4,21,200      | 17,71,920       | 1,23,12,000     | 64,39,500       | 7,89,750   |
| Gross Margin                                          | 84,240        | 3,18,946        | 12,31,200       | 10,30,320       | 63,180     |
| Less: Customer level operating activities cost (W.N.) | 31,150        | 95,415          | 5,40,825        | 2,90,563        | 62,906     |
| Customer level Operating income                       | <b>53,090</b> | <b>2,23,531</b> | <b>6,90,375</b> | <b>7,39,757</b> | <b>274</b> |

**ACTIVITY BASED COSTING 6.20**

**Comment on the results:** Customer D is the most profitable customer. D's profits are even higher than C (whose revenue is the highest) despite having only 52.30% of the unit volume of customer C. The main reason is that C receives a discount of ₹ 9 per case while customer D receives only a ₹ 3.60 discount per case.

Customer E is the least profitable. The profits of E is even less than A (whose revenue is least) Customer E received a discount of ₹ 10.80 per case, makes more frequent orders, requires more customer visits and requires more delivery kms. in comparison with customer A.

**Working note:****Computation of customer level operating activities costs:**

| Particulars                                                                 | Customers     |               |                 |                 |               |
|-----------------------------------------------------------------------------|---------------|---------------|-----------------|-----------------|---------------|
|                                                                             | A (₹)         | B (₹)         | C (₹)           | D (₹)           | E (₹)         |
| Order taking costs (₹)<br>(No. of purchase × ₹750)                          | 11,250        | 18,750        | 22,500          | 18,750          | 22,500        |
| Customer visits costs (₹)<br>(No. of customer visits × ₹600)                | 1,200         | 1,800         | 3,600           | 1,200           | 1,800         |
| Delivery vehicles travel costs (₹)<br>(Kms travelled × ₹5.75 per km.)       | 1,150         | 1,035         | 1,725           | 2,300           | 3,450         |
| Product handling costs (₹)<br>(units × ₹3.75)                               | 17,550        | 73,830        | 5,13,000        | 2,68,313        | 32,906        |
| Cost of expediting deliveries (₹)<br>(No. of expedited deliveries × ₹2,250) | -             |               |                 |                 | 2,250         |
| <b>Total cost of customer level operating activities (₹)</b>                | <b>31,150</b> | <b>95,415</b> | <b>5,40,825</b> | <b>2,90,563</b> | <b>62,906</b> |

**(2) Insight gained by reporting both the list selling price and the actual selling price for each customer:**

Separate reporting of both-the listed and actual selling prices enables Alpha Ltd. To examine which customer has received what discount per case, whether the discount received has any relationship with the 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 a direct relationship with sales volume, except in the case of customer E. The reasons for ₹10.80 discount per case for customer E should be explored.

**BQ 15**

'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                        | Present Cost (₹) | Estimation for the budget period                     |
|---------------------------------|------------------|------------------------------------------------------|
| ATM Services:                   |                  |                                                      |
| (a) Machine Maintenance         | 4,00,000         | All fixed, no change.                                |
| (b) Rents                       | 2,00,000         | Fully fixed, no change.                              |
| (c) Currency Replenishment Cost | 1,00,000         | Expected to double during budget period.             |
| Total                           | 7,00,000         | (This activity is driven by no. of ATM transactions) |

**ACTIVITY BASED COSTING 6.21**

|                     |           |                                                                                                                                                                                                                                              |
|---------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Computer Processing | 5,00,000  | Half this amount is fixed and no change is expected.<br>The variable portion is expected to increase to three times the current level.<br>(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.<br>For every increase of one lakh statement, one lakh rupees is the budgeted increase.<br>(This activity is driven by the number of statements) |
| Computer Inquiries  | 2,00,000  | Estimated to increase by 80% during the budget period.<br>(This activity is driven by telephone minutes)                                                                                                                                     |

**The activity drivers and their budgeted quantifies are given below:**

| <b>Activity Drivers</b>                 | <b>Deposits</b> | <b>Loans</b> | <b>Credit Cards</b> |
|-----------------------------------------|-----------------|--------------|---------------------|
| 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:**

1. Calculate the budgeted rate for each activity.
2. Prepare the budgeted cost statement activity wise.
3. Compute the budgeted product cost per account for each product using (1) and (2) above.

**Answer**

**Statement Showing "Budgeted Cost per unit of the Product"**

| <b>Activity</b>                                      | <b>Budgeted Activity Cost (₹)</b> | <b>Activity Driver</b>                 | <b>Budgeted Activity Driver units</b> | <b>Activity Rate (₹)</b> | <b>Deposits</b> | <b>Loans</b> | <b>Credit Cards</b> |
|------------------------------------------------------|-----------------------------------|----------------------------------------|---------------------------------------|--------------------------|-----------------|--------------|---------------------|
| ATM Services                                         | 8,00,000                          | No. of ATM Transaction                 | 2,00,000                              | 4.00                     | 6,00,000        | -            | 2,00,000            |
| Computer Processing                                  | 10,00,000                         | No. of Computer processing Transaction | 20,00,000                             | 0.50                     | 7,50,000        | 1,00,000     | 1,50,000            |
| Issuing Statements                                   | 20,00,000                         | No. of Statements                      | 5,00,000                              | 4.00                     | 14,00,000       | 2,00,000     | 4,00,000            |
| Computer Inquiries                                   | 3,60,000                          | Telephone Minutes                      | 7,20,000                              | 0.50                     | 1,80,000        | 90,000       | 90,000              |
| Budgeted Cost                                        | 41,60,000                         |                                        |                                       |                          | 29,30,000       | 3,90,000     | 8,40,000            |
| Units of Product (as estimated in the budget period) |                                   |                                        |                                       |                          | 58,600          | 13,000       | 14,000              |
| Budgeted Cost per unit of the product                |                                   |                                        |                                       |                          | 50              | 30           | 60                  |

**Working Note:**

| <b>Activity</b>                 | <b>Budgeted Cost (₹)</b> | <b>Remark</b>                 |
|---------------------------------|--------------------------|-------------------------------|
| ATM Services:                   |                          |                               |
| (a) Machine Maintenance         | 4,00,000                 | All fixed, no change.         |
| (b) Rents                       | 2,00,000                 | Fully fixed, no change.       |
| (c) Currency Replenishment Cost | 2,00,000                 | Doubled during budget period. |

**ACTIVITY BASED COSTING 6.22**

|                     |           |                                                                                                                                                        |
|---------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total               | 8,00,000  |                                                                                                                                                        |
| Computer Processing | 2,50,000  | ₹2,50,000 (half of ₹5,00,000) is fixed and no change is expected.                                                                                      |
|                     | 7,50,000  | ₹2,50,000 (variable portion) is expected to increase to three times the current level.                                                                 |
| Total               | 10,00,000 |                                                                                                                                                        |
| Issuing Statements  | 18,00,000 | Existing.                                                                                                                                              |
|                     | 2,00,000  | 2 lakh statements are expected to be increased in budgeted period. For every increase of one lakh statement, one lakh rupees is the budgeted increase. |
| Total               | 20,00,000 |                                                                                                                                                        |
| Computer Inquiries  | 3,60,000  | Estimated to increase by 80% during the budget period.<br>(₹2,00,000 × 180%)                                                                           |

# PAST YEAR QUESTIONS

## PYQ 1

PQR pens Ltd. 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                   | ₹        |
|-------------------------------|----------|
| Volume related activity costs | 4,75,020 |
| Set up related cost           | 5,79,988 |
| Purchase related cost         | 5,04,992 |

**Calculate the overhead cost per unit of each Product: Gel Pen and Ball Pen on the basis of:**

- (1) Traditional method of charging overheads
- (2) Activity based costing method and
- (3) Find out the difference in cost per unit between both the methods.

**[(10 Marks) May 2018]**

## Answer

### (1) Statement Showing Overhead Cost per unit "Traditional Method"

| Particulars                      | Gel Pen                    | Ball Pen                    |
|----------------------------------|----------------------------|-----------------------------|
| Overheads @ ₹20 per machine hour | ₹4,80,000<br>(24,000 × 20) | ₹10,80,000<br>(54,000 × 20) |
| Number of units                  | 5,500                      | 24,000                      |
| <b>Overheads Cost Per Unit</b>   | <b>₹87.27</b>              | <b>₹45.00</b>               |

$$\begin{aligned}
 \text{Overheads Recovery Rate} &= \text{Annual Overheads} \div \text{Annual Machine Hours} \\
 &= (4,75,020 + 5,79,988 + 5,04,992) \div (24,000 + 54,000) \\
 &= ₹15,60,000 \div 78,000 = \text{₹20 per machine hour}
 \end{aligned}$$

**Note:** Overheads is recovered on the basis of Machine Hours (as per ICAI suggested answer).

### (2) Statement Showing Overhead Cost per unit "Activity Based Costing"

| Activity Cost Pool             | Cost Driver            | Ratio     | Amount   | Gel Pen       | Ball Pen      |
|--------------------------------|------------------------|-----------|----------|---------------|---------------|
| Volume related activity costs  | Machine Hours          | 24 : 54   | 4,75,020 | 1,46,160      | 3,28,860      |
| Set up related cost            | No. of Setups          | 30 : 56   | 5,79,988 | 2,02,321      | 3,77,667      |
| Purchase related cost          | No. of Purchase Orders | 240 : 448 | 5,04,992 | 1,76,160      | 3,28,832      |
| Total Cost                     |                        |           |          | 5,24,641      | 10,35,359     |
| ÷ Total Units                  |                        |           |          | 5,500         | 24,000        |
| <b>Overheads Cost Per Unit</b> |                        |           |          | <b>₹95.39</b> | <b>₹43.14</b> |

**Note:** Machine hours is used as Cost driver of volume related activity cost (as per ICAI suggested answer).

### (3) Difference in overheads cost per unit under both methods

| Particulars                                   | Gel Pen        | Ball Pen       |
|-----------------------------------------------|----------------|----------------|
| Overheads cost per unit (Traditional method)  | ₹87.27         | ₹45.00         |
| Overheads cost per unit (Activity based cost) | ₹95.39         | ₹43.14         |
| <b>Difference in overheads cost per unit</b>  | <b>- ₹8.12</b> | <b>+ ₹1.86</b> |

**PYQ 2**

M/s HMB Limited is producing a product in 10 batches each of 15,000 units in a year incurring the following overheads their on:

| Particulars          | (₹)       |
|----------------------|-----------|
| Material procurement | 22,50,000 |
| Maintenance          | 17,30,000 |
| Set-up               | 6,84,500  |
| Quality control      | 5,14,800  |

The prime cost for the year amounted to ₹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 set-ups         | 2,250           |
| No. of inspections     | 2,710           |

The company has produced a batch of 15,000 units and has incurred ₹26,38,700 and ₹3,75,200 on materials and wages respectively.

**The usage of activities of the said batch are as follows:**

| Activity Driver    | Activity Volume |
|--------------------|-----------------|
| Material orders    | 48              |
| Maintenance hours  | 810             |
| No. of set-ups     | 40              |
| No. of inspections | 25              |

**You are required to:**

- (1) Find out cost of product per unit on absorption costing basis for the said batch.
- (2) Determine cost driver rate, total cost and cost per unit of output of the said batch on the basis of activity based costing.

**[(10 Marks) Nov 2018]**

**Answer**

**(1) Statement Showing Unit Cost Using Absorption Costing Method**

| Particulars                                  | (₹)              |
|----------------------------------------------|------------------|
| Direct Material                              | 26,38,700        |
| Direct Labour                                | 3,75,200         |
| <b>Prime Cost</b>                            | <b>30,13,900</b> |
| Production Overhead @ 17.1847% of Prime Cost | 5,17,930         |
| <b>Total Cost</b>                            | <b>35,31,830</b> |
| ÷ Number of units                            | ÷ 15,000         |
| <b>Cost Per Unit</b>                         | <b>₹235.46</b>   |

**Calculation of overhead rate:**

$$\begin{aligned}
 \text{Overheads Recovery Rate} &= (\text{Total Overheads} \div \text{Total Prime Cost}) \times 100 \\
 &= [(22,50,000 + 17,30,000 + 6,84,500 + 5,14,800) \div 3,01,39,000] \times 100 \\
 &= \mathbf{17.1847\% \text{ of Prime Cost}}
 \end{aligned}$$

**(2) Statement Showing Unit Cost and Total Cost Using ABC Method**

| Particulars     | (₹)       |
|-----------------|-----------|
| Direct Material | 26,38,700 |

**ACTIVITY BASED COSTING 6.25**

|                                            |  |                  |
|--------------------------------------------|--|------------------|
| Direct Labour                              |  | 3,75,200         |
| <b>Prime Cost</b>                          |  | <b>30,13,900</b> |
| Production Overhead:                       |  |                  |
| Material procurement (₹1,500 × 48 orders)  |  | 72,000           |
| Maintenance (₹190.53 × 810 hours)          |  | 1,54,329         |
| Set-up (₹304.22 × 40 set-ups)              |  | 12,169           |
| Quality control (₹189.96 × 25 inspections) |  | 4,749            |
| <b>Total Cost</b>                          |  | <b>32,57,147</b> |
| Number of units                            |  | 15,000           |
| <b>Cost Per Unit</b>                       |  | <b>₹217.14</b>   |

**Statement Showing Determination of Cost Driver Rate**

| Activity Cost Pool   | Amount     | Cost Driver        | Volume | Cost Driver Rate       |
|----------------------|------------|--------------------|--------|------------------------|
| Material procurement | ₹22,50,000 | Material orders    | 1,500  | ₹1,500 per order       |
| Maintenance          | ₹17,30,000 | Maintenance hours  | 9,080  | ₹190.53 per hour       |
| Set-up               | ₹6,84,500  | No. of set-ups     | 2,250  | ₹304.22 per set-up     |
| Quality control      | ₹5,14,800  | No. of inspections | 2,710  | ₹189.96 per inspection |

**PYQ 3**

MNO Ltd. manufactures two types of equipment A and B and absorbs overheads on the basis of direct labour hours. The budgeted overheads and direct labour hours for the month of March 2019 are ₹15,00,000 and 25,000 hours respectively.

*The information about the company's products is as follows:*

| Particulars                 | Equipment A   | Equipment B   |
|-----------------------------|---------------|---------------|
| Budgeted Production volume  | 3,200 units   | 3,850 units   |
| Direct material cost        | ₹350 per unit | ₹400 per unit |
| Direct labour cost:         |               |               |
| Y : 3 hours @ ₹120 per hour | ₹360          | -             |
| Z : 4 hours @ ₹120 per hour | -             | ₹480          |

*Overheads of ₹15,00,000 can be identified with three major activities:*

|                    |            |
|--------------------|------------|
| Order Processing   | ₹3,00,000  |
| Machine Processing | ₹10,00,000 |
| Product Inspection | ₹2,00,000  |

These activities are driven by number of orders processed, machine hours worked, and inspection hours, respectively. The data relevant to these activities is as follows:

| Equipments | Orders processed | Machine hours worked | Inspection hours |
|------------|------------------|----------------------|------------------|
| A          | 400              | 22,500               | 5,000            |
| B          | 200              | 27,500               | 15,000           |
| Total      | 600              | 50,000               | 20,000           |

**Required:**

- (1) Prepare a statement showing the manufacturing cost per unit of each product using the absorption costing method assuming the budgeted manufacturing volume is attained.
- (2) Determine cost driver rates and prepare a statement showing the manufacturing costs of each product using activity based costing, assuming the budgeted manufacturing volume is attained.
- (3) MNO Ltd.'s selling prices are based heavily on cost. By using direct labour hours as an application base, calculate the amount of cost distortion (under-costed or over-costed) for each equipment.

**[(10 Marks) May 2019]**

**Answer**



**(1) Statement Showing Unit Manufacturing Cost Using Absorption Costing Method**

| Particulars                        | Equipment A | Equipment B   |
|------------------------------------|-------------|---------------|
| Direct material cost               | ₹350        | ₹400          |
| Direct labour cost                 | ₹360        | ₹480          |
| Overheads @ ₹60 per hour           | ₹180        | ₹240          |
| <b>Manufacturing cost per unit</b> | <b>₹890</b> | <b>₹1,120</b> |

Predetermined overhead rate = Budgeted overheads ÷ Budgeted labour hours  
 = ₹15,00,000 ÷ 25,000 hours = ₹60 per hour

Total labour hours = 3,200 units of A × 3 hours + 3,850 units of B × 4 hours  
 = 25,000 hours

**(2) Statement Showing Determination of Cost Driver Rate**

| Activity Cost Pool | Amount     | Cost Driver      | Volume | Cost Driver Rate        |
|--------------------|------------|------------------|--------|-------------------------|
| Order processing   | ₹3,00,000  | Orders processed | 600    | ₹500 per order          |
| Machine processing | ₹10,00,000 | Machine hours    | 50,000 | ₹20 per machine hour    |
| Inspection         | ₹2,00,000  | Inspection hours | 20,000 | ₹10 per inspection hour |

**Statement Showing Unit Manufacturing Cost Using ABC Method**

| Particulars                        | Equipment A    | Equipment B      |
|------------------------------------|----------------|------------------|
| Direct material cost               | ₹350           | ₹400             |
| Direct labour cost                 | ₹360           | ₹480             |
| Overheads per unit (W.N.)          | ₹218.75        | ₹207.79          |
| <b>Manufacturing cost per unit</b> | <b>₹928.75</b> | <b>₹1,087.79</b> |

**(3) Statement Showing Cost Distortion**

| Particulars                                      | Equipment A      | Equipment B    |
|--------------------------------------------------|------------------|----------------|
| Unit manufacturing cost:                         |                  |                |
| Using direct labour hours as an application base | 890              | 1,120          |
| Using activity based costing                     | 928.75           | 1,087.79       |
| <b>Cost distortion</b>                           | <b>(-) 38.75</b> | <b>+ 32.21</b> |

**Working note:**

**Calculation of overheads cost per unit under ABC costing:**

| Overheads                                                      | A              | B              |
|----------------------------------------------------------------|----------------|----------------|
| Order processing @ ₹500 per order of 400/200 orders            | ₹2,00,000      | ₹1,00,000      |
| Machine processing ₹20 per machine hour of 22,500/27,500 hours | ₹4,50,000      | ₹5,50,000      |
| Inspection ₹10 per inspection hour of 5,000/15,000 hours       | ₹50,000        | ₹1,50,000      |
| Total overheads                                                | ₹7,00,000      | ₹8,00,000      |
| ÷ Number of units                                              | ÷ 3,200        | ÷ 3,850        |
| <b>Overhead per unit</b>                                       | <b>₹218.75</b> | <b>₹207.79</b> |

**PYQ 4**

PQR Ltd has decided to analyse the profitability of its five new customers. It buys soft drink bottles in cases at ₹45 per case and sells them to retail customers at a list price of ₹54 per case. The data pertaining to five customers are given below:

| Particulars               | Customers |        |        |        |       |
|---------------------------|-----------|--------|--------|--------|-------|
|                           | A         | B      | C      | D      | E     |
| Number of Cases Sold      | 9,360     | 14,200 | 62,000 | 38,000 | 9,800 |
| List Selling Price ₹      | 54        | 54     | 54     | 54     | 54    |
| Actual Selling Price ₹    | 54        | 53.40  | 49     | 50.20  | 48.60 |
| Number of Purchase Orders | 30        | 50     | 60     | 50     | 60    |

**ACTIVITY BASED COSTING 6.27**

|                                   |    |    |     |    |    |
|-----------------------------------|----|----|-----|----|----|
| Number of Customers Visits        | 4  | 6  | 12  | 4  | 6  |
| Number of Deliveries              | 20 | 60 | 120 | 80 | 40 |
| Kilometers Travelled Per Delivery | 40 | 12 | 10  | 20 | 60 |
| Number of Expediate Deliveries    | 0  | 0  | 0   | 0  | 2  |

Its five activities and their cost drivers are:

| <b>Activity</b>      | <b>Cost Driver</b>              |
|----------------------|---------------------------------|
| Order taking         | ₹200 per purchase order         |
| Customer visits      | ₹300 per customer visit         |
| Deliveries           | ₹4.00 per delivery km travelled |
| Product handling     | ₹2.00 per case sold             |
| Expedited deliveries | ₹100 per each such delivery     |

**Required:**

- (1) Compute the customer level operating income of each of five retail customers by using the Cost Driver rates.
- (2) Examine the result to give your comments on customer 'D' in comparison with customer 'C' and on customer 'E' in comparison with customer 'A'.

**[(10 Marks) Nov 2019]**

**Answer****(1) Computation of Customer Level Operating Income**

| <b>Particulars</b>                                    | <b>Customers</b> |               |                 |                 |                |
|-------------------------------------------------------|------------------|---------------|-----------------|-----------------|----------------|
|                                                       | <b>A (₹)</b>     | <b>B (₹)</b>  | <b>C (₹)</b>    | <b>D (₹)</b>    | <b>E (₹)</b>   |
| Cases sold                                            | 9,360            | 14,200        | 62,000          | 38,000          | 9,800          |
| Revenue at list price @ ₹54 p.u.                      | 5,05,440         | 7,66,800      | 33,48,000       | 20,52,000       | 5,29,200       |
| Less: Discount                                        | -                | 8,520         | 3,10,000        | 1,44,400        | 52,920         |
| Revenue net of discount                               | 5,05,440         | 7,58,280      | 30,38,000       | 19,07,600       | 4,76,280       |
| Less: COGS @ ₹45 p.u.                                 | 4,21,200         | 6,39,000      | 27,90,000       | 17,10,000       | 4,41,000       |
| Gross Margin                                          | 84,240           | 1,19,280      | 2,48,000        | 1,97,600        | 35,280         |
| Less: Customer level operating activities cost (W.N.) | 29,120           | 43,080        | 1,44,400        | 93,600          | 43,200         |
| <b>Customer Level Operating Income</b>                | <b>55,120</b>    | <b>76,200</b> | <b>1,03,600</b> | <b>1,04,000</b> | <b>(7,920)</b> |

**Working note:****Computation of customer level operating activities costs:**

| <b>Particulars</b>                                                        | <b>Customers</b> |               |                 |               |               |
|---------------------------------------------------------------------------|------------------|---------------|-----------------|---------------|---------------|
|                                                                           | <b>A (₹)</b>     | <b>B (₹)</b>  | <b>C (₹)</b>    | <b>D (₹)</b>  | <b>E (₹)</b>  |
| Order taking costs (₹)<br>(No. of purchase orders × ₹200)                 | 6,000            | 10,000        | 12,000          | 10,000        | 12,000        |
| Customer visits costs (₹)<br>(No. of customer visits × ₹300)              | 1,200            | 1,800         | 3,600           | 1,200         | 1,800         |
| Delivery costs (₹)<br>(*Kms travelled × ₹4.00 per km.)                    | 3,200            | 2,880         | 4,800           | 6,400         | 9,600         |
| Product handling costs (₹)<br>(Number of case sold × ₹2.00)               | 18,720           | 28,400        | 1,24,000        | 76,000        | 19,600        |
| Cost of expediting deliveries (₹)<br>(No. of expedited deliveries × ₹100) | -                | -             | -               | -             | 200           |
| <b>Total cost of customer level operating activities</b>                  | <b>29,120</b>    | <b>43,080</b> | <b>1,44,400</b> | <b>93,600</b> | <b>43,200</b> |

\* Kms travelled = Number of deliveries × Kilometres travelled per delivery

**(2) Comment on the results:**

**Customer D and Customer C:** Operating income of Customer D is more than of Customer C, despite having only 61.29% (38,000 units) of the units volume sold in comparison to Customer C (62,000 units). Customer C receives a higher percent of discount i.e. 9.26% (₹5) while Customer D receive a discount of 7.04% (₹3.80). Though the gross margin of customer C (₹2,48,000) is more than Customer D (₹1,97,600) but total cost of customer level operating activities of C (₹1,44,400) is more in comparison to Customer D (₹93,600). As a result, operating income is more in case of Customer D.

**Customer E and Customer A:** Customer E is not profitable while Customer A is profitable. Customer E receives a discount of 10% (₹5.4) while Customer A doesn't receive any discount. Sales Volume of Customer A and E is almost same. However, total cost of customer level operating activities of E is far more (₹43,200) in comparison to Customer A (₹29,120). This has resulted in occurrence of loss in case of Customer E.

**PYQ 5**

ABC Ltd. is engaged in production of three types of Fruit Juices: Apple, Orange and Mixed Fruit. The following cost data for the month of March 2020 are as under:

| Particulars                | Apple  | Orange | Mixed Fruit |
|----------------------------|--------|--------|-------------|
| Units produced and sold    | 10,000 | 15,000 | 20,000      |
| Material per unit (₹)      | 8      | 6      | 5           |
| Direct Labour per unit (₹) | 5      | 4      | 3           |
| No. of Purchase Orders     | 34     | 32     | 14          |
| No. of Deliveries          | 110    | 64     | 52          |
| Shelf Stocking Hours       | 110    | 160    | 170         |

Overheads incurred by the company during the month are as under:

| Particulars          | (₹)      |
|----------------------|----------|
| Ordering costs       | 64,000   |
| Delivery costs       | 1,58,200 |
| Shelf Stocking costs | 87,560   |

**Required:**

- (1) Calculate cost driver's rate.
- (2) Calculate total cost of each product using Activity Based Costing.

**[(6 Marks) Nov 2020]**

**Answer**

**(1) Statement Showing Cost Driver Rate**

| Activity Cost Pool   | Amount   | Cost Driver            | Volume | Cost Driver Rate              |
|----------------------|----------|------------------------|--------|-------------------------------|
| Ordering costs       | 64,000   | No. of Purchase Orders | 80     | ₹800 per purchase order       |
| Delivery costs       | 1,58,200 | No. of Deliveries      | 226    | ₹700 per delivery             |
| Shelf Stocking costs | 87,560   | Shelf Stocking Hours   | 440    | ₹199 per shelf stocking hours |

**(2) Statement Showing Total Cost Using Activity Based Costing**

| Particulars                              | Apple                 | Orange               | Mixed Fruit          |
|------------------------------------------|-----------------------|----------------------|----------------------|
| Units produced and sold                  | 10,000                | 15,000               | 20,000               |
| Material cost @ ₹8/ ₹6/ ₹5 per unit      | 80,000                | 90,000               | 1,00,000             |
| Direct Labour @ ₹5/ ₹4/ ₹3 per unit      | 50,000                | 60,000               | 60,000               |
| Production Overhead:                     |                       |                      |                      |
| Ordering costs @ ₹800 per purchase order | 27,200<br>(34 × 800)  | 25,600<br>(32 × 800) | 11,200<br>(14 × 800) |
| Delivery costs @ ₹700 per delivery       | 77,000<br>(110 × 700) | 44,800<br>(64 × 700) | 36,400<br>(52 × 700) |

**ACTIVITY BASED COSTING 6.29**

|                                       |                       |                       |                       |
|---------------------------------------|-----------------------|-----------------------|-----------------------|
| Shelf Stocking costs @ ₹199 per hours | 21,890<br>(110 × 199) | 31,840<br>(160 × 199) | 33,830<br>(170 × 199) |
| <b>Total Cost</b>                     | <b>2,56,090</b>       | <b>2,52,240</b>       | <b>2,41,430</b>       |

**PYQ 6**

ABC Ltd. manufactures three products X, Y and Z using the same plant and resources. It has given the following information for the year ended on 31<sup>st</sup> March, 2020:

| <b>Particulars</b>             | <b>X</b> | <b>Y</b> | <b>Z</b> |
|--------------------------------|----------|----------|----------|
| Production quantity (in units) | 1,200    | 1,440    | 1,968    |
| Resources per unit:            |          |          |          |
| Direct materials (₹)           | 90       | 84       | 176      |
| Direct labour (₹)              | 18       | 20       | 30       |

Budgeted direct labour rate was ₹4 per hour and the production overheads, shown in table below, were absorbed to products using direct labour hour rate. Company followed Absorption Costing Method. However, the company is now considering adopting Activity Based Costing Method.

|                      | <b>Budgeted Overheads (₹)</b> | <b>Cost Driver</b>     | <b>Remarks</b>                                                                               |
|----------------------|-------------------------------|------------------------|----------------------------------------------------------------------------------------------|
| Material Procurement | 50,000                        | No. of orders          | No. of orders was 25 units for each product.                                                 |
| Set-up               | 40,000                        | No. of production Runs | All the three products are produced in production runs of 48 units.                          |
| Quality Control      | 28,240                        | No. of Inspections     | Done for each production run.                                                                |
| Maintenance          | 1,28,000                      | Maintenance hours      | Total maintenance hours were 6,400 and was allocated in the ratio of 1:1:2 between X, Y & Z. |

**Required:**

- (1) Calculate the total cost per unit of each product using the Absorption Costing Method.
- (2) Calculate the total cost per unit of each product using the Activity Based Costing Method.

[[10 Marks] Jan 2021]

**Answer****(1) Statement Showing Total Cost Per Unit of Each Product Using Absorption Costing Method**

| <b>Particulars</b>                | <b>X (₹)</b>        | <b>Y (₹)</b>     | <b>Z (₹)</b>        |
|-----------------------------------|---------------------|------------------|---------------------|
| Direct Material                   | 90                  | 84               | 176                 |
| Direct Labour                     | 18                  | 20               | 30                  |
| Production Overhead @ ₹9 per hour | 40.50<br>(9 × 18/4) | 45<br>(9 × 20/4) | 67.50<br>(9 × 30/4) |
| <b>Total Unit Cost</b>            | <b>148.50</b>       | <b>149</b>       | <b>273.50</b>       |

**Working Note:****Calculation of overhead rate per direct labour hour:**

$$\begin{aligned} \text{Overhead recovery rate} &= \text{Budgeted overheads} \div \text{Budgeted labour hours} \\ &= (50,000 + 40,000 + 28,240 + 1,28,000) \div 27,360 \text{ hours} = ₹9/\text{hour} \end{aligned}$$

$$\text{Budgeted labour hours} = 1,200 \text{ X} \times 18/4 + 1,440 \text{ Y} \times 20/4 + 1,968 \text{ C} \times 30/4 = 27,360 \text{ hours}$$

**(2) Statement Showing Total Cost Per Unit of Each Product Using ABC Method**

| <b>Particulars</b> | <b>X (₹)</b> | <b>Y (₹)</b> | <b>Z (₹)</b> |
|--------------------|--------------|--------------|--------------|
| Direct Material    | 90           | 84           | 176          |
| Direct Labour      | 18           | 20           | 30           |

**ACTIVITY BASED COSTING 6.30**

|                        |                                 |                                 |                                 |
|------------------------|---------------------------------|---------------------------------|---------------------------------|
| Production Overhead:   |                                 |                                 |                                 |
| Material Procurement   | 10.81<br>[(48×270.27)/1,200]    | 10.89<br>[(58×270.27)/1,440]    | 10.85<br>[(79×270.27)/1,968]    |
| Set-up                 | 8.68<br>[(25×416.67)/1,200]     | 8.68<br>[(30×416.67)/1,440]     | 8.68<br>[(41×416.67)/1,968]     |
| Quality Control        | 6.13<br>[(25×294.17)/1,200]     | 6.13<br>[(30×294.17)/1,440]     | 6.13<br>[(41×294.17)/1,968]     |
| Maintenance            | 26.67<br>[(20×6,400×1/4)/1,200] | 22.22<br>[(20×6,400×1/4)/1,440] | 32.52<br>[(20×6,400×1/2)/1,968] |
| <b>Total Unit Cost</b> | <b>160.29</b>                   | <b>151.92</b>                   | <b>264.18</b>                   |

**Calculation of Activity rate:**

| Activity Cost Pool   | Amount    | Cost Driver            | Volume | Cost Driver Rate       |
|----------------------|-----------|------------------------|--------|------------------------|
| Material Procurement | ₹50,000   | No. of orders          | 185    | ₹270.27 per order      |
| Set-up               | ₹40,000   | No. of production Runs | 96     | ₹416.67 per run        |
| Quality Control      | ₹28,240   | No. of Inspections     | 96     | ₹294.17 per inspection |
| Maintenance          | ₹1,28,000 | Maintenance hours      | 6,400  | ₹20 per hour           |

Total no. of orders = (1,200 + 1,440 + 1,968) ÷ 25  
= 48 orders + 58 orders + 79 orders = 185 orders

Total no. of production run = (1,200 + 1,440 + 1,968) ÷ 48  
= 25 runs + 30 runs + 41 runs = 96 runs

Total no. of inspection = Total no. of runs = 96 inspections

**PYQ 7**

PQR Ltd. is engaged in the production of three Products P, Q and R. the company calculates Activity Cost Rates on the basis of Cost Driver capacity which is provided as below:

| Activity            | Cost Driver               | Cost Driver Capacity | Cost      |
|---------------------|---------------------------|----------------------|-----------|
| Direct Labour hours | Labour hours              | 30,000 Labour hours  | ₹3,00,000 |
| Production runs     | Number of Production runs | 600 Production runs  | ₹1,80,000 |
| Quality Inspections | Number of inspections     | 8,000 Inspections    | ₹2,40,000 |

The consumption of activities during the period is as under:

| Activity/Products   | P      | Q     | R     |
|---------------------|--------|-------|-------|
| Labour hours        | 10,000 | 8,000 | 6,000 |
| Production runs     | 200    | 180   | 160   |
| Quality Inspections | 3,000  | 2,500 | 1,500 |

**You are required to:**

- (1) Compute the costs allocated to each product from each activity.
- (2) Calculate the cost of unused capacity for each activity.
- (3) A potential customer has approached the company for supply of 12,000 units of a new product 'S' to be delivered in lots of 1,500 units per quarter. This will involve an initial design cost of ₹30,000 and per quarter production will involve the following:

|                            |             |
|----------------------------|-------------|
| Direct Material            | ₹18,000     |
| Direct Labour hours        | 1,500 hours |
| No. of production runs     | 15          |
| No. of quality inspections | 250         |

**Prepare cost sheet segregating Direct and Indirect costs and compute the Sales value per quarter of product 'S' using ABC system considering a mark-up of 20% on cost.**

**[(10 Marks) July 2021]**

**Answer****(1) Statement of Cost Allocation to Each Product from Each Activity**

| Activity            | Product                    |                         |                         |           |
|---------------------|----------------------------|-------------------------|-------------------------|-----------|
|                     | P (₹)                      | Q (₹)                   | R (₹)                   | Total (₹) |
| Direct Labour hours | 1,00,000<br>(10,000 × ₹10) | 80,000<br>(8,000 × ₹10) | 60,000<br>(6,000 × ₹10) | 2,40,000  |
| Production runs     | 60,000<br>(200 × ₹300)     | 54,000<br>(180 × ₹300)  | 48,000<br>(160 × ₹300)  | 1,62,000  |
| Quality Inspections | 90,000<br>(3,000 × ₹30)    | 75,000<br>(2,500 × ₹30) | 45,000<br>(1,500 × ₹30) | 2,10,000  |

**Working note:****Cost driver rate/Activity rate:**

|                     |   |                                   |   |                    |
|---------------------|---|-----------------------------------|---|--------------------|
| Direct Labour hours | = | ₹3,00,000 ÷ 30,000 labour hours   | = | ₹10 per hour       |
| Production runs     | = | ₹1,80,000 ÷ 600 production runs   | = | ₹300 per run       |
| Quality inspection  | = | ₹2,40,000 ÷ 8,000 inspection runs | = | ₹30 per inspection |

**(2) Computation of cost of unused capacity for each activity:**

|                     |   |                       |   |         |
|---------------------|---|-----------------------|---|---------|
| Direct Labour hours | = | ₹3,00,000 - ₹2,40,000 | = | ₹60,000 |
| Production runs     | = | ₹1,80,000 - ₹1,62,000 | = | ₹18,000 |
| Quality inspection  | = | ₹2,40,000 - ₹2,10,000 | = | ₹30,000 |

**Total cost of unused capacity is ₹1,08,000.**

**(3) Cost Sheet**

| Particulars                                                  | Amount (₹)    |
|--------------------------------------------------------------|---------------|
| <b>(A) Direct Cost:</b>                                      |               |
| Direct Material                                              | 18,000        |
| Direct expenses: Initial design cost (30,000 × 1,500/12,000) | 3,750         |
| <b>Total (A)</b>                                             | <b>21,750</b> |
| <b>(B) Indirect cost:</b>                                    |               |
| Direct Labour hours (1,500 × ₹10)                            | 15,000        |
| Production runs (15 × ₹300)                                  | 4,500         |
| Quality Inspections (250 × ₹30)                              | 7,500         |
| <b>Total (B)</b>                                             | <b>27,000</b> |
| Total cost (A + B)                                           | 48,750        |
| Add: Profit @ 20% on cost                                    | 9,750         |
| <b>Sales value</b>                                           | <b>58,500</b> |
| <b>Sale Price per unit of S (58,500 ÷ 1,500)</b>             | <b>39</b>     |

**PYQ 8**

A Drug store is presently selling three types of drugs namely 'Drug A', 'Drug B' and 'Drug C'. Due to some constraints, it has decided to go for only one product line of drugs. It has provided the following data for the year 2020-21 for each product line:

|                                  | A          | B            | C            |
|----------------------------------|------------|--------------|--------------|
| Revenues                         | ₹74,50,000 | ₹1,11,75,000 | ₹1,86,25,000 |
| Cost of goods sold               | ₹41,44,500 | ₹68,16,750   | ₹1,20,63,750 |
| Number of purchase orders placed | 560        | 810          | 630          |
| Number of deliveries received    | 950        | 1,000        | 850          |
| Hours of shelf-stocking time     | 900        | 1,250        | 2,350        |
| Items sold                       | 1,75,200   | 1,50,300     | 1,44,500     |

Following additional information is also provided:

| Activity         | Description of activity                | Total Cost | Cost-allocation base                                |
|------------------|----------------------------------------|------------|-----------------------------------------------------|
| Drug License fee | Drug License fee                       | ₹5,00,000  | To be distributed in ratio 2:3:5 between A, B and C |
| Ordering         | Placing of orders for purchases        | ₹8,30,000  | 2,000 purchase orders                               |
| Delivery         | Physical delivery and receipt of goods | ₹18,20,000 | 2,800 deliveries                                    |
| Shelf stocking   | Stocking of goods                      | ₹32,40,000 | 4,500 hours of shelf-stocking time                  |
| Customer Support | Assistance provided to customers       | ₹28,20,000 | 4,70,000 items sold                                 |

**Required:**

- Calculate the operating income and operating income as a percentage (%) of revenue of each product line if:
  - All support cost (other than cost of goods sold) are allocated in the ratio of cost of goods sold.
  - All support cost (other than cost of goods sold) are allocated using an activity-based costing system.
- Give your opinion about choosing the product line on the basis of operating income as a percentage (%) of revenue of each product line under both the situations as above.

**[(10 Marks) Dec 2021]**

**Answer**

- (a) Statement of Operating income and Operating income as a % of revenues for each product line (When support costs are allocated to product lines on the basis of cost of goods sold of each product)**

|                                       | A (₹)         | B (₹)         | C (₹)        | Total (₹)     |
|---------------------------------------|---------------|---------------|--------------|---------------|
| Revenues                              | 74,50,000     | 1,11,75,000   | 1,86,25,000  | 3,72,50,000   |
| Cost of Goods sold (COGS)             | 41,44,500     | 68,16,750     | 1,20,63,750  | 2,30,25,000   |
| Support cost (40% of COGS)            | 16,57,800     | 27,26,700     | 48,25,500    | 92,10,000     |
| Total cost                            | 58,02,300     | 95,43,450     | 1,68,89,250  | 3,22,35,000   |
| Operating income (Sales – Total cost) | 16,47,700     | 16,31,550     | 17,35,750    | 50,15,000     |
| <b>% of Operating income to Sales</b> | <b>22.12%</b> | <b>14.60%</b> | <b>9.32%</b> | <b>13.46%</b> |

- (b) Statement of Operating income and Operating income as a % of revenues for each product line (When support costs are allocated to product lines using an activity based costing system)**

|                                       | A (₹)                       | B (₹)                      | C (₹)                      | Total (₹)     |
|---------------------------------------|-----------------------------|----------------------------|----------------------------|---------------|
| Revenues                              | 74,50,000                   | 1,11,75,000                | 1,86,25,000                | 3,72,50,000   |
| Cost of Goods sold (COGS)             | 41,44,500                   | 68,16,750                  | 1,20,63,750                | 2,30,25,000   |
| Drug license fee @ ₹50,000/base point | 1,00,000<br>(50,000 × 2)    | 1,50,000<br>(50,000 × 3)   | 2,50,000<br>(50,000 × 5)   | 5,00,000      |
| Ordering cost @ ₹415/purchase order   | 2,32,400<br>(415 × 560)     | 3,36,150<br>(415 × 810)    | 2,61,450<br>(415 × 630)    | 8,30,000      |
| Delivery cost @ ₹650/delivery         | 6,17,500<br>(650 × 950)     | 6,50,000<br>(650 × 1,000)  | 5,52,500<br>(650 × 850)    | 18,20,000     |
| Shelf stocking cost @ ₹720/hour       | 6,48,000<br>(720 × 900)     | 9,00,000<br>(720 × 1,250)  | 16,92,000<br>(720 × 2,350) | 32,40,000     |
| Customer Support cost @ ₹6/unit       | 10,51,200<br>(6 × 1,75,200) | 9,01,800<br>(6 × 1,50,300) | 8,67,000<br>(6 × 1,44,500) | 28,20,000     |
| Total cost                            | 67,93,600                   | 97,54,700                  | 1,56,86,700                | 3,22,35,000   |
| Operating income (Sales – Total cost) | 6,56,400                    | 14,20,300                  | 29,38,300                  | 50,15,000     |
| <b>% of Operating income to Sales</b> | <b>8.81%</b>                | <b>12.71%</b>              | <b>15.78%</b>              | <b>13.46%</b> |

- Opinion about choosing the product line:** As per first method where we use COGS as a flat rate for allocating support costs, Drug A seems to be most profitable @ 22.12% and Drug C seems to be least profitable @ 9.32% but this is deceptive method. ABC method on the other hand uses the cost driver in



**ACTIVITY BASED COSTING 6.33**

each of the support costs for allocating it to the product line. Thus, it is much more accurate. Accordingly now Drug C seems to be most profitable at 15.78% and Drug A seems to be the least profitable at 8.81%. Therefore, it is suggested that company should go with Drug C.

**Working notes:**

(a) Total support cost = ₹5,00,000 + ₹8,30,000 + ₹18,20,000 + ₹32,40,000 + ₹28,20,000  
= **₹92,10,000**

(b) Total COGS = ₹41,44,500 + ₹68,16,750 + ₹1,20,63,750  
= **₹2,30,25,000**

(c) % of support cost to COGS =  $\frac{92,10,000}{2,30,25,000} \times 100$  = **40%**

**(d) Calculation of Cost Driver Rate**

| Activity<br>(1)  | Total cost (₹)<br>(2) | Cost allocation base<br>(3) | Cost driver rate<br>(4) = [(2)÷(3)] |
|------------------|-----------------------|-----------------------------|-------------------------------------|
| Drug License fee | 5,00,000              | 2 : 3 : 5 total 10          | ₹50,000 per base point              |
| Ordering         | 8,30,000              | 2,000 purchase orders       | ₹415 per purchase order             |
| Delivery         | 18,20,000             | 2,800 deliveries            | ₹650 per delivery                   |
| Shelf-stocking   | 32,40,000             | 4,500 hours                 | ₹720 per stocking hour              |
| Customer support | 28,20,000             | 4,70,000 items sold         | ₹6 per item sold                    |

**PYQ 9**

Star Limited manufacture three products using the same production methods. A conventional product costing system is being used currently. Details of the three products for a typical period are:

| Particulars                  | AX    | BX     | CX     |
|------------------------------|-------|--------|--------|
| Direct Labour hours per unit | 1.00  | 0.90   | 1.50   |
| Machine hours per unit       | 2.00  | 1.50   | 2.50   |
| Direct Material per unit (₹) | 35    | 25     | 45     |
| Volume (units)               | 7,500 | 12,500 | 25,000 |

Direct Labour costs ₹20 per hour and production overheads are absorbed on a machine hour basis. The overhead absorption rate for the period is ₹30 per machine hour.

Management is considering using Activity Based Costing system to ascertain the cost of the products. Further analysis shows that the total production overheads can be divided as follows:

|                                    |     |
|------------------------------------|-----|
| Cost relating to set up            | 40% |
| Cost relating to machinery         | 10% |
| Cost relating to material handling | 30% |
| Cost relating to Inspection        | 20% |

The following activity volumes are associated with the product line for the period as a whole. Total activities for the period:

| Particulars                     | AX  | BX  | CX  | Total |
|---------------------------------|-----|-----|-----|-------|
| Number of set-ups               | 350 | 450 | 740 | 1,540 |
| Number of movement of Materials | 200 | 280 | 675 | 1,155 |
| Number of inspections           | 200 | 400 | 900 | 1,500 |

**Required:**

1. Calculate the cost per unit of each product using the conventional method.
2. Calculate the cost per unit of each product using activity based costing method.

**[(10 Marks) May 2022]**

**Answer****1. Statement Showing "Cost per unit as per Conventional Method"**

| Particulars                                      | AX (₹) | BX (₹) | CX (₹) |
|--------------------------------------------------|--------|--------|--------|
| Direct Materials                                 | 35     | 25     | 45     |
| Direct Labour [(1, 0.9, 1.5 hours) × ₹20]        | 20     | 18     | 30     |
| Production Overheads [(2, 1.5, 2.5 hours) × ₹30] | 60     | 45     | 75     |
| Cost per unit                                    | 115    | 88     | 150    |

**2. Statement Showing "Cost per unit as per ABC Method"**

| Particulars                                | AX (₹)                  | BX (₹)                  | CX (₹)                   |
|--------------------------------------------|-------------------------|-------------------------|--------------------------|
| Production (units)                         | 7,500                   | 12,500                  | 25,000                   |
| Direct Materials @ ₹35/₹25/₹45 per unit    | 2,62,500                | 3,12,500                | 11,25,000                |
| Direct Labour @ ₹20/₹18/₹30 per unit       | 1,50,000                | 2,25,000                | 7,50,000                 |
| Production Overhead:                       |                         |                         |                          |
| Setup Costs @ ₹750 per setup               | 2,62,500<br>(750 × 350) | 3,37,500<br>(750 × 450) | 5,55,000<br>(750 × 740)  |
| Machine Related Costs @ ₹3 per hour        | 45,000<br>(3 × 15,000)  | 56,250<br>(3 × 18,750)  | 1,87,500<br>(3 × 62,500) |
| Material Handling Cost @ ₹750 per movement | 1,50,000<br>(750 × 200) | 2,10,000<br>(750 × 280) | 5,06,250<br>(750 × 675)  |
| Inspection Costs @ ₹385 per inspection     | 77,000<br>(385 × 200)   | 1,54,000<br>(385 × 400) | 3,46,500<br>(385 × 900)  |
| <b>Total Costs</b>                         | <b>9,47,000</b>         | <b>12,95,250</b>        | <b>34,70,250</b>         |
| <b>Cost per unit (Total Cost ÷ Units)</b>  | <b>126.267</b>          | <b>103.62</b>           | <b>138.81</b>            |

**Working Notes:**

(a) Total Machine Hours =  $7,500 \times 2 + 12,500 \times 1.5 + 25,000 \times 2.5$  = **96,250 hours**

(b) Total Production OH =  $96,250 \text{ machine hours} \times ₹30$  = **₹28,87,500**

**(c) Statement Showing Cost Driver Rate:**

| Cost Pool            | %   | Overheads | Cost Driver Basis        | Volume | Cost Driver Rate |
|----------------------|-----|-----------|--------------------------|--------|------------------|
| Set-up               | 40% | 11,55,000 | No of set ups            | 1,540  | 750/Setup        |
| Machine related cost | 10% | 2,88,750  | No of Machine Hours      | 96,250 | 3/Machine Hour   |
| Material handling    | 30% | 8,66,250  | No of Material movements | 1,155  | 750/Movement     |
| Inspection           | 20% | 5,77,500  | No of inspections        | 1,500  | 385/Inspection   |
| Total                | -   | 28,87,500 | -                        | -      | -                |

**PYQ 10**

XYZ Ltd. is engaged in manufacturing two products- Express Coffee and Instant Coffee. It furnishes the following data for a year:

| Products       | Actual Output (units) | Total Machine Hours | Total Number of Purchase | Total Number of set ups |
|----------------|-----------------------|---------------------|--------------------------|-------------------------|
| Express Coffee | 5,000                 | 20,000              | 160                      | 20                      |
| Instant Coffee | 60,000                | 1,20,000            | 384                      | 44                      |

The annual overheads are as under:

| Particulars              | Amount   |
|--------------------------|----------|
| Machine Processing costs | 7,00,000 |
| Set up related costs     | 7,68,000 |
| Purchase related costs   | 6,80,000 |

**You are required to:**

**ACTIVITY BASED COSTING 6.35**

- (a) Compute the costs allocated to each product – Express Coffee and Instant Coffee from each activity on the basis of Activity – Based Costing (ABC) method.
- (b) Find out the Overhead cost per units of each product – Express coffee and instant coffee based on (a) above.

**[(4 Marks) Nov 2022]****Answer****(a) Statement Showing Cost Allocated to Each Product Using Activity Based Costing**

| Activity Cost Pool     | Cost Driver          | Ratio     | Amount   | Express coffee   | Instant coffee    |
|------------------------|----------------------|-----------|----------|------------------|-------------------|
| Machine Processing     | No. of machine hours | 20 : 120  | 7,00,000 | 1,00,000         | 6,00,000          |
| Set up related costs   | No. set ups          | 20 : 44   | 7,68,000 | 2,40,000         | 5,28,000          |
| Purchase related costs | No. of purchase      | 160 : 384 | 6,80,000 | 2,00,000         | 4,80,000          |
| <b>Total Cost</b>      |                      |           |          | <b>₹5,40,000</b> | <b>₹16,08,000</b> |

**(b) Overhead cost per unit:**

|                |   |                    |   |               |
|----------------|---|--------------------|---|---------------|
| Express coffee | = | 5,40,000 ÷ 5,000   | = | <b>₹108</b>   |
| Instant coffee | = | 16,08,000 ÷ 60,000 | = | <b>₹26.80</b> |

**PYQ 11**

Beta Limited produces 50,000 Units, 45,000 Units and 62,000 Units of product 'A', 'B' and 'C' respectively. At present the company follows absorption costing method and absorbs overhead on the basis of direct labour hours. Now, the Company wants to adopt Activity Based Costing.

The information provided by Beta Limited is as follows:

|                      | Product A     | Product B     | Product C     |
|----------------------|---------------|---------------|---------------|
| Floor Space Occupied | 5,000 Sq. Ft. | 4,500 Sq. Ft. | 6,200 Sq. Ft. |
| Direct Labour Hours  | 7,500 Hours   | 7,200 Hours   | 7,800 Hours   |
| Direct Machine Hours | 6,000 Hours   | 4,500 Hours   | 4,650 Hours   |
| Power Consumption    | 32%           | 28%           | 40%           |

Overhead for year are as follows:

|                      |                   |
|----------------------|-------------------|
| Rent & Taxes         | ₹8,63,500         |
| Electricity Expense  | ₹10,66,475        |
| Indirect labour      | ₹13,16,250        |
| Repair & Maintenance | ₹1,28,775         |
|                      | <b>₹33,75,000</b> |

**Required:**

- (1) Calculate the overhead rate per labour hour under Absorption Costing.
- (2) Prepare a cost statement showing overhead cost per unit for each product – 'A', 'B' and 'C' as per Activity based Costing.

**[(5 Marks) May 2023]****Answer**

- (1) **Overhead rate per labour hour** = Overhead ÷ Labour hours  
 = ₹33,75,000 ÷ 22,500 hours (7,500 + 7,200 + 7,800)  
 = **₹150 per labour hour**

**(2) Statement Showing Overheads Cost per Unit**  
**(Using Activity based Costing)**

| Activity Cost Pool  | Cost Driver         | Ratio    | Amount    | Product A | Product B | Product C |
|---------------------|---------------------|----------|-----------|-----------|-----------|-----------|
| Rent & Taxes        | Floor space         | 50:45:62 | 8,63,500  | 2,75,000  | 2,47,500  | 3,41,000  |
| Electricity Expense | Power consumption   | 32:28:40 | 10,66,475 | 3,41,272  | 2,98,613  | 4,26,590  |
| Indirect labour     | Direct labour hours | 75:72:78 | 13,16,250 | 4,38,750  | 4,21,200  | 4,56,300  |

**ACTIVITY BASED COSTING 6.36**

|                                |               |             |          |               |               |               |
|--------------------------------|---------------|-------------|----------|---------------|---------------|---------------|
| Repair & Maintenance           | Machine hours | 600:450:465 | 1,28,775 | 51,000        | 38,250        | 39,525        |
| Total Cost                     |               |             |          | 11,06,022     | 10,05,563     | 12,63,415     |
| ÷ Total Units                  |               |             |          | ÷50,000       | ÷45,000       | ÷62,000       |
| <b>Overheads Cost Per Unit</b> |               |             |          | <b>₹22.12</b> | <b>₹22.35</b> | <b>₹20.38</b> |

# SUGGESTED REVISION

| <b>Ques. No.</b>                                                                                   | <b>Observations or KEY Points<br/>(Note down during revisions)</b> | <b>Page No. of<br/>Practical<br/>Register</b> | <b>1<sup>st</sup> &amp; 2<sup>nd</sup><br/>Revision</b> | <b>3<sup>rd</sup>, 4<sup>th</sup> &amp;<br/>5<sup>th</sup><br/>Revision</b> | <b>Revision<br/>during<br/>Exams</b> |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------|
| <b>BQ (Book Questions covering Study Module of ICAI, PM, RTP's, MTP's and Important Questions)</b> |                                                                    |                                               |                                                         |                                                                             |                                      |
| <b>1</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>2</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>3</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>4</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>5</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>6</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>7</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>8</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>9</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>10</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>11</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>12</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>13</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>14</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>15</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>PYQ (Past Year Questions)</b>                                                                   |                                                                    |                                               |                                                         |                                                                             |                                      |
| <b>1</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>2</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>3</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>4</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>5</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>6</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>7</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>Y</b>                             |
| <b>8</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>9</b>                                                                                           |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>10</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |
| <b>11</b>                                                                                          |                                                                    |                                               | <b>Y</b>                                                | <b>Y</b>                                                                    | <b>-</b>                             |

# ***CHAPTER - 7***

## ***DIRECT EXPENSES***

### ***LEARNING OUTCOMES***

***After studying this chapter you will be able to:***

- ***Discuss the measurement of Direct expenses***
- ***Discuss the treatment of Direct expenses.***

**1. Direct Expenses:**

**Expenses other than direct material cost and direct employee cost**, which are incurred to manufacture a product or for provision of service and **can be directly traced in an economically feasible manner** to a cost object. The following costs are examples for direct expenses:

- (a) Royalty paid/ payable for production or provision of service;
- (b) Hire charges paid for hiring specific equipment;
- (c) Cost for product/ service specific design or drawing;
- (d) Cost of product/ service specific software;
- (e) Other expenses which are directly related with the production of goods or provision of service etc.

**2. Measurement of Direct Expenses:**

The direct expenses are measured **at invoice or agreed price net of rebate or discount but includes duties and taxes** (for which input credit not available), commission and other directly attributable costs.

In case of **sub-contracting**, where goods are get manufactured by **job workers** independent of the principal entity, are measured **at agreed price**. Where the principal supplies some materials to the job workers, the value of such materials and other incidental expenses are added with the job charges paid to the job workers.

**3. Treatment of Direct Expenses:**

Direct Expenses **form part of the prime cost** for the product or service to which it can be directly traceable and attributable. In case of **lump-sum payment** or onetime payment, the cost is **amortised** over the estimated production volume or benefit derived.

If the expenses incurred are of **insignificant amount** i.e. not material, it can be **treated as part of overheads**.

**BQ 1**

Aditya Ltd. is an engineering manufacturing company producing job order on the basis of specification given by the customers. During the last the month it has completed three job works namely A, B and C. The following are the items of expenditures which are incurred apart from direct materials and direct employee cost:

- (a) Office and administration cost: ₹3,00,000
- (b) Product blueprint cost for job A: ₹1,40,000
- (c) Hire charges paid for machinery used in job work B: ₹40,000
- (d) Salary to office attendants: ₹50,000
- (e) One time license fee paid for software used to make computerized graphics for job C: ₹50,000
- (f) Salary paid to marketing manager: ₹1,20,000

**Calculate direct expenses attributable to each Job.**

**Answer****Calculation of Direct Expenses**

| <b>Particulars</b>              | <b>Job A (₹)</b> | <b>Job B (₹)</b> | <b>Job C (₹)</b> |
|---------------------------------|------------------|------------------|------------------|
| Product blueprint cost          | 1,40,000         | -                | -                |
| Hire charges paid for machinery | -                | 40,000           | -                |
| License fee paid for software   | -                | -                | 50,000           |
| <b>Total Direct Expenses</b>    | <b>1,40,000</b>  | <b>40,000</b>    | <b>50,000</b>    |

**BQ 2**

The following expenditures were incurred in Aditya Ltd. For the month of March 2024:

| <b>Particulars</b>            | <b>₹</b> |
|-------------------------------|----------|
| Paid for power & fuel         | 4,80,200 |
| Wages paid to factory workers | 8,44,000 |
| Bill paid to job workers      | 9,66,000 |
| Royalty paid for production   | 8,400    |



***DIRECT EXPENSES 7.2***

|                                          |          |
|------------------------------------------|----------|
| Fee paid to technician hired for the job | 96,000   |
| Administrative overheads                 | 76,000   |
| Commission paid to sales staffs          | 1,26,000 |

***You are required to calculate direct expenses for the month.***

***Answer***

***Calculation of Direct Expenses***

| <b><i>Particulars</i></b>                | <b><i>₹</i></b>         |
|------------------------------------------|-------------------------|
| Paid for power & fuel                    | 4,80,200                |
| Bill paid to job workers                 | 9,66,000                |
| Royalty paid for production              | 8,400                   |
| Fee paid to technician hired for the job | 96,000                  |
| <b><i>Total</i></b>                      | <b><i>15,50,600</i></b> |

***Notes:***

- (a)*** Wages paid to factory workers is direct employee cost.
- (b)*** Administrative overhead is indirect expense.
- (c)*** Commission paid to sales staffs comes under selling expenses.

# ***CHAPTER - 8***

## ***SERVICE COSTING***

### ***LEARNING OBJECTIVES***

***When you have finished studying this chapter, you should be able to***

- Understand the service sector and different services.***
- Understand the concept of cost unit and cost per unit for various services.***
- Understand the concept of cost classification.***
- Understand the commercial tonne kilometers and absolute tonne kilometers.***
- Understand to method of computation of operating cost, net taking and total taking in respect of Transport, Hotel and lodges, Hospital, Educational institute, IT & ITES, Toll, Financial institutes, Insurance and Power generation services etc.***

## TRANSPORT SERVICE

### BQ 1

AXA Passenger Transport Company is running 5 buses between two towns, which are 40 kms apart. Seating capacity of each bus is 40 passengers. Following details are available from their books, for the month of April 2023:

|                                            |                  |
|--------------------------------------------|------------------|
| Salary of Drivers, Cleaners and Conductors | ₹24,000          |
| Salary to Supervisor                       | ₹10,000          |
| Diesel and other Oil                       | ₹40,000          |
| Repairs and Maintenance                    | ₹8,000           |
| Taxation and Insurance                     | ₹16,000          |
| Depreciation                               | ₹26,000          |
| Insurance                                  | ₹20,000          |
| <b>Total</b>                               | <b>₹1,44,000</b> |

Actual passengers carried were 75% of the seating capacity. All the five buses run on all days for the month. Each bus made one round trip per day.

**Calculate cost per passenger – Kilometer.**

**Answer**

### Operating Cost Sheet

| Particulars                                | Amount          |
|--------------------------------------------|-----------------|
| <b>(A) Standing Charges:</b>               |                 |
| Salary of Drivers, Cleaners and Conductors | 24,000          |
| Salary to Supervisor                       | 10,000          |
| Taxation and Insurance                     | 16,000          |
| Depreciation                               | 26,000          |
| Insurance                                  | 20,000          |
| <b>Total (A)</b>                           | <b>96,000</b>   |
| <b>(B) Running Expenses:</b>               |                 |
| Diesel and other Oil                       | 40,000          |
| <b>Total (B)</b>                           | <b>40,000</b>   |
| <b>(C) Maintenance Charges:</b>            |                 |
| Repairs and Maintenance                    | 8,000           |
| <b>Total (C)</b>                           | <b>8,000</b>    |
| <b>Total operating cost (A + B + C)</b>    | <b>1,44,000</b> |
| ÷ Total passenger - kms                    | ÷ 3,60,000      |
| <b>Cost per passenger-km</b>               | <b>₹0.40</b>    |

**Working:**

$$\text{Passenger-kms} = 5 \text{ buses} \times 40 \text{ kms} \times 40 \text{ passengers} \times 75\% \times 30 \text{ days} \times 2 = 3,60,000$$

### BQ 2

Fast Roadways runs 10 buses between two suburban centres which are 25 kms apart. Seating capacity of each bus is 30 passengers.

**The expenses for the month of November were as under:**

|                                    |                  |
|------------------------------------|------------------|
| Salaries of Mechanical Staff       | ₹6,000           |
| Salaries of Drivers and Conductors | ₹60,000          |
| Diesel, Oil and Lubricants         | ₹40,000          |
| Taxes, Insurance, etc.             | ₹5,200           |
| Repairs and Maintenance            | ₹8,000           |
| Depreciation                       | ₹32,000          |
| <b>Total</b>                       | <b>₹1,51,200</b> |

Seating capacity utilization was 60%. All the buses ran 25 days of the month. Each bus made four round trips daily.

- (a) Find out the cost per passenger-km and the cost per round trip per passenger.  
 (b) What would have been the cost per round trip per passenger if the seating capacity utilisation were to go up to 80%?  
 (c) What would have been the cost per round trip per passenger, if all the expenses (other than depreciation) were to go up by 20% at a seating capacity utilisation of 80%?

[(a) ₹0.168, ₹8.40; (b) ₹0.126, ₹6.30; (c) ₹0.146, ₹7.30]

### BQ 3

Mr. Jaidka owns a fleet of taxis and the following information is available from the records maintained by him:

|                           |           |                          |                    |
|---------------------------|-----------|--------------------------|--------------------|
| (i) Number of taxis       | 10        | (vii) Garage rent        | ₹600 p.m.          |
| (ii) Cost of each taxi    | ₹20,000   | (viii) Insurance premium | 5% p.a.            |
| (iii) Salary of manager   | ₹600 p.m. | (ix) Annual tax          | ₹600 per taxi      |
| (iv) Salary of accountant | ₹500 p.m. | (x) Driver's salary      | ₹200 p.m. per taxi |
| (v) Salary of cleaner     | ₹200 p.m. | (xi) Annual repairs      | ₹1,000 per taxi    |
| (vi) Salary of mechanic   | ₹400 p.m. |                          |                    |

Total life of a taxi is about 2,00,000 kms taxi runs in all 3,000 kms in a month of which 30% it runs empty. Petrol consumption is one litre for 10 kms @ ₹1.80 per litre. Oil and other sundries are ₹5 per 100 kms.

*Calculate the effective cost of running a taxi per km.*

[₹0.779 per km]

### BQ 4

ABC Transport Company has been given a route 40 km long to run a bus. The bus costs the company a sum of ₹10,00,000. It has been insured at 3% p.a. and the annual tax will amount to ₹20,000. Garage rent is ₹20,000 p.m. Annual repairs will be ₹2,04,000 and the bus is likely to last for 2.5 years.

The driver's salary will be ₹30,000 p.m. and the conductor's salary will be ₹25,000 p.m. in addition to 10% of takings as commission (to be shared by the driver and the conductor equally). Cost of stationery will be ₹1,000 p.m. Manager cum Accountant's salary is ₹17,000 p.m. Petrol and oil will be ₹500 per 100 km.

The bus will make 3 up and down trips carrying on an average 40 passengers on each trip.

*Assuming 15% profit on takings, calculate the bus fare to be charged from each passenger. The bus will run on an average 25 days in a month.*

### Answer

#### Statement of Cost Per Passenger Km

| Particulars                     |                                                  | Amount          |
|---------------------------------|--------------------------------------------------|-----------------|
| <b>(A) Standing Charges:</b>    |                                                  |                 |
| Depreciation per month          | $(10,00,000 \div 2.5 \text{ Years} \times 1/12)$ | 33,333          |
| Insurance per month             | $[(10,00,000 \times 3\%) \times 1/12]$           | 2,500           |
| Annual Tax for one month        | $(20,000 \times 1/12)$                           | 1,667           |
| Garage Rent                     |                                                  | 20,000          |
| Manager-cum accountant's salary |                                                  | 17,000          |
| Stationery                      |                                                  | 1,000           |
| Driver's salary                 |                                                  | 30,000          |
| Conductor's salary              |                                                  | 25,000          |
| <b>Total (A)</b>                |                                                  | <b>1,30,500</b> |
| <b>(B) Running Charges:</b>     |                                                  |                 |
| Petrol and oil                  | $(500/100 \times 6,000 \text{ kms})$             | 30,000          |
| Commission @ 10% of collections |                                                  | 23,667          |
| <b>Total (B)</b>                |                                                  | <b>53,667</b>   |
| <b>(C) Maintenance Charges:</b> |                                                  |                 |
| Repairs and maintenance         | $(2,04,000 \times 1/12)$                         | 17,000          |

|                                         |                 |
|-----------------------------------------|-----------------|
| <b>Total (C)</b>                        | <b>17,000</b>   |
| <b>Total operating cost (A + B + C)</b> | <b>2,01,167</b> |
| Add: Profit @ 15% of collections        | 35,500          |
| <b>Collections (WN 3)</b>               | <b>2,36,667</b> |
| ÷ Total Passenger-kms                   | ÷ 2,40,000      |
| <b>Fare for per passenger-km</b>        | <b>₹0.9861</b>  |

**WN 1: Calculation of total travelling of bus in one month:**

$$= 2 \times \text{No of round trips daily} \times \text{Distance one way} \times \text{No of days}$$

$$= 2 \times 3 \times 40 \times 25 = \mathbf{6,000 \text{ kms}}$$

**WN 2: Calculation of passenger-kms per month:**

$$= \text{No of kms travelled per month} \times \text{No of passengers}$$

$$= 6,000 \times 40 = \mathbf{2,40,000 \text{ passenger-kms}}$$

**WN 3: Calculation of collections:**

$$\begin{aligned} \text{Total collections} &= \text{Operating cost (excluding commission on collections)} + 10\% \text{ for commission} + 15\% \text{ for profit} \\ &= 1,30,500 + 30,000 + 17,000 + 25\% \text{ of collections} \\ \mathbf{Collections} &= \mathbf{₹2,36,667} \end{aligned}$$

**BQ 5**

Shankar has been promised a contract to run a tourist car on a 20 km long route for the chief executive of a multinational firm. He buys a car costing ₹1,50,000. The annual cost of insurance and taxes are ₹4,500 and ₹900 respectively. He has to pay ₹500 per month for a garage where he keeps the car when it is not in use. The annual repair costs are estimated at ₹4,000. The car is estimated to have a life of 10 years, at the end of which the scrap value is likely to be ₹50,000.

He hires a driver who is to be paid ₹300 per month plus 10% of the takings as commission. Other incidental expenses are estimated at ₹200 per month. Petrol and oil will cost ₹100 per 100 kms. The car will make 4 round trips each day.

**Assuming that profit of 15% on taking is desired and that the car will be on the road for 25 days on an average per month what should he charge per round trip?**

**Answer****Operating Cost Sheet**

| <b>Particulars</b>                            | <b>Amount</b>   |
|-----------------------------------------------|-----------------|
| <b>(A) Standing Charges:</b>                  |                 |
| Insurance (4,500 ÷ 12)                        | 375             |
| Taxes (900 ÷ 12)                              | 75              |
| Garage Rent                                   | 500             |
| Driver's Salary                               | 300             |
| Incidental Expenses                           | 200             |
| Depreciation (10,000 ÷ 12)                    | 833.33          |
| <b>Total (A)</b>                              | <b>2,283.33</b> |
| <b>(B) Running Charges:</b>                   |                 |
| Petrol and Oil (1.00 × 4,000)                 | 4,000           |
| Commission @ 10% on taking (10% of 8,822.21)  | 882.22          |
| <b>Total (B)</b>                              | <b>4,882.22</b> |
| <b>(C) Maintenance Charges:</b>               |                 |
| Annual Repairs (4,000 ÷ 12)                   | 333.33          |
| <b>Total (C)</b>                              | <b>333.33</b>   |
| <b>Total operating cost (A + B + C)</b>       | <b>7,498.88</b> |
| Add: Profit @ 15% on taking (15% of 8,822.21) | 1,323.33        |

|                                                         |                 |
|---------------------------------------------------------|-----------------|
| <b>Taking (WN 2)</b>                                    | <b>8,822.21</b> |
| ÷ Total round trips per month (25 days × 4 round trips) | 100             |
| <b>Taking per round trip</b>                            | <b>₹88.22</b>   |

**WN 1: Calculation of total travelling of a car in one month:**

$$= 20 \text{ Kms.} \times 2 \text{ sides} \times 4 \text{ times} \times 25 \text{ days} = 4,000 \text{ kms}$$

**WN 2: Calculation of collections:**

|                    |   |                                                                                            |
|--------------------|---|--------------------------------------------------------------------------------------------|
| Total collections  | = | Operating cost (excluding commission on collections) + 10% for commission + 15% for profit |
|                    | = | 6,616.66 + 25% of collections                                                              |
| <b>Collections</b> | = | <b>₹8,822.21</b>                                                                           |

**BQ 6**

Saitravel owns a bus and operates a tourist service on daily basis. The bus starts from Newcity to Restvillage and returns back to Newcity the same day. Distance between Newcity and Restvillage is 250 kms. This trip operates for 10 days in a month.

The bus also plies for another 10 days between Newcity and Shivapur and return back to Newcity the same day, distance between these two places is 200 kms.

The bus makes local sightseeing trips for 5 days in a month, covering a total distance of 60 kms per day.

**The following data are given:**

|                          |                            |
|--------------------------|----------------------------|
| Cost of bus              | ₹3,50,000                  |
| Depreciation             | 25% per annum              |
| Driver's salary          | ₹1,200 p.m.                |
| Conductor's salary       | ₹1,000 p.m.                |
| Part-time clerk's salary | ₹400 p.m.                  |
| Insurance                | ₹1,800 p.a.                |
| Diesel consumption       | 4 kms per litre @ ₹8/litre |
| Token tax                | ₹2,400 p.a.                |
| Permit fee               | ₹1,000 p.m.                |
| Lubricant oil            | ₹100 for every 200 kms.    |
| Repairs and maintenance  | ₹1,500 p.m.                |
| Normal capacity          | 50 persons                 |

While plying to and from Restvillage the bus occupies 90% of the capacity and 80% when it plies between Newcity to Shivapur (both ways). In the city the bus runs full capacity. Passenger Tax is 20% of net takings of the travel's firm.

**Calculate the rate to be charged to Restvillage and Shivapur from Newcity per passenger, if the profit required to be earned is 33- $\frac{1}{3}$ % of net takings of the firm.**

**[Newcity to Restvillage: 250kms × 0.161 = ₹40.25; Newcity to Shivapur: 200kms × 0.161 = ₹32.20]**

**BQ 7**

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 runs each month | : | 8               |
| Seating capacity occupied      | : | 90%             |

**(ii) Delhi to Agra and back the same day:**

|                                |   |                 |
|--------------------------------|---|-----------------|
| Distance covered               | : | 210 kms one way |
| Numbers 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  
 Numbers of days run each month : 6  
 Seating capacity occupied : 100%

**(iv) Following are the other details**

Cost of the bus : ₹12,00,000  
 Salary of the driver : ₹24,000 p.m.  
 Salary of the Conductor : ₹21,000 p.m.  
 Salary of the part-time Accountant : ₹5,000 p.m.  
 Insurance of the bus : ₹4,800 p.a.  
 Diesel consumption : 4 kms per litre  
 Diesel rate : ₹56 per liter  
 Road tax : ₹15,915 p.a.  
 Lubricant Oil : ₹10 per 100 kms  
 Permit fee : ₹315 p.m.  
 Repairs and maintenance : ₹1,000 p.m.  
 Depreciation of the bus : 20% p.a.  
 Seating capacity of the bus : 50 persons  
 Passenger tax : 20% of the total taking

**Calculate the bus fare to be charged from each passenger to earn a profit of 30% on total taking, fares are to be indicated per passenger for the journeys (i) Delhi to Chandigarh, (ii) Delhi to Agra and (iii) Delhi to Jaipur**

**Answer**

**Statement of Fare to be Charged**

| Particulars                                  | Amount             |
|----------------------------------------------|--------------------|
| <b>(A) Standing Charges:</b>                 |                    |
| Salary of driver                             | 24,000             |
| Salary of conductor                          | 21,000             |
| Salary of part time accountant               | 5,000              |
| Insurance (4,800 ÷ 12)                       | 400                |
| Road tax (15,915 ÷ 12)                       | 1,326.25           |
| Permit fee                                   | 315                |
| Depreciation (₹12,00,000 × 20%) ÷ 12         | 20,000             |
| <b>Total (A)</b>                             | <b>72,041.25</b>   |
| <b>(B) Running Costs:</b>                    |                    |
| Diesel (11,440 km ÷ 4 km) × ₹56              | 1,60,160           |
| Lubricant oil (11,440 km. ÷ 100 ) × ₹10      | 1,144              |
| <b>Total (B)</b>                             | <b>1,61,304</b>    |
| <b>(C) Maintenance Costs:</b>                |                    |
| Repairs and Maintenance                      | 1,000              |
| <b>Total (C)</b>                             | <b>1,000</b>       |
| <b>Total Operating Cost (A + B + C)</b>      | <b>2,34,345.25</b> |
| Add: Profit @ 30% on Taking                  | 1,40,604.15        |
| <b>Net Taking</b>                            | <b>3,74,952.40</b> |
| Add: Passenger tax @ 20 % on Taking          | 93,738.10          |
| <b>Taking per month</b>                      | <b>4,68,690.50</b> |
| ÷ Total passenger kms                        | ÷ 5,20,500         |
| <b>Fare per passenger per km</b>             | <b>0.90</b>        |
| <b>Fare Delhi to Chandigarh (250 × 0.90)</b> | <b>₹225</b>        |
| <b>Fare Delhi to Agra (210 × 0.90)</b>       | <b>₹189</b>        |
| <b>Fare Delhi to Jaipur (270 × 0.90)</b>     | <b>₹243</b>        |



**Working Notes:****1. Calculation of taking:**

|               |   |                                               |
|---------------|---|-----------------------------------------------|
| Taking        | = | Total operating cost + Profit + Passenger tax |
|               | = | 2,34,345.25 + 30% of taking + 20% of taking   |
| Taking        | = | 2,34,345.25 + 50% of taking                   |
| <b>Taking</b> | = | <b>4,68,690.50</b>                            |

**2. Calculation of total km runs per month:**

| <b>Bus route</b>    | <b>Kms per trip</b> | <b>Trips per day</b> | <b>Days per month</b> | <b>Kms per month</b> |
|---------------------|---------------------|----------------------|-----------------------|----------------------|
| Delhi to Chandigarh | 250                 | 2                    | 8                     | 4,000 kms            |
| Delhi to Agra       | 210                 | 2                    | 10                    | 4,200 kms            |
| Delhi to Jaipur     | 270                 | 2                    | 6                     | 3,240 kms            |
|                     |                     |                      |                       | <b>11,440 kms</b>    |

**3. Calculation of total passenger kms:**

$$= (4,000 \text{ kms} \times 50 \text{ persons} \times 90\%) + (4,200 \text{ kms} \times 50 \text{ persons} \times 85\%) + (3,240 \text{ kms} \times 50 \text{ persons} \times 100\%)$$

$$= \mathbf{5,20,500}$$

**BQ 8**

SMC is a public school having five buses each plying in different directions for the transport of its school students. In view of a 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 work load 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 the junior students. Similarly in the afternoon the first trip drops the junior students and an hour later second trip takes the senior students home.

The distance travelled by each bus one way is 8 kms. The school works 25 days in a month and remains closed for vacation in May, June and December. Bus fee, however is payable by the students for all the 12 months in a year.

**The details of expenses for a year are as under:**

|                                                                               |                             |
|-------------------------------------------------------------------------------|-----------------------------|
| Driver's salary                                                               | ₹4,500 per month per driver |
| Cleaner's salary                                                              | ₹3,500 per month            |
| (Salary payable for all 12 months and 1 cleaner employee for all the 5 buses) |                             |
| License fee, taxes etc.                                                       | ₹8,600 per bus per annum    |
| Insurance                                                                     | ₹10,000 per bus per annum   |
| Repair and maintenance                                                        | ₹35,000 per bus per annum   |
| Purchase price of the bus                                                     | ₹15,00,000 each             |
| Life                                                                          | 12 years                    |
| Salvage value at the end of economic life                                     | ₹3,00,000                   |
| Diesel cost                                                                   | ₹45.00 per litre            |
| Average mileage                                                               | 4 kms per litre             |
| Seating capacity of each bus                                                  | 50 students                 |
| (The seating capacity is fully occupied during the whole year)                |                             |

Students picked up and dropped within a range up to 4 kms of distance from the school are charged half fare and fifty per cent of the students travelling in each trip are in this category. Ignore interest.

**Since the charges are to be based on average cost, you are required to:**

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

**[(a) ₹3,78,000 & ₹18,90,000; (b) (i) ₹210, (ii) ₹420]**

**BQ 9**

A company is considering three alternative proposals for conveyance facilities for its sales personnel who have to do considerable travelling approximately 20,000 Kms every year. **The proposals are as follows:**

- (i) Purchase and maintain its own fleet of cars. The average cost of a car is ₹6,00,000.
- (ii) Allow the executive to use his own car and reimburse expenses at the rate of ₹10 per kilometer and also bear insurance costs.
- (iii) Hire cars from an agency at ₹1,80,000 per year per car. The Company will have to bear costs of petrol, taxes and tyres.

**The following further details are available:**

- (a) Petrol ₹6 per km.
- (b) Repairs and maintenance ₹0.20 per km.
- (c) Tyres ₹0.12 per km.
- (d) Insurance ₹1,200 per car per annum.
- (e) Taxes ₹800 per car per annum.
- (f) Life of the car 5 years with annual mileage of 20,000 kms.
- (g) Resale value ₹80,000 at the end of the fifth year.

**Work out the relative costs of three proposals and rank them.**

**Answer****Calculation of Relative Costs of Three Proposals and their Ranking**

| Particulars                                    | Own Car         | Reimbursement   | Hire            |
|------------------------------------------------|-----------------|-----------------|-----------------|
| <b>(A) Standing Charges:</b>                   |                 |                 |                 |
| Insurance                                      | 1,200           | 1,200           | -               |
| Taxes                                          | 800             | -               | 800             |
| Depreciation $(6,00,000 - 80,000) \times 1/5$  | 1,04,000        | -               | -               |
| Hire Charges                                   | -               | -               | 1,80,000        |
| <b>Total (A)</b>                               | <b>1,06,000</b> | <b>1,200</b>    | <b>1,80,800</b> |
| <b>(B) Running Charges:</b>                    |                 |                 |                 |
| Petrol $(20,000 \times 6)$                     | 1,20,000        | -               | 1,20,000        |
| Reimbursement $(20,000 \times 10)$             | -               | 2,00,000        | -               |
| <b>Total (B)</b>                               | <b>1,20,000</b> | <b>2,00,000</b> | <b>1,20,000</b> |
| <b>(C) Maintenance Charges:</b>                |                 |                 |                 |
| Repairs and maintenance $(20,000 \times 0.20)$ | 4,000           | -               | -               |
| Tyres $(20,000 \times .12)$                    | 2,400           | -               | 2,400           |
| <b>Total (C)</b>                               | <b>6,400</b>    | <b>-</b>        | <b>2,400</b>    |
| <b>Total Cost (A + B + C)</b>                  | <b>2,32,400</b> | <b>2,01,200</b> | <b>3,03,200</b> |
| <b>Rank</b>                                    | <b>II</b>       | <b>I</b>        | <b>III</b>      |

**Analysis:**

The Second alternative i.e., use of own car by the executive and reimbursement of expenses by the company is the best alternative from company's point of view.

**BQ 10**

Navya LMV Pvt. Ltd, operates cab/ car rental service in Delhi/NCR. It provides its service to the offices of Noida, Gurugram and Faridabad. At present it operates CNG fuelled cars but it is also considering to upgrade these into Electric vehicle (EV). The details related with the owning of CNG & EV propelled cars are as tabulated below:

| Particulars                       | CNG Car  | EV Car    |
|-----------------------------------|----------|-----------|
| Car purchase price (₹)            | 9,20,000 | 15,20,000 |
| Govt. subsidy to purchase car (₹) | -        | 1,50,000  |
| Life of the car                   | 15 Years | 10 Years  |
| Residual value (₹)                | 95,000   | 1,70,000  |

**SERVICE COSTING 8.8**

|                                              |          |               |
|----------------------------------------------|----------|---------------|
| Mileage                                      | 20 km/kg | 240 km/charge |
| Electricity consumption per full charge      | -        | 30 KWH        |
| CNG cost per kg (₹)                          | 60       | -             |
| Power cost per KWH (₹)                       | -        | 7.60          |
| Annual maintenance cost (₹)                  | 8,000    | 5,200         |
| Annual insurance (₹)                         | 7,600    | 14,600        |
| Tyre replacement cost in every 5 year (₹)    | 16,000   | 16,000        |
| Battery replacement cost in every 8 year (₹) | 12,000   | 5,40,000      |

Apart from the above, the following are the additional information:

| <b>Particulars</b>                                  |             |
|-----------------------------------------------------|-------------|
| Average distance covered by a car in a month        | 1,500 km    |
| Driver's salary (₹)                                 | 20,000 p.m. |
| Garage rent per car (₹)                             | 4,500 p.m.  |
| Share of Office and administration cost per car (₹) | 1,500 p.m.  |

**Calculate the operating cost of vehicle per month per car for both CNG & EV options.**

**Answer**

**Operating Cost Sheet**

| <b>Particulars</b>                                                           | <b>CNG Car (₹)</b> | <b>EV Car (₹)</b> |
|------------------------------------------------------------------------------|--------------------|-------------------|
| <b>(A) Running Charges:</b>                                                  |                    |                   |
| Fuel cost/ Power consumption cost                                            | 4,500              | 1,425             |
| <b>Total (A)</b>                                                             | <b>4,500</b>       | <b>1,425</b>      |
| <b>(B) Standing Charges</b>                                                  |                    |                   |
| Depreciation                                                                 | 4,583.33           | 10,000            |
| Monthly insurance cost $(7,600 \div 12) / (14,600 \div 12)$                  | 633.33             | 1,216.67          |
| Driver's salary                                                              | 20,000             | 20,000            |
| Garage rent                                                                  | 4,500              | 4,500             |
| Share of office and administration cost                                      | 1,500              | 1,500             |
| <b>Total (B)</b>                                                             | <b>31,216.66</b>   | <b>37,216.67</b>  |
| <b>(C) Maintenance Charges:</b>                                              |                    |                   |
| Monthly maintenance cost $(8,000 \div 12) / (5,200 \div 12)$                 | 666.67             | 433.33            |
| Amortised cost of tyre replacement $[(16,000 \div 5 \text{ years}) \div 12]$ | 177.78             | 133.33            |
| Amortised cost of battery replacement                                        | 66.67              | 4,500             |
| <b>Total (C)</b>                                                             | <b>911.12</b>      | <b>5,066.66</b>   |
| <b>Total Cost (A + B + C)</b>                                                | <b>36,627.78</b>   | <b>43,708.33</b>  |

**Working notes:**

- (a) **Fuel cost per month** =  $(₹60 \div 20 \text{ kms}) \times 1,500 \text{ kms}$  = **₹4,500**
- Power cost per month** =  $(₹7.6 \times 30 \text{ KWH} \div 240 \text{ kms}) \times 1,500 \text{ kms}$  = **₹1,425**
- (b) **Depreciation CNG Car** =  $(₹9,20,000 - ₹95,000) \div 15 \text{ Years} \times 1/12$  = **₹4,583.33**
- Depreciation EV Car** =  $(₹15,20,000 - ₹1,50,000 - ₹1,70,000) \div 10 \text{ Years} \times 1/12$
- = **₹10,000**
- (c) **Amortised cost of tyre CNG Car:**
- Life of car = 15 years
- Replacement of tyres = after 5 years
- Total replacements = only 2 replacements during 15 years  
(no replacement at the end of useful life, sold as scrap)
- Amortised cost =  $[(₹16,000 \times 2) \div 15 \text{ Years}] \times 1/12$  = **₹177.78**
- (d) **Amortised cost of tyre EV Car:**

|                      |   |                                                                                                 |           |
|----------------------|---|-------------------------------------------------------------------------------------------------|-----------|
| Life of car          | = | 10 years                                                                                        |           |
| Replacement of tyres | = | after 5 years                                                                                   |           |
| Total replacements   | = | only 1 replacement during 10 years<br>(no replacement at the end of useful life, sold as scrap) |           |
| Amortised cost       | = | $(₹16,000 \div 10 \text{ Years}) \times 1/12$                                                   | = ₹133.33 |

**(e) Amortised cost of battery CNG Car:**

|                        |   |                                               |          |
|------------------------|---|-----------------------------------------------|----------|
| Life of car            | = | 15 years                                      |          |
| Replacement of battery | = | after 8 years                                 |          |
| Total replacements     | = | only one replacement during 15 years          |          |
| Amortised cost         | = | $(₹12,000 \div 15 \text{ Years}) \times 1/12$ | = ₹66.67 |

**(f) Amortised cost of battery EV Car:**

|                        |   |                                                 |          |
|------------------------|---|-------------------------------------------------|----------|
| Life of car            | = | 10 years                                        |          |
| Replacement of battery | = | after 8 years                                   |          |
| Total replacements     | = | only one replacement during 10 years            |          |
| Amortised cost         | = | $(₹5,40,000 \div 10 \text{ Years}) \times 1/12$ | = ₹4,500 |

**BQ 11**

A practicing Chartered Accountant now spends on an average ₹2.50 per km on taxi fare for his client's work. He is considering two alternatives, the purchase of a new small car or an old bigger car.

**The estimated cost figures are:**

| Items                                         | New Small Car | Old Big Car |
|-----------------------------------------------|---------------|-------------|
| Purchase price                                | 84,000        | 40,000      |
| Sale price after 5 years                      | 34,000        | 8,000       |
| Repairs and servicing per annum               | 1,800         | 2,400       |
| Taxes and Insurance p.a.                      | 3,400         | 1,600       |
| Kms run per litre                             | 15 kms.       | 8 kms       |
| Petrol price per litre (including mobile oil) | 8.50          | 8.50        |

**He estimates that he does 12,000 kms annually. Which of the three alternatives will be cheaper?**

**Answer**

**Statement Showing Relative Costs of Three Alternatives**

| Particulars                              | New Small Car | Old Big Car   | Taxi          |
|------------------------------------------|---------------|---------------|---------------|
| <b>(A) Standing Charges:</b>             |               |               |               |
| Taxes and Insurance                      | 3,400         | 1,600         | -             |
| Depreciation:                            |               |               |               |
| Small Car $(84,000 - 34,000) \times 1/5$ | 10,000        | -             | -             |
| Big Car $(40,000 - 8,000) \times 1/5$    | -             | 6,400         | -             |
| <b>Total (A)</b>                         | <b>13,400</b> | <b>8,000</b>  | <b>-</b>      |
| <b>(B) Running Charges:</b>              |               |               |               |
| Petrol:                                  |               |               |               |
| Small Car $(12,000 \times 8.5/15)$       | 6,800         | -             | -             |
| Big Car $(12,000 \times 8.5/8)$          | -             | 12,750        | -             |
| Taxi fare $(12,000 \times 2.5)$          | -             | -             | 30,000        |
| <b>Total (B)</b>                         | <b>6,800</b>  | <b>12,750</b> | <b>30,000</b> |
| <b>(C) Maintenance Charges:</b>          |               |               |               |
| Repairs and Servicing                    | 1,800         | 2,400         | -             |
| <b>Total (C)</b>                         | <b>1,800</b>  | <b>2,400</b>  | <b>-</b>      |
| <b>Total Cost (A + B + C)</b>            | <b>22,000</b> | <b>23,150</b> | <b>30,000</b> |

**Small Car option is cheaper.**

**BQ 12**

Prakash Automobiles distributes its foods to a regional dealer using a single lorry. The dealer's premises are 40 kms away by road. The lorry has a capacity of 10 tonnes and makes the journey twice a day fully loaded on the outward journeys and empty on return journeys.

**The following information is available for a four weekly period during the year 2023:**

|                                 |                            |
|---------------------------------|----------------------------|
| Petrol consumption              | 8 kms per litre            |
| Petrol cost                     | ₹13 per litre              |
| Oil                             | ₹100 per week              |
| Driver's wages                  | ₹400 per week              |
| Repairs                         | ₹100 per week              |
| Garage rent                     | ₹150 per week              |
| Cost of lorry (excluding tyres) | ₹4,50,000                  |
| Life of lorry                   | 80,000 kms                 |
| Insurance                       | ₹6,500 per annum           |
| Cost of tyres                   | ₹6,250                     |
| Life of tyres                   | 25,000 kms                 |
| Estimated sale value of lorry   | ₹50,000 at end of its life |
| Vehicle license cost            | ₹1,300 per annum           |
| Other overhead cost             | ₹41,600 per annum          |
| The lorry operates              | five days week             |

**Required:**

- (a) A statement to show the total cost of operating the vehicle for the four weekly period analysed into running costs and fixed costs.  
 (b) Calculate the vehicle cost per kilometer and ton-km.

**Answer**

**(a) Statement of Operating Cost of a Lorry of M/S Prakash Automobile  
(For the four weekly period)**

| Particulars                                                                                 | Amount        |
|---------------------------------------------------------------------------------------------|---------------|
| <b>(A) Fixed Costs:</b>                                                                     |               |
| Garage rent (150 × 4)                                                                       | 600           |
| Insurance (6,500 ÷ 52) × 4                                                                  | 500           |
| License cost (1,300 ÷ 52) 4100                                                              | 100           |
| Other overheads (41,600 ÷ 52) × 4                                                           | 3,200         |
| Driver's wages (400 × 4)                                                                    | 1,600         |
| <b>Total (A)</b>                                                                            | <b>6,000</b>  |
| <b>(B) Running Costs:</b>                                                                   |               |
| Cost of petrol (3,200 Kms × 13/8)                                                           | 5,200         |
| Oil (100 × 4)                                                                               | 400           |
| Repairs (100 × 4)                                                                           | 400           |
| Cost of tyres                                                                               | 800           |
| Depreciation [ $\{(4,50,000 - 50,000) \div 80,000 \text{ Kms}\} \times 3,200 \text{ Kms}$ ] | 16,000        |
| <b>Total (B)</b>                                                                            | <b>22,800</b> |
| <b>Total operating cost (A + B)</b>                                                         | <b>28,800</b> |

(b) **Vehicle cost per kilometer** =  $\frac{\text{Total cost} \div \text{Total Km}}{28,800 \div 3,200 \text{ km}}$  = **₹9.00**

**Cost per ton-km** =  $\frac{\text{Total cost} \div \text{Total ton-km}}{28,800 \div 16,000 \text{ ton-km}}$  = **₹1.80**

**Working notes:****1. Distance travelled in 4 weeks period:**

40 kms one way × 2 (return) × 2 trips × 5 days × 4 weeks = **3,200 kms**

$$2. \text{ Total ton-km} = 1,600 \text{ kms} \times 10 + 1,600 \text{ kms} \times \text{Nil} = 16,000$$

$$3. \text{ Tyres cost} = (6,250 \div 25,000 \text{ kms}) \times 3,200 \text{ kms} = ₹800$$

**BQ 13**

A transport company has 20 vehicles, which capacities are as follows:

| <i>No of vehicles</i> | <i>Capacity per vehicle</i> |
|-----------------------|-----------------------------|
| 5                     | 9 MT                        |
| 6                     | 12 MT                       |
| 7                     | 15 MT                       |
| 2                     | 20 MT                       |

The company provides the goods transport service between stations 'A' to station 'B'. Distance between these stations is 100 kilometres. Each vehicle makes one round trip per day an average. Vehicles are loaded with an average of 90 per cent of capacity at the time of departure from station 'A' to station 'B' and at the time of return back loaded with 70 per cent of capacity. 10 per cent of vehicles are laid up for repairs every day.

**The following information is related to the month of October, 2023:**

|                                                                          |                     |
|--------------------------------------------------------------------------|---------------------|
| Salary of Transport Manager                                              | ₹60,000             |
| Salary of 30 drivers                                                     | ₹20,000 each driver |
| Wages of 25 Helpers                                                      | ₹12,000 each helper |
| Loading and unloading charges                                            | ₹850 each trip      |
| Consumable stores (depends on the running of vehicles)                   | ₹1,35,000           |
| Insurance (Annual)                                                       | ₹8,40,000           |
| Road Licence (Annual)                                                    | ₹6,00,000           |
| Cost of Diesel per litre                                                 | ₹78                 |
| Kilometres run per litre each vehicle                                    | 5 Km.               |
| Lubricant, Oil etc.                                                      | ₹1,15,000           |
| Cost of replacement of Tyres, Tubes, other parts etc. (on running basis) | ₹4,25,000           |
| Garage rent (Annual)                                                     | ₹9,00,000           |
| Routine mechanical services                                              | ₹3,00,000           |
| Electricity and Gas charges (for office, garage and washing station)     | ₹55,000             |
| Depreciation of vehicles (on time basis)                                 | ₹6,00,000           |

There is a workshop attached to transport department which repairs these vehicles and other vehicles also. 40 per cent of transport manager's salary is debited to the workshop. The transport department has been apportioned ₹88,000 by the workshop during the month. During the month operation was 25 days.

**You are required:**

- Calculate per ton-km operating cost.
- Determine the freight to be charged per ton-km, if the company earned a profit of 25 per cent on freight.

**Answer**

**(i) Operating Cost Sheet for the month of October, 2023**

| <i>Particulars</i>            | <i>Amount</i> |
|-------------------------------|---------------|
| <b>(A) Standing Charges:</b>  |               |
| Salaries & Wages:             |               |
| Manager (60% of ₹60,000)      | 36,000        |
| Drivers (30 × ₹20,000)        | 6,00,000      |
| Helpers (25 × ₹12,000)        | 3,00,000      |
| Insurance (₹8,40,000 ÷ 12)    | 70,000        |
| Road licence (₹6,00,000 ÷ 12) | 50,000        |
| Garage rent (₹9,00,000 ÷ 12)  | 75,000        |
| Electricity charges           | 55,000        |
| Depreciation                  | 6,00,000      |

|                                                          |                                                        |                  |
|----------------------------------------------------------|--------------------------------------------------------|------------------|
| <b>Total (A)</b>                                         |                                                        | <b>17,86,000</b> |
| <b>(B) Running Charges:</b>                              |                                                        |                  |
| Loading and unloading charges                            |                                                        | 7,65,000         |
| Consumable Stores                                        |                                                        | 1,35,000         |
| Cost of diesel                                           | $[(90,000 \text{ kms} \div 5 \text{ kms}) \times ₹78]$ | 14,04,000        |
| Lubricants, Oil etc.                                     |                                                        | 1,15,000         |
| <b>Total (B)</b>                                         |                                                        | <b>24,19,000</b> |
| <b>(C) Maintenance Charges:</b>                          |                                                        |                  |
| Replacement of Tyres, Tubes & other parts                |                                                        | 4,25,000         |
| Routine mechanical services                              |                                                        | 3,00,000         |
| Apportioned work shop expenses (for repairs of vehicles) |                                                        | 88,000           |
| <b>Total (C)</b>                                         |                                                        | <b>8,13,000</b>  |
| <b>Total operating cost (A + B + C)</b>                  |                                                        | <b>50,18,000</b> |
| ÷ Total ton-kms.                                         |                                                        | 9,43,200         |
| <b>Cost per ton-km</b>                                   |                                                        | <b>₹5.32</b>     |

**(ii) Calculation of Chargeable Freight:**

|                    |   |                                         |                 |
|--------------------|---|-----------------------------------------|-----------------|
| Freight per ton-km | = | Cost per ton-km + 25% profit on freight |                 |
|                    | = | ₹5.32 ÷ 75%                             | = <b>₹7.093</b> |

**Working notes:**

- Calculation of kms ran in Oct, 2023** =  $100 \text{ kms} \times 2 \times 25 \text{ days} \times 20 \text{ vehicles} \times 90\%$   
= 90,000 kms.
- Loading and unloading charges** =  $[(20 \text{ vehicles} \times 90\%) \times 25 \text{ days} \times 2 \text{ trips} \times ₹850]$   
= **₹7,65,000**
- Calculation of ton-kms** =  $\{100 \text{ kms} \times 25 \text{ days} \times 90\% \times [(5 \times 9 \text{ tons}) + (6 \times 12 \text{ tons}) + (7 \times 15 \text{ tons}) + (2 \times 20 \text{ tons})] + 100 \text{ kms} \times 25 \text{ days} \times 70\% [(5 \times 9 \text{ tons}) + (6 \times 12 \text{ tons}) + (7 \times 15 \text{ tons}) + (2 \times 20 \text{ tons})]\} - 10\%$   
= **9,43,200 ton-km**

**BQ 14**

A Factory which uses a large amount of coal is situated between two collieries X and Y, the former being 5 kms and the latter being 10 kms far from the factory. A fleet of lorries of 5 tonnes carrying capacity is used for the collection coal from the pitheads. The lorry averages a speed of 20 kms per hour when running and regularly takes 10 minutes in the factory premises to unload. At colliery X the loading time averages 30 minutes per load and at colliery Y 20 minutes per load.

Driver's wages, license, insurance, depreciation, garage rent and similar charges are noticed to cost ₹6 per hour operated. Fuel oil, tyres, repairs and similar charges are noticed to cost ₹0.60/km run.

**Draw a statement showing the cost per tonne km of carrying coal from each colliery if the coal is equal quality and price. From which colliery should the purchase be made?**

**Answer****Statement Showing Cost per Tonne-Km**

| Particulars                                                                                    | Colliery X                             | Colliery Y                              |
|------------------------------------------------------------------------------------------------|----------------------------------------|-----------------------------------------|
| Drivers wages, license, insurance, depreciation, garage rent and similar charges @ ₹6 per hour | $(6.00 \times \frac{70}{60})$<br>7.00  | $(6.00 \times \frac{90}{60})$<br>9.00   |
| Fuel oil, tyres, repairs similar charges @ ₹0.60 per Km                                        | $(0.60 \times 10 \text{ kms})$<br>6.00 | $(0.60 \times 20 \text{ kms})$<br>12.00 |
| <b>Operating Cost</b>                                                                          | <b>13.00</b>                           | <b>21.00</b>                            |
| ÷ Effective tonne-kms                                                                          | ÷ 25                                   | ÷ 50                                    |
| <b>Cost per tonne-km</b>                                                                       | <b>₹0.52</b>                           | <b>₹0.42</b>                            |

**Decision: Purchase should be made from colliery X having lower operating cost per trip.**



**Working Notes:****(1) Total operating time in 1 trip:**

Running time (mine to plot)

 $\frac{60}{20} \times 5 \text{ Kms}$   
15 minutes

Loading time

30 minutes

Running time (plot to mine)

15 minutes

Unloading time

10 minutes

**Total operating time in one trip****70 minutes****Colliery Y** $\frac{60}{20} \times 10 \text{ Kms}$   
30 minutes

20 minutes

30 minutes

10 minutes

**90 minutes****(2) Effective tonnes km per trip:**5 tonnes  $\times$  5 kms +  
Nil tonnes  $\times$  5 kms  
**= 25 tonne kms**5 tonnes  $\times$  10 kms +  
Nil tonnes  $\times$  10 kms  
**= 50 tonne kms****BQ 15**

A chemical factory runs its boiler on furnace oil obtained from Indian oil and Bharat petroleum whose depots are situated at a distance of 12 and 8 miles from the factory site. Transportation of furnace oil is made by the company's own tank lorries for 5 tonnes capacity each. Onward trips are made only on full load and the lorries return empty. The filling in time takes an average 40 minutes for Indian oil and 30 minutes for Bharat petroleum. But the emptying time in the factory is only 40 minutes for all. From the records available it is been that the average speed of the company's lorries work out to 24 miles per hour.

The varying operating charges average ₹0.60 paise per mile covered and fixed charges ₹7.50 per hour of operation. Calculate the cost per tonne mile for each source.

**Answer****Statement Showing Cost per Tonne-mile**

| <b>Particulars</b>                | <b>Indian Oil</b>                         | <b>Bharat Petroleum</b>                  |
|-----------------------------------|-------------------------------------------|------------------------------------------|
| Fixed charges @ ₹7.50 per hour    | $(7.50 \times \frac{140}{60})$<br>17.50   | $(7.50 \times \frac{110}{60})$<br>13.75  |
| Variable charges @ ₹0.60 per mile | $(0.60 \times 24 \text{ miles})$<br>14.40 | $(0.60 \times 16 \text{ miles})$<br>9.60 |
| <b>Operating Cost</b>             | <b>31.90</b>                              | <b>23.35</b>                             |
| ÷ Effective tonne-miles           | ÷ 60                                      | ÷ 40                                     |
| <b>Cost per tonne-km</b>          | <b>₹0.5317</b>                            | <b>₹0.5838</b>                           |

**Working Notes:****(1) Total operating time in 1 trip:**

Running time (factory to depot)

 $\frac{60}{24} \times 12 \text{ miles}$   
30 minutes

Loading time

40 minutes

Running time (Depot to factory)

30 minutes

Unloading time

40 minutes

**Total operating time in one trip****140 minutes****Bharat Petroleum** $\frac{60}{24} \times 8 \text{ miles}$   
20 minutes

30 minutes

20 minutes

40 minutes

**110 minutes****(2) Effective tonnes-miles per trip:**5 tonnes  $\times$  12 miles +  
Nil tonnes  $\times$  12 miles  
**= 60 tonne miles**5 tonnes  $\times$  8 miles +  
Nil tonnes  $\times$  8 miles  
**= 40 tonne miles****BQ 16**

A Lorry starts with a load of 20 MT of Goods from Station 'A'. It unloads 8 MT in Station 'B' and balance goods in Station 'C'. On return trip, it reaches Station 'A' with a load of 16 MT, loaded at Station 'C'. The distance between A to B, B to C and C to A are 80 Kms, 120 Kms and 160 Kms, respectively.

Compute "Absolute MT-Kilometer" and "Commercial MT – Kilometer".

**Answer**

**Weighted Average or Absolute basis MT kms:**

$$= 20 \text{ MT} \times 80 \text{ kms} + 12 \text{ MT} \times 120 \text{ kms} + 16 \text{ MT} \times 160 \text{ kms}$$

$$= \mathbf{5,600 \text{ MT km.}}$$

**Simple Average or Commercial basis MT kms:**

$$= \text{Average load} \times \text{Total kms travelled}$$

$$= \frac{20+12+16}{3} \text{ MT} \times 360 \text{ kms} = \mathbf{5,760 \text{ MT km.}}$$

**BQ 17**

Harry transport Service is a Delhi based national goods transport service provider, owning five trucks for this purpose. The cost of running and maintaining these trucks are as follows:

|                                        |                              |
|----------------------------------------|------------------------------|
| Diesel cost                            | ₹15 per km.                  |
| Engine oil                             | ₹4,200 for every 14,000 km.  |
| Repairs and maintenance                | ₹12,000 for every 10,000 km. |
| Driver's salary                        | ₹20,000 per truck per month  |
| Cleaner's salary                       | ₹7,000 per truck per month   |
| Supervision and other general expenses | ₹15,000 per month            |
| Cost of loading of goods               | ₹200 per Metric Ton (MT)     |

Each truck was purchased for ₹20 Lakhs with an estimated life of 7,20,000 km.

During the next month, it is expecting 6 bookings the details of which are as follows:

| Sl. No. | Journey            | Distance (in kms) | Weight - Up (in MT) | Weight - Down (in MT) |
|---------|--------------------|-------------------|---------------------|-----------------------|
| 1       | Delhi to Kochi     | 2,700             | 15                  | 7                     |
| 2       | Delhi to Guwahati  | 1,890             | 13                  | 0                     |
| 3       | Delhi to Vijaywada | 1,840             | 16                  | 0                     |
| 4       | Delhi to Varanasi  | 815               | 11                  | 0                     |
| 5       | Delhi to Asansol   | 1,280             | 13                  | 5                     |
| 6       | Delhi to Chennai   | 2,185             | 11                  | 9                     |
|         | Total              | 10,710            | 79                  | 21                    |

**Required:**

- (1) Calculate the total absolute ton-km for the next month.
- (2) Calculate cost per ton-km.

**Answer**

**(1) Calculation of total absolute ton-km:**

$$= (15 \text{ MT} \times 2,700 \text{ km} + 7 \text{ MT} \times 2,700 \text{ km}) + (13 \text{ MT} \times 1,890 \text{ km}) + (16 \text{ MT} \times 1,840 \text{ km}) + (11 \text{ MT} \times 815 \text{ km}) + (13 \text{ MT} \times 1,280 \text{ km} + 5 \text{ MT} \times 1,280 \text{ km}) + (11 \text{ MT} \times 2,185 \text{ km} + 9 \text{ MT} \times 2,185 \text{ km})$$

$$= \mathbf{1,89,115 \text{ ton-km.}}$$

**(2) Operating Cost Sheet Showing Cost per MT-km**

| Particulars                            | Amount          |
|----------------------------------------|-----------------|
| <b>(A) Standing Charges:</b>           |                 |
| Drivers' salaries (₹20,000 × 5 trucks) | 1,00,000        |
| Cleaners' salaries (₹7,000 × 5 trucks) | 35,000          |
| Supervision and other expenses         | 15,000          |
| <b>Total (A)</b>                       | <b>1,50,000</b> |

|                                             |                                 |                 |
|---------------------------------------------|---------------------------------|-----------------|
| <b>(B) Running Charges:</b>                 |                                 |                 |
| Diesel cost                                 | (21,420 kms × ₹15)              | 3,21,300        |
| Engine oil cost                             | [(₹4,200/14,000) × 21,420]      | 6,426           |
| Cost of loading                             | [(79 + 21) × ₹200]              | 20,000          |
| Depreciation                                | [(₹20 Lakhs/7,20,000) × 21,420] | 59,500          |
| <b>Total (B)</b>                            |                                 | <b>4,07,226</b> |
| <b>(C) Repairs and Maintenance Charges:</b> |                                 |                 |
| Repairs and maintenance                     | [(₹12,000/10,000) × 21,420]     | 25,704          |
| <b>Total (C)</b>                            |                                 | <b>25,704</b>   |
| <b>Total operating cost (A + B + C)</b>     |                                 | <b>5,82,930</b> |
| ÷ Total ton-kms.                            |                                 | 1,89,115        |
| <b>Cost per ton-km</b>                      |                                 | <b>₹3.08</b>    |

**Working notes:**

(a) **Calculation of kms** = 10,710 km. × 2 sides = **21,420 kms.**

**BQ 18**

Global Transport Ltd. charges ₹90 per ton for its 6-tons truck load from city 'A' to city 'B'. The charges for the return journey are ₹84 per ton. No concession or reduction in these rates is made for any delivery of goods at intermediate station 'C'.

In January 2023, the truck made 12 outwards 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 ₹1,200 was paid as fine. For the remaining trips the truck carried full load out of which all the goods on load were reloaded 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 cost and maintenance charges are ₹60,000 and ₹12,000 respectively. Running charges spent during January 2023 are ₹2,944.

**You are required to find out the cost per absolute ton-kilometer and the profit for January, 2023.**

**Answer**

**Statement of Cost per Absolute Ton-Kilometer**  
(For the month of January, 2023)

| Particulars                       | Amount       |
|-----------------------------------|--------------|
| Fixed cost (60,000 ÷ 12)          | 5,000        |
| Maintenance charges (12,000 ÷ 12) | 1,000        |
| Running charges                   | 2,944        |
| <b>Total operating cost</b>       | <b>8,944</b> |
| ÷ Absolute ton-kms                | ÷ 44,720     |
| <b>Cost per ton-km</b>            | <b>₹0.20</b> |

**Statement of Profit**  
(For the month of January, 2023)

| Particulars                                                      | Amount        |
|------------------------------------------------------------------|---------------|
| <b>Receipts:</b>                                                 |               |
| A to B (12 journeys × 6 tons × ₹90)                              | 6,480         |
| B to A (5 journeys × 8 tons × ₹84) + (7 journeys × 6 tons × ₹84) | 6,888         |
| <b>Total Receipts</b>                                            | <b>13,368</b> |
| Less: Total operating cost                                       | (8,944)       |
| <b>Operating Profit</b>                                          | <b>4,424</b>  |
| Less: Fine paid for overloading                                  | (1,200)       |
| <b>Net Profit</b>                                                | <b>₹3,224</b> |

**Notes:**

- (1) While calculating absolute/commercial ton km., actual load carried are considered irrespective of the fact it attracts fines or penalty.
- (2) Fine paid for overloading is an abnormal expenditure and is not included in the operating cost of the bus. This amount will be debited to Costing Profit and Loss A/c and hence deducted from operating profit to arrive at net profit/loss.
- (3) No concession or reduction in rates for any delivery of goods at station 'C'.

**Working Notes:****Calculation of absolute ton-kms:**

$$\begin{aligned}
 \text{A to B} &= (10 \text{ journeys} \times 300 \text{ kms} \times 6 \text{ tons}) + \{2 \text{ journeys} \times [(140 \text{ kms} \times 6 \text{ tons}) + (160 \text{ kms} \times 4 \text{ tons})]\} \\
 &= \mathbf{20,960} \\
 \text{B to A} &= (5 \text{ journeys} \times 300 \text{ kms} \times 8 \text{ tons}) + (6 \text{ journeys} \times 300 \text{ kms} \times 6 \text{ tons}) + \{1 \text{ journey} \times [(160 \text{ kms} \times 6 \text{ tons}) + (140 \text{ kms} \times \text{Nil tons})]\} \\
 &= \mathbf{23,760} \\
 \text{Total} &= 20,960 + 23,760 = \mathbf{44,720}
 \end{aligned}$$

**BQ 19**

GTC has a lorry of 6-ton carrying capacity. It operates lorry service from city A to city B. It charges ₹2,400 per ton from city 'A' to city 'B' and ₹2,200 per ton for the return journey from city 'B' to city 'A'. Goods are also delivered to an intermediate city 'C' but no concession or reduction in rates is given. Distance between the city 'A' to 'B' is 300 km and distance from city 'A' to 'C' is 140 km.

In January 2023, the truck made 12 outward journeys for city 'B'. The details of journeys are as follows:

| <b>Outward journey</b> | <b>No. of journeys</b> | <b>Load (in ton)</b> |
|------------------------|------------------------|----------------------|
| 'A' to 'B'             | 10                     | 6                    |
| 'A' to 'C'             | 2                      | 6                    |
| 'C' to 'B'             | 2                      | 4                    |
| <b>Return journey</b>  | <b>No. of journeys</b> | <b>Load (in ton)</b> |
| 'B' to 'A'             | 5                      | 8                    |
| 'B' to 'A'             | 6                      | 6                    |
| 'B' to 'C'             | 1                      | 6                    |
| 'C' to 'A'             | 1                      | 0                    |

Annual fixed costs and maintenance charges are ₹6,00,000 and ₹1,20,000 respectively. Running charges spent during January 2023 are ₹2,94,400 (includes ₹12,400 paid as penalty for overloading).

**You are required to:**

1. Calculate the cost as per (a) Commercial ton-kilometre. (b) Absolute ton-kilometre
2. Calculate Net Profit/ loss for the month of January, 2023.

**Answer****1. (a) Calculation of cost per commercial ton-kms:**

$$\text{Cost per commercial ton-km} = \frac{3,42,000}{44,862} = \mathbf{₹7.62}$$

**1. (b) Calculation of cost per absolute ton-kms:**

$$\text{Cost per absolute ton-km} = \frac{3,42,000}{44,720} = \mathbf{₹7.65}$$

**2. Statement of Profit**  
**(For the month of January, 2023)**

| Particulars                                                                         | Amount          |
|-------------------------------------------------------------------------------------|-----------------|
| <b>Receipts:</b>                                                                    |                 |
| From outward journey (12 journeys × 6 tons × ₹2,400)                                | 1,72,800        |
| From return journey (5 journeys × 8 tons × ₹2,200) + (7 journeys × 6 tons × ₹2,200) | 1,80,400        |
| <b>Total Receipts</b>                                                               | <b>3,53,200</b> |
| Less: Total operating cost                                                          | (3,42,000)      |
| <b>Operating Profit</b>                                                             | <b>11,200</b>   |
| Less: Fine paid for overloading                                                     | (12,400)        |
| <b>Net Loss for the month</b>                                                       | <b>(₹1,200)</b> |

**Notes:**

- (1) While calculating absolute/commercial ton km., actual load carried are considered irrespective of the fact it attracts fines or penalty.
- (2) Penalty paid for overloading is an abnormal expenditure and is not included in the operating cost of the bus. This amount will be debited to Costing Profit and Loss A/c and hence deducted from operating profit to arrive at net profit/loss.
- (3) No concession or reduction in rates for any delivery of goods at station 'C'.

**Working Notes:**

**(i) Statement of Total Monthly Cost**  
**(For the month of January, 2023)**

| Particulars                         | Amount          |
|-------------------------------------|-----------------|
| Fixed cost (6,00,000 ÷ 12)          | 50,000          |
| Maintenance charges (1,20,000 ÷ 12) | 10,000          |
| Running charges (2,94,400 – 12,400) | 2,82,000        |
| <b>Total Operating Cost</b>         | <b>3,42,000</b> |

**(ii) Calculation of commercial ton-kms:**

|                   |   |                                                                                                        |   |                |
|-------------------|---|--------------------------------------------------------------------------------------------------------|---|----------------|
| Total distance    | = | 12 journeys × 300 kms × 2 (two way)                                                                    | = | <b>7,200</b>   |
| Total weight      | = | 12 journeys × 6 ton + 2 journeys × 4 ton + 5 journeys × 8 ton + 6 Journeys × 6 ton + 1 journey × 6 ton | = | <b>162 ton</b> |
| Commercial ton-km | = | Total distance × Average weight                                                                        |   |                |
|                   | = | 7,200 kms × (162 tons ÷ 26 journeys)                                                                   | = | <b>44,862</b>  |

**(iii) Calculation of absolute ton-kms:**

|                 |   |                                                                                                                               |   |               |
|-----------------|---|-------------------------------------------------------------------------------------------------------------------------------|---|---------------|
| A to B          | = | (10 journeys × 300 kms × 6 tons) + {2 journeys × [(140 kms × 6 tons) + (160 kms × 4 tons)]}                                   |   |               |
|                 | = | <b>20,960</b>                                                                                                                 |   |               |
| B to A          | = | (5 journeys × 300 kms × 8 tons) + (6 journeys × 300 kms × 6 tons) + {1 journey × [(160 kms × 6 tons) + (140 kms × Nil tons)]} |   |               |
|                 | = | <b>23,760</b>                                                                                                                 |   |               |
| Absolute ton-km | = | 20,960 + 23,760                                                                                                               | = | <b>44,720</b> |

**BQ 20**

GMCS Ltd. 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 Ltd.'s garage situated within the plant compound.

**Following are the some information related with the vehicles:**

|                          | <b>Ramgarh</b> | <b>Pratapgarh</b> | <b>Devgarh</b> |
|--------------------------|----------------|-------------------|----------------|
| No. of vehicles assigned | 4              | 3                 | 5              |

**SERVICE COSTING 8.18**

|                                            |         |         |         |
|--------------------------------------------|---------|---------|---------|
| No. of trips a day                         | 3       | 2       | 4       |
| One way distance from the processing plant | 24 k.m. | 34 k.m. | 16 k.m. |
| Fee and tax p.m.                           | ₹5,600  | ₹6,400  | Nil     |

All the 5 vehicles assigned to Devgarh panchayat, were purchased five years back at a cost of ₹9,25,000 each. The 4 vehicles assigned to Ramgarh panchayat, were purchased two years back at a cost of ₹11,02,000 each and the remaining vehicles assigned to Pratapgarh were purchased last year at a cost of ₹13,12,000 each. With the purchase of each vehicle a two years free servicing warranty is provided. A vehicle gives 10 kmpl mileage in the first two year of purchase, 8 kmpl in next two years and 6 kmpl afterwards. The vehicles are subject to depreciation of 10% p.a. on straight line basis irrespective of usage. A vehicle has the capacity to carry 10,000 litres of milk but on an average only 70% of the total capacity is utilized.

**The following expenditure is related with the vehicles:**

|                                                  |                              |
|--------------------------------------------------|------------------------------|
| Salary of Driver (a driver for each vehicle)     | ₹24,000 p.m.                 |
| Salary to Cleaner (a cleaner for each vehicle)   | ₹12,000 p.m.                 |
| Allocated garage parking fee                     | ₹4,200 per vehicle per month |
| Servicing cost for every complete 5,000 k.m. run | ₹15,000                      |
| Price of diesel per litre                        | ₹78.00                       |

**From the above information you are required to calculate:**

- (a) Total operating cost per month for each vehicle. (Take 30 days for the month)  
 (b) Vehicle operating cost per litre of milk.

**Answer****(a) Operating Cost Sheet for Each Vehicle (Monthly)**

| Particulars                         | Ramgarh                           | Pratapgarh                      | Devgarh                           |
|-------------------------------------|-----------------------------------|---------------------------------|-----------------------------------|
| <b>(A) Fixed Costs:</b>             |                                   |                                 |                                   |
| Salary to drivers                   | 96,000<br>(4 × 24,000)            | 72,000<br>(3 × 24,000)          | 1,20,000<br>(5 × 24,000)          |
| Salary to cleaners                  | 48,000<br>(4 × 12,000)            | 36,000<br>(3 × 12,000)          | 60,000<br>(5 × 12,000)            |
| Allocated garage parking fee        | 16,800<br>(4 × 4,200)             | 12,600<br>(3 × 4,200)           | 21,000<br>(5 × 4,200)             |
| Depreciation                        | 36,733                            | 32,800                          | 38,542                            |
| Toll tax passes                     | 5,600                             | 6,400                           | -                                 |
| <b>Total (A)</b>                    | <b>2,03,133</b>                   | <b>1,59,800</b>                 | <b>2,39,542</b>                   |
| <b>(B) Variable Costs:</b>          |                                   |                                 |                                   |
| Diesel cost                         | 1,68,480                          | 95,472                          | 2,49,600                          |
| Servicing cost                      | 45,000                            | -                               | 45,000                            |
| <b>Total (B)</b>                    | <b>2,13,480</b>                   | <b>95,472</b>                   | <b>2,94,600</b>                   |
| <b>Total Operating Cost (A + B)</b> | <b>4,16,613</b>                   | <b>2,55,272</b>                 | <b>5,34,142</b>                   |
| <b>Operating cost per vehicle</b>   | <b>1,04,153</b><br>(4,16,613 ÷ 4) | <b>85,091</b><br>(2,55,272 ÷ 3) | <b>1,06,828</b><br>(5,34,142 ÷ 5) |

**(b) Vehicle operating cost per litre of milk:**

$$= \frac{\text{Total operating cost}}{\text{Total Milk carried a month}} = \frac{(4,16,613 + 2,55,272 + 5,34,142)}{79,80,000} = \text{₹0.15}$$

**Working Notes:****1. Calculation of distance covered by each vehicle in a month:**

|            |   |                                              |   |            |
|------------|---|----------------------------------------------|---|------------|
| Ramgarh    | = | 4 vehicles × 3 trips × 2 × 24 kms. × 30 days | = | 17,280 kms |
| Pratapgarh | = | 3 vehicles × 2 trips × 2 × 34 kms. × 30 days | = | 12,240 kms |
| Devgarh    | = | 5 vehicles × 4 trips × 2 × 16 kms. × 30 days | = | 19,200 kms |

**2. Calculation of cost of diesel:**

$$\text{Ramgarh} = 17,280 \text{ kms} \times \frac{78}{8} = \text{₹1,68,480}$$

|            |   |                              |   |           |
|------------|---|------------------------------|---|-----------|
| Pratapgarh | = | 12,240 kms × $\frac{78}{10}$ | = | ₹95,472   |
| Devgarh    | = | 19,200 kms × $\frac{78}{6}$  | = | ₹2,49,600 |

**3. Calculation of cost of service:**

|                        |                                                     |         |
|------------------------|-----------------------------------------------------|---------|
| Ramgarh (17,280 kms)=  | three completed 5,000 kms @ 15,000 per completion = | ₹45,000 |
| Pratapgarh =           | under free service warranty =                       | Nil     |
| Devgarh (19,200 kms.)= | 3 completed 5,000 kms @ 15,000 per completion =     | ₹45,000 |

**4. Calculation of Depreciation:**

|            |   |                                     |   |         |
|------------|---|-------------------------------------|---|---------|
| Ramgarh    | = | 11,02,000 × 4 vehicles × 10% × 1/12 | = | ₹36,733 |
| Pratapgarh | = | 13,12,000 × 3 vehicles × 10% × 1/12 | = | ₹32,800 |
| Devgarh    | = | 9,25,000 × 5 vehicles × 10% × 1/12  | = | ₹38,542 |

**5. Calculation of Milk litre:**

|              |   |                                                      |   |           |
|--------------|---|------------------------------------------------------|---|-----------|
| Ramgarh      | = | 10,000 litres × .70 × 4 vehicles × 3 trips × 30 days | = | 25,20,000 |
| Pratapgarh   | = | 10,000 litres × .70 × 3 vehicles × 2 trips × 30 days | = | 12,60,000 |
| Devgarh      | = | 10,000 litres × .70 × 5 vehicles × 4 trips × 30 days | = | 42,00,000 |
| <b>Total</b> | = | <b>79,80,000 litres</b>                              |   |           |

**HOTEL AND LODGES****BQ 21**

A company runs a holiday home. For this purpose, it has hired a building at a rent of ₹10,000 per month along with 5% of total taking. It has three types of suites for its customers viz. single room, double room and triple room. Following information is given:

| Type of suites | Number of rooms | Occupancy percentage |
|----------------|-----------------|----------------------|
| Single room    | 100             | 100%                 |
| Double room    | 50              | 80%                  |
| Triple room    | 30              | 60%                  |

The rent of double room suite is to be fixed at 2.5 times of the single room suite and that of triple room suite as twice of the double room suite.

*The other expenses for the year 2023 are as follows:*

| Expenses                    | ₹         |
|-----------------------------|-----------|
| 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**

**Statement Showing Rent to be Charged**

| Particulars                 | ₹         |
|-----------------------------|-----------|
| 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  |



|                                                   |                  |
|---------------------------------------------------|------------------|
| Building rent:                                    |                  |
| Fixed                                             | 1,20,000         |
| Variable @ 5% on taking                           | 1,76,067         |
| <b>Total Cost</b>                                 | <b>28,17,067</b> |
| Add: Profit @ 20% on taking                       | 7,04,266         |
| <b>*Total Taking</b>                              | <b>35,21,333</b> |
| ÷ Equivalent single room days                     | ÷ 1,04,400       |
| <b>Rent for single room day</b>                   | <b>₹33.73</b>    |
| <b>Rent for double room day (33.73 × 2.5)</b>     | <b>₹84.32</b>    |
| <b>Rent for triple room day (33.73 × 2.5 × 2)</b> | <b>₹168.65</b>   |

**Working Notes:****1. Calculation of Taking:**

|                     |   |                                                                          |
|---------------------|---|--------------------------------------------------------------------------|
| *Total Taking       | = | Operating cost (excluding rent on taking) + 5% for rent + 20% for profit |
|                     | = | ₹26,41,000 + 25% of total takings                                        |
| 75% of Taking       | = | ₹26,41,000                                                               |
| <b>Total Taking</b> | = | <b>₹35,21,333</b>                                                        |

**2. Calculation of equivalent single room suites:**

| Type of suites                           | Room days                              | Equivalent single room suites |
|------------------------------------------|----------------------------------------|-------------------------------|
| Single room suite                        | $100 \times 360 \times 100\% = 36,000$ | $36,000 \times 1 = 36,000$    |
| Double room suite                        | $50 \times 360 \times 80\% = 14,400$   | $14,400 \times 2.5 = 36,000$  |
| Triple room suite                        | $30 \times 360 \times 60\% = 6,480$    | $6,480 \times 5 = 32,400$     |
| <b>Total equivalent single room days</b> |                                        | <b>1,04,400</b>               |

**BQ 22**

A lodging home is being run in a small hill station with 100 single rooms. The home offers concessional rates during six off-season (Winter) 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 31<sup>st</sup> March. [Assume a month to be of 30 days].

- (a) Occupancy during the season is 80% while in the off- season it is 40% only.
- (b) Total investment in the home is ₹200 lakhs of which 80% relate to buildings and balance for furniture and equipment.
- (c) Expenses:
- |                                          |           |
|------------------------------------------|-----------|
| Staff salary [Excluding room attendants] | ₹5,50,000 |
| Repairs to building                      | ₹2,61,000 |
| Laundry charges                          | ₹80,000   |
| Interior                                 | ₹1,75,000 |
| Miscellaneous expenses                   | ₹1,90,800 |
- (d) Annual depreciation is to be provided for buildings @ 5% and on furniture and equipment @ 15% on straight-line basis.
- (e) Room attendants are paid ₹10 per room day on the basis of occupancy of the rooms in a month.
- (f) Monthly lighting charges are ₹120 per room, except in four months in winter when it is ₹30 per room.

**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****Statement Showing Per Day Chargeable Rent**

| Particulars         | ₹        |
|---------------------|----------|
| Staff salary        | 5,50,000 |
| Repairs to building | 2,61,000 |
| Laundry charges     | 80,000   |
| Interior            | 1,75,000 |

|                                                             |                  |
|-------------------------------------------------------------|------------------|
| Miscellaneous expenses                                      | 1,90,800         |
| Depreciation:                                               |                  |
| On Building (₹200 lakhs × 80% × 5%)                         | 8,00,000         |
| On Furniture (₹200 lakhs × 20% × 15%)                       | 6,00,000         |
| Room attendant's wages:                                     |                  |
| In Season (100 rooms × 80% × 30 days × 6 months × ₹10)      | 1,44,000         |
| In Off-Season (100 rooms × 40% × 30 days × 6 months × ₹10)  | 72,000           |
| Lighting charges:                                           |                  |
| Season & Non Winter (100 rooms × 80% × 6 months × ₹120)     | 57,600           |
| Off-Season & Non Winter (100 rooms × 40% × 2 months × ₹120) | 9,600            |
| Off-Season & Winter (100 rooms × 40% × 4 months × ₹30)      | 4,800            |
| <b>Total Cost</b>                                           | <b>29,44,800</b> |
| Add: Profit @ 20% on Room rent or 25% on Cost               | 7,36,200         |
| <b>Total Rent to be Charged</b>                             | <b>36,81,000</b> |
| ÷ Equivalent Off-Season room days                           | ÷ 36,000         |
| <b>Rent for one room per day in Off-Season</b>              | <b>₹102.25</b>   |
| <b>Rent for one room per day in Season (₹102.25 × 2)</b>    | <b>₹204.50</b>   |

**Working Notes:**

$$\begin{aligned}
 \text{Equivalent Off-Season room days} &= 100 \times 80\% \times 30 \text{ days} \times 6 \text{ months} \times 2 \text{ (double of Off-Season)} + \\
 &\quad 100 \times 40\% \times 30 \text{ days} \times 6 \text{ months} \times 1 \\
 &= 14,400 \times 2 + 7,200 \times 1 \\
 &= \mathbf{36,000 \text{ Room days}}
 \end{aligned}$$

**HOSPITAL****BQ 23**

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                                                                | ₹75,000                |
| Supervisors 2 persons                                                         | ₹25,000 per month each |
| Nurses 4 persons                                                              | ₹20,000 per month each |
| Ward Boys 4 persons                                                           | ₹5,000 per month each  |
| Doctors paid                                                                  | ₹2,50,000 per month    |
| (paid on the basis of number of patients attended and the time spent by them) |                        |

**Other expenses for the year are as follows:**

|                                       |            |
|---------------------------------------|------------|
| Repairs (Fixed)                       | ₹81,000    |
| Food to Patients (Variable)           | ₹8,80,000  |
| Other services to patients (Variable) | ₹3,00,000  |
| Laundry charges (Variable)            | ₹6,00,000  |
| Medicines (Variable)                  | ₹7,50,000  |
| Other fixed expenses                  | ₹10,80,000 |
| Administration expenses allocated     | ₹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 ₹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 to**

- Calculate profit per Patient day, if the hospital recovers on an average ₹2,000 per day from each patient
- Find out Breakeven point for the hospital.

**Answer****(a) Statement Showing Profit Per Patient Day**

| Particulars                                                  | Amount             |
|--------------------------------------------------------------|--------------------|
| <b>(A) Variable Costs:</b>                                   |                    |
| Doctor fess (2,50,000 × 12)                                  | 30,00,000          |
| Food to Patients (Variable)                                  | 8,80,000           |
| Other services to patients (Variable)                        | 3,00,000           |
| Laundry charges (Variable)                                   | 6,00,000           |
| Medicines (Variable)                                         | 7,50,000           |
| Bed hire charges (100 × 750 beds)                            | 75,0000            |
| <b>Total (A)</b>                                             | <b>56,05,000</b>   |
| <b>(B) Fixed Costs:</b>                                      |                    |
| Rent (75,000 × 12)                                           | 9,00,000           |
| Supervisors (2 persons × 25,000 × 12)                        | 6,00,000           |
| Nurses (4 persons × 20,000 × 12)                             | 9,60,000           |
| Ward Boys (4 persons × 5,000 × 12)                           | 2,40,000           |
| Repairs (Fixed)                                              | 81,000             |
| Other fixed expenses                                         | 10,80,000          |
| Administration expenses allocated                            | 10,00,000          |
| <b>Total (B)</b>                                             | <b>48,61,000</b>   |
| <b>Total cost (A + B)</b>                                    | <b>1,04,66,000</b> |
| <b>Collection from patients (2,000 × 8,000 patient days)</b> | <b>1,60,00,000</b> |
| <b>Profit (Collection – Total cost)</b>                      | <b>55,34,000</b>   |
| <b>Profit per patient day (Profit ÷ Patient days)</b>        | <b>691.75</b>      |

**(b) Calculation of BEP for the hospital:**

$$\begin{aligned} \text{BEP} &= \text{Fixed cost} \div \text{Contribution per patient day} \\ &= 48,61,000 \div 1,299.375 = \mathbf{3,741 \text{ patient days}} \end{aligned}$$

**Working Notes:****1. Calculation of number of Patient days:**

$$\begin{aligned} &= (35 \text{ beds} \times 150 \text{ days}) + (25 \text{ beds} \times 80 \text{ days}) + 750 \text{ beds} \\ &= \mathbf{8,000} \end{aligned}$$

**2. Calculation Contribution per patient day:**

$$\begin{aligned} \text{Contribution} &= \text{Sales} - \text{Variable cost} \\ &= 1,60,00,000 - 56,05,000 = 1,03,95,000 \\ \text{Contribution per patient day} &= 1,03,95,000 \div 8,000 = \mathbf{1,299.375} \end{aligned}$$

**INFORMATION TECHNOLOGY (IT) AND IT ENABLED SERVICES (ITES)****BQ 24**

Following are the data pertaining to Infotech Pvt. Ltd, for the year 2022 – 23:

|                                |            |
|--------------------------------|------------|
| Salary to 5 Software Engineers | ₹15,00,000 |
| Salary to 2 Project Leaders    | ₹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 as are as follows:

|                                          |           |
|------------------------------------------|-----------|
| Project duration                         | 6 months  |
| Travel expenses incurred for the project | ₹1,87,500 |

One Project Leader and three Software Engineers were involved for the entire duration of the project, whereas Project Manager spends 2 months' efforts, during the execution of the project. Two Laptops were purchased at a cost of ₹50,000 each, for use in the project and the life of the same is estimated to be 2 years.

**Prepare Project cost sheet considering overheads are absorbed on the basis of salary.**

**Answer**

**Project Cost Sheet**

| <b>Particulars</b>                                    | <b>Amount</b>    |
|-------------------------------------------------------|------------------|
| Salaries:                                             |                  |
| Software engineers (3 × 25,000 × 6 months)            | 4,50,000         |
| Project Leader (37,500 × 6 months)                    | 2,25,000         |
| Project manager (50,000 × 2 months)                   | 1,00,000         |
| <b>Total Salary</b>                                   | <b>7,75,000</b>  |
| Overheads (50 % of Salary)                            | 3,87,500         |
| Travel expenses                                       | 1,87,500         |
| Depreciation on Laptops [(1,00,000 ÷ 2 years) × 6/12] | 25,000           |
| <b>Total Project Cost</b>                             | <b>13,75,000</b> |

**Working Notes:**

$$\begin{aligned}
 1. \quad \text{Total Overheads per annum} &= \text{Repairs \& Maintenance + Administration Overheads} \\
 &= 3,00,000 + 12,00,000 \\
 &= \mathbf{15,00,000}
 \end{aligned}$$

**2. Calculation of total salary per annum and salary per month:**

| <b>Particulars</b>             | <b>Total Per Annum</b> | <b>Per Person Per Annum</b> | <b>Per Person Per Month</b> |
|--------------------------------|------------------------|-----------------------------|-----------------------------|
| Salary to 5 Software Engineers | ₹15,00,000             | ₹3,00,000                   | ₹25,000                     |
| Salary to 2 Project Leaders    | ₹9,00,000              | ₹4,50,000                   | ₹37,500                     |
| Salary to Project Manager      | ₹6,00,000              | ₹6,00,000                   | ₹50,000                     |
| <b>Total</b>                   | <b>₹30,00,000</b>      | <b>₹13,50,000</b>           | <b>₹1,12,500</b>            |

**3. Calculation of Overhead absorption rate:**

$$\begin{aligned}
 \text{Overhead absorption rate} &= \text{Total overheads per annum} \div \text{Total salary per annum} \\
 &= 15,00,000 \div 30,00,000 = \mathbf{50\% \text{ of salary}}
 \end{aligned}$$

**TOLL PLAZA or TOLL ROADS**

**BQ 25**

BHG Toll Plaza Ltd built a 60 km. long highway and now operates a toll plaza to collect tolls from passing vehicles using the highway. The company has estimated that a total of 12 crores vehicles (only single type of vehicle) will be using the highway during the 10 years toll collection tenure.

**Toll Operating and Maintenance cost for the month of April are as follows:**

|                                                         |                         |
|---------------------------------------------------------|-------------------------|
| Salary:                                                 |                         |
| Collection Personnel (3 Shifts and 4 persons per shift) | ₹550 per day per person |
| Supervisor (2 Shifts and 1 person per shift)            | ₹750 per day per person |
| Security Personnel (3 Shifts and 6 persons per shift)   | ₹450 per day per person |
| Toll Booth Manager (2 Shifts and 1 person per shift)    | ₹900 per day per person |
| Electricity                                             | ₹8,00,000               |
| Telephone                                               | ₹1,40,000               |
| Maintenance cost                                        | ₹30 Lakhs               |

Monthly depreciation and amortisation expenses will be ₹1.50 crore. Further, the company needs 25% profit over total cost to cover interest and other costs.

**Required:**

1. Calculate cost per kilometre per month.
2. Calculate the toll rate per vehicle.

**Answer**

**1. Statement of Cost per Kilometer per Month  
(for the month April)**

| <b>Particulars</b>                                                            | <b>Amount (₹)</b>  |
|-------------------------------------------------------------------------------|--------------------|
| Salary to Collection personnel (3 shifts × 4 persons × 30 days × 550 per day) | 1,98,000           |
| Salary to Supervisor (2 shifts × 1 person × 30 days × 750 per day)            | 45,000             |
| Salary to Security personnel (3 shifts × 6 persons × 30 days × 450 per day)   | 2,43,000           |
| Salary to Toll booth manager (2 shifts × 1 persons × 30 days × 900 per day)   | 54,000             |
| Electricity                                                                   | 8,00,000           |
| Telephone                                                                     | 1,40,000           |
| Maintenance cost                                                              | 30,00,000          |
| Depreciation and amortization expenses                                        | 1,50,00,000        |
| <b>Total Cost for April 2020</b>                                              | <b>1,94,80,000</b> |
| ÷ Total kilometers                                                            | ÷ 60 kms           |
| <b>Cost per Kilometer for April</b>                                           | <b>₹3,24,667</b>   |

**2. Calculation of toll rate per vehicle:**

|                                |   |                                                      |                       |
|--------------------------------|---|------------------------------------------------------|-----------------------|
| Total Toll Collection in April | = | Total Cost for April + 25%                           |                       |
|                                | = | ₹1,94,80,000 + 25 %                                  | = <b>₹2,43,50,000</b> |
| Toll Rate per vehicle          | = | Total collection for April ÷ Total vehicles in April |                       |
|                                | = | ₹2,43,50,000 ÷ 10,00,000                             | = <b>₹24.35</b>       |

**Working Notes:****Calculation of number of vehicles using the highway per month:**

|                                                              |   |                  |
|--------------------------------------------------------------|---|------------------|
| Total estimated number of vehicles using highway in 10 years | = | 12 crores        |
| ∴ Total number of vehicles using highway in 1 year           | = | 1.2 crores       |
| ∴ Total number of vehicles using highway in 1 month          | = | <b>10,00,000</b> |

**BQ 26**

SLS Infrastructure built and operates 110 km. highway on the basis of Built-Operate-Transfer (BOT) for the period of 25 years. A traffic assessment has been carried out to estimate the traffic flow per day shows the following figures:

| <b>Sl. No.</b> | <b>Type of vehicle</b>    | <b>Daily traffic volume</b> |
|----------------|---------------------------|-----------------------------|
| 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:**

| <b>Activities</b>                                                 | <b>Amount<br/>(₹ in Lakh)</b> |
|-------------------------------------------------------------------|-------------------------------|
| Site clearance                                                    | 170.70                        |
| Land development and filling work                                 | 9,080.35                      |
| Sub base and base courses                                         | 10,260.70                     |
| Bituminous work                                                   | 35,070.80                     |
| Bridge, flyover, underpasses, pedestrian subway, footbridge, etc. | 29,055.60                     |
| Drainage and protection work                                      | 9,040.50                      |
| Traffic sign, marking and road appurtenance                       | 8,405.00                      |

|                                           |                    |
|-------------------------------------------|--------------------|
| Maintenance, repairing and rehabilitation | 12,429.60          |
| Environment management                    | 982.00             |
| <b>Total Project Cost</b>                 | <b>1,14,495.25</b> |

An average cost of ₹1,120 Lakh has to be incurred on administration and toll plaza operation.

**On the basis of the vehicle specifications (i.e. weight, size, time saving etc.), the following weights has been assigned to passing vehicles:**

| Sl. No. | Type of vehicle           | Weight (%) |
|---------|---------------------------|------------|
| 1       | Two wheelers              | 5%         |
| 2       | Car and SUVs              | 20%        |
| 3       | Bus and LCV               | 30%        |
| 4       | Heavy commercial vehicles | 45%        |

**Required:**

- (1) Calculate the total project cost per day of concession period.
- (2) Compute toll fee to be charged for per vehicle of each type, if the company wants earn a profit of 15% on total cost.

**Note:** Concession period is a period for which an infrastructure is allowed to operate and recover its investment.

**Answer**

**(1) Statement Showing Total Project Cost per Day**

| Activities                                                        | Amount<br>(₹ in Lakh) |
|-------------------------------------------------------------------|-----------------------|
| Site clearance                                                    | 170.70                |
| Land development and filling work                                 | 9,080.35              |
| Sub base and base courses                                         | 10,260.70             |
| Bituminous work                                                   | 35,070.80             |
| Bridge, flyover, underpasses, pedestrian subway, footbridge, etc. | 29,055.60             |
| Drainage and protection work                                      | 9,040.50              |
| Traffic sign, marking and road appurtenance                       | 8,405.00              |
| Maintenance, repairing and rehabilitation                         | 12,429.60             |
| Environment management                                            | 982.00                |
| Administration and toll plaza operation cost                      | 1,120.00              |
| <b>Total Project Cost</b>                                         | <b>1,15,615.25</b>    |
| ÷ Concession period in days (25 years × 365 days)                 | ÷ 9,125               |
| <b>Cost per day of concession period (₹ in Lakh)</b>              | <b>₹12.67</b>         |

**(2) Statement Showing Toll Fee to be Charged per Vehicle of Each Type**

| Particulars                                     | Amount         |
|-------------------------------------------------|----------------|
| Toll to be recovered per day                    | 14,57,050      |
| ÷ Total equivalent Two wheelers per day         | ÷ 76,444       |
| Toll per Two wheelers                           | <b>₹19.06</b>  |
| Toll per Cars and SUVs (₹19.06 × 4)             | <b>₹76.24</b>  |
| Toll per Bus and LCV (₹19.06 × 6)               | <b>₹114.36</b> |
| Toll per Heavy commercial vehicles (₹19.06 × 9) | <b>₹171.54</b> |

**Working note:**

**(a) Calculation of Toll per day:**

|                       |   |                                                        |
|-----------------------|---|--------------------------------------------------------|
| Toll recovery per day | = | Cost per day of concession period + 15% profit on cost |
|                       | = | ₹12,67,000 + 15% of ₹12,67,000 = <b>₹14,57,050</b>     |

**(b) Calculation of Equivalent Two wheelers per day:**

| SL. No.                                     | Type of vehicle           | Weight (%) | Ratio | Daily traffic volume | Equivalent Two wheeler |
|---------------------------------------------|---------------------------|------------|-------|----------------------|------------------------|
| 1                                           | Two wheelers              | 5%         | 1     | 44,500               | 44,500                 |
| 2                                           | Car and SUVs              | 20%        | 4     | 3,450                | 13,800                 |
| 3                                           | Bus and LCV               | 30%        | 6     | 1,800                | 10,800                 |
| 4                                           | Heavy commercial vehicles | 45%        | 9     | 816                  | 7,344                  |
| <b>Total Equivalent Two wheeler per day</b> |                           |            |       |                      | <b>76,444</b>          |

**EDUCATIONAL INSTITUTIONS****BQ 27**

A professional institute has organised correspondence course for the benefit of its students who have to undergo two courses Intermediate and Final, the latter being open to only those who pass the former. The number of students involved per annum is 12,500 and 5,000 for intermediate course and final course respectively.

**The fixed expenses for the two courses taken together are as under:**

**Salaries:**

|                         |            |
|-------------------------|------------|
| Academic                | ₹13,44,000 |
| General                 | ₹3,15,000  |
| Rent, lighting etc.     | ₹2,45,000  |
| Postage, telephone etc. | ₹1,75,000  |
| Stationery              | ₹1,22,500  |

**The following further details are also available:**

|                                             | <b>Intermediate</b> | <b>Final</b> |
|---------------------------------------------|---------------------|--------------|
| Number of study papers                      | 60                  | 90           |
| No. of pages per study paper                | 40                  | 48           |
| Cost per pages                              | ₹0.08               | ₹0.10        |
| Packing and forwarding per set              | ₹25                 | ₹37.50       |
| No. of annual answer papers to be submitted | 16                  | -            |
| Cost of correcting one answer paper         | ₹3                  | -            |
| Postage per answer paper                    | ₹1                  | -            |

**Ascertain the cost of imparting tuition per student for the course.**

**Answer****Statement Showing Cost of Imparting Tuition per Student**

| Particulars                                  | <b>Intermediate</b> | <b>Final</b>   |
|----------------------------------------------|---------------------|----------------|
| Fixed Expenses per student (WN)              | 125.80              | 125.80         |
| Cost of study papers:                        |                     |                |
| Intermediate (60 × 40 × 0.08)                | 192.00              | -              |
| Final (90 × 48 × 0.10)                       | -                   | 432.00         |
| Packing and forwarding per set               | 25.00               | 37.50          |
| Cost of correcting answer papers (16 × 3)    | 48.00               | -              |
| Cost of postage answer papers (16 × 1)       | 16.00               | -              |
| <b>Cost of Imparting Tuition per Student</b> | <b>₹406.80</b>      | <b>₹595.30</b> |

**Working Note:**

|                           |   |                                                       |                 |
|---------------------------|---|-------------------------------------------------------|-----------------|
| Fixed expenses            | = | 13,44,000 + 3,15,000 + 2,45,000 + 1,75,000 + 1,22,500 |                 |
|                           | = | 22,01,500                                             |                 |
| Fixed expense per student | = | 22,01,500 ÷ 17,500 students                           | = <b>125.80</b> |



**BQ 28**

Star study centre provides coaching classes to school students. The study centre has taken an auditorium of 250 seat capacity on rent ₹3,75,000 per month. It has also hired some renowned teachers for taking classes. A teacher takes ₹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.

- (1) Calculate the total cost per batch.
- (2) Compute the minimum fee to be charged per student in a batch, if the centre operates at 60% capacity.
- (3) Determine the fee per student if the study centre desires to earn a profit of 50% on cost and study centre operates at 50% capacity.

**Answer****(1) Statement Showing Cost per Batch**

| Particulars                                                           | Amount            |
|-----------------------------------------------------------------------|-------------------|
| Auditorium hire charges (3,75,000 × 4 months)                         | 15,00,000         |
| Teachers' remuneration (3,000 × 2 hour × 3 days × 4 weeks × 4 months) | 2,88,000          |
| <b>Total cost per batch</b>                                           | <b>₹17,88,000</b> |

- (2) **Minimum Fee per Student in a Batch** = Total Cost per batch ÷ Number of students  
 = ₹17,88,000 ÷ 150 students (250 seats × 60%)  
 = **₹11,920**
- (3) **Fee per Student in a Batch** = (Total Cost + Profit) ÷ Number of students  
 = ₹17,88,000 + 50% of ₹17,88,000 ÷ 125 students  
 (250 seats × 50%)  
 = **₹21,456**

**BQ 29**

AD Higher Secondary School (AHSS) offers courses for 11<sup>th</sup> & 12<sup>th</sup> 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:

|                                                             | Amount (₹)  |
|-------------------------------------------------------------|-------------|
| Teachers' salary (25 teachers × ₹35,000 × 12 months)        | 1,05,00,000 |
| Principal's salary                                          | 14,40,000   |
| Lab attendants' salary (2 attendants × ₹15,000 × 12 months) | 3,60,000    |
| Salary to library staff                                     | 1,44,000    |
| Salary to peons (4 peons × ₹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:****(a)**

|                                            | Standard 11 & 12 |           |           | Primary & 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 hours        | 120 hours | 240 hours | 60 hours            |
| Time spent by principal for administration | 208 hours        | 312 hours | 480 hours | 1,400 hours         |
| Teachers for 11 & 12 standard              | 4                | 5         | 6         | 10                  |

- (b) 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.
- (c) 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.
- (d) One peon is fully dedicated for higher secondary section. Other peons dedicate their 15% time for higher secondary section.
- (e) All school students irrespective of section and age participates in annual functions and sports activities.

**Required:**

1. Calculate cost per student per annum for all three streams.
2. If the management decides to take uniform fee of ₹1,000 per month from all higher secondary students, calculate stream wise profitability.
3. If management decides to take 10% profit on cost, compute fee to be charged from the students of all three streams respectively.

**Answer****1. Statement of Cost per Student per annum**

| Particulars                       | Arts (₹)                   | Commerce (₹)               | Science (₹)                | Total (₹)        |
|-----------------------------------|----------------------------|----------------------------|----------------------------|------------------|
| Teachers' salary                  | 16,80,000<br>(35,000×12×4) | 21,00,000<br>(35,000×12×5) | 25,20,000<br>(35,000×12×6) | 63,00,000        |
| Re-apportionment of salary:       |                            |                            |                            |                  |
| of Economics teacher              | (84,000)                   | 84,000                     | -                          | -                |
| of Mathematics teacher            | -                          | 61,091                     | (61,091)                   | -                |
| Principal's salary                | 1,24,800                   | 1,87,200                   | 2,88,000                   | 6,00,000         |
| Lab assistants' salary            | -                          | -                          | 1,72,800                   | 1,72,800         |
| Salary to library staff           | 43,200                     | 28,800                     | 57,600                     | 1,29,600         |
| Salary to peons                   | 31,636                     | 94,909                     | 47,455                     | 1,74,000         |
| Examination expenses              | 86,400                     | 2,59,200                   | 1,29,600                   | 4,75,200         |
| Salary to other staffs            | 38,400                     | 1,15,200                   | 57,600                     | 2,11,200         |
| Office & Administration expenses  | 1,21,600                   | 3,64,800                   | 1,82,400                   | 6,68,800         |
| Annual Day expenses               | 36,000                     | 1,08,000                   | 54,000                     | 1,98,000         |
| Sports expenses                   | 9,600                      | 28,800                     | 14,400                     | 52,800           |
| <b>Total Cost per annum</b>       | <b>20,87,636</b>           | <b>34,32,000</b>           | <b>34,62,764</b>           | <b>89,82,400</b> |
| ÷ Number of Students              | ÷ 120                      | ÷ 360                      | ÷ 180                      | ÷ 660            |
| <b>Cost per student per annum</b> | <b>17,397</b>              | <b>9,533</b>               | <b>19,238</b>              | <b>13,610</b>    |

**2. Statement of Profitability**

| Particulars                           | Arts (₹)          | Commerce (₹)    | Science (₹)        | Total (₹)          |
|---------------------------------------|-------------------|-----------------|--------------------|--------------------|
| No. of students                       | 120               | 360             | 180                | 660                |
| Total Fees @ 12,000 per student p.a.  | 14,40,000         | 43,20,000       | 21,60,000          | 79,20,000          |
| Less: Total Cost per annum            | (20,87,636)       | (34,32,000)     | (34,62,764)        | (89,82,400)        |
| <b>Total Profit/ (Loss) per annum</b> | <b>(6,47,636)</b> | <b>8,88,000</b> | <b>(13,02,764)</b> | <b>(10,62,400)</b> |

**3. Statement Showing Fees to be Charged to Earn a 10% Profit on Cost**

| Particulars                | Arts (₹) | Commerce (₹) | Science (₹) |
|----------------------------|----------|--------------|-------------|
| Cost per student per annum | 17,397   | 9,533        | 19,238      |
| Add: Profit @10%           | 1,740    | 953          | 1,924       |
| Fees per annum             | 19,137   | 10,486       | 21,162      |
| Fees per month             | 1,595    | 874          | 1,764       |

**Working Notes:**

**(a) Re-apportionment of Economics and Mathematics teachers' salary:**

| Particulars                 | Economics                           |          | Mathematics                         |          |
|-----------------------------|-------------------------------------|----------|-------------------------------------|----------|
|                             | Arts                                | Commerce | Science                             | Commerce |
| No. of classes              | 832                                 | 208      | 940                                 | 160      |
| Salary re-apportionment (₹) | (84,000)                            | 84,000   | (61,091)                            | 61,091   |
|                             | $(₹4,20,000 \div 1,040) \times 208$ |          | $(₹4,20,000 \div 1,100) \times 160$ |          |

- (b) Principal's salary has been apportioned on the basis of time spent by him for administration of classes.
- (c) Lab attendants' salary has been apportioned on the basis of lab classes attended by the students.
- (d) Salary of library staffs are apportioned on the basis of time spent by the students in library.
- (e) Salary of Peons are apportioned on the basis of number of students. The peons' salary allocable to higher secondary classes is calculated as below:

| Particulars                                                                           | Amount (₹)      |
|---------------------------------------------------------------------------------------|-----------------|
| Peon dedicated for higher secondary (1 peon $\times$ 10,000 $\times$ 12 months)       | 1,20,000        |
| Add: 15% of other peons' salary {15% of 3 peons $\times$ 10,000 $\times$ 12 months} } | 54,000          |
| <b>Total</b>                                                                          | <b>1,74,000</b> |

- (f) Examination expenditure has been apportioned taking number of students into account (It may also be apportioned on the basis of number of examinations).
- (g) Salary to other staffs, office & administration cost, Annual day expenses and sports expenses are apportioned on the basis of number of students.

**INSURANCE COMPANIES****BQ 30**

Sanziet Lifecare Ltd. operates in life insurance business. Last year it 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 policy sold           | 528          |
| Total insured value of policies | ₹1,320 crore |

**Required:**

- Calculate total cost for Professionals Protection Plus' policy segregating the costs into four main activities namely (a) Product development, Marketing and Sales support, (b) Operations, (c) IT and (d) Support functions.
- Calculate cost per policy.
- Calculate cost per rupee of insured value.

**Answer**

**1. Statement Showing Total Cost for 'Professionals Protection Plus' Policy**

| Particulars                                                  | Amount             |
|--------------------------------------------------------------|--------------------|
| <b>(a) Product development, Marketing and Sales support:</b> |                    |
| Policy development cost                                      | 11,25,000          |
| Cost of marketing of the policy                              | 45,20,000          |
| Sales support expenses                                       | 11,45,000          |
| <b>Total (a)</b>                                             | <b>67,90,000</b>   |
| <b>(b) Operations:</b>                                       |                    |
| Policy issuance cost                                         | 10,05,900          |
| Policy servicing cost                                        | 35,20,700          |
| Claims management cost                                       | 1,25,600           |
| <b>Total (b)</b>                                             | <b>46,52,200</b>   |
| <b>(c) IT Cost:</b>                                          |                    |
| IT cost                                                      | 74,32,000          |
| <b>Total (c)</b>                                             | <b>74,32,000</b>   |
| <b>(d) Support functions:</b>                                |                    |
| Postage and logistics                                        | 10,25,000          |
| Facilities cost                                              | 15,24,000          |
| Employees cost                                               | 5,60,000           |
| Office administration cost                                   | 16,20,400          |
| <b>Total (d)</b>                                             | <b>47,29,400</b>   |
| <b>Total Cost (a + b + c + d)</b>                            | <b>2,36,03,600</b> |

2. Calculate cost per policy = Total Cost ÷ No. of Policies  
 = ₹2,36,03,600 ÷ 528  
 = **₹44,703.79**

3. Cost per rupee of insured value = Total Cost ÷ Total insured value  
 = ₹2,36,03,600 ÷ ₹1,320 crores  
 = **₹0.0018**

**FINANCIAL INSTITUTES****BQ 31**

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:

**Direct professional labour:**

|                                                               |           |
|---------------------------------------------------------------|-----------|
| Loan processor monthly salary<br>(4 employees @ ₹60,000 each) | ₹2,40,000 |
|---------------------------------------------------------------|-----------|

**Loan department overhead costs (monthly):**

|                             |                  |
|-----------------------------|------------------|
| Chief loan officer's salary | ₹75,000          |
| Telephone expenses          | ₹7,500           |
| Depreciation Building       | ₹28,000          |
| Legal advice                | ₹24,000          |
| Advertising                 | ₹40,000          |
| Miscellaneous               | ₹6,500           |
| <b>Total overhead costs</b> | <b>₹1,81,000</b> |

**You are required to compute the cost of processing home loan application on the assumption that five hundred home loan applications are processed each month.**

**Answer**

**Statement of Cost of Processing of One Home Loan Application**

| <b>Particulars</b>                                     | <b>Amount</b>   |
|--------------------------------------------------------|-----------------|
| Direct professional labour cost (4 employees × 60,000) | 2,40,000        |
| Service overhead cost (25% of 1,81,000)                | 45,250          |
| <b>Total processing cost per month</b>                 | <b>2,85,250</b> |
| ÷ Number of applications processed per month           | ÷ 500           |
| <b>Cost of Processing One Home Loan Application</b>    | <b>₹570.50</b>  |

**POWER HOUSES****BQ 32**

Prepare the cost statement of Ignus Thermal Power Station showing the cost of electricity generated per kwh, from the data provided below pertaining to the year 2022-23:

|                               |               |
|-------------------------------|---------------|
| Total units generated         | 20,00,000 kwh |
| Operating labour              | ₹30,00,000    |
| Repairs & maintenance         | ₹10,00,000    |
| Lubricants, spares and stores | ₹8,00,000     |
| Plant supervision             | ₹6,00,000     |
| Administration overheads      | ₹40,00,000    |

5 kwh. of electricity generated per kg of coal consumed @ ₹4.25 per kg. Depreciation charges @ 5% on capital cost of ₹5,00,00,000.

**Answer****Cost Statement of Ignus Thermal Power Station**

| <b>Particulars</b>                                    | <b>Amount</b>      |
|-------------------------------------------------------|--------------------|
| <b>(A) Fixed Costs:</b>                               |                    |
| Plant supervision                                     | 6,00,000           |
| Administration overheads                              | 40,00,000          |
| Depreciation (₹5,00,00,000 × 5%)                      | 25,00,000          |
| <b>Total (A)</b>                                      | <b>71,00,000</b>   |
| <b>(B) Variable Costs:</b>                            |                    |
| Operating labour (Student can treat it as fixed also) | 30,00,000          |
| Lubricant, spares and stores                          | 8,00,000           |
| Repairs and Maintenance                               | 10,00,000          |
| Coal cost (20,00,000 kwh ÷ 5 kwh) × ₹4.25 per kg      | 17,00,000          |
| <b>Total (B)</b>                                      | <b>65,00,000</b>   |
| <b>Total Operating Cost (A + B)</b>                   | <b>1,36,00,000</b> |
| ÷ Total kwh generated                                 | ÷ 20,00,000        |
| <b>Cost of electricity generated per kwh</b>          | <b>₹6.80</b>       |

**BQ 33**

From the following data pertaining to the year 2022-23 prepare a cost statement showing the cost of electricity generated per kwh by Chambal Thermal Power Station.

|                               |               |
|-------------------------------|---------------|
| Total units generated         | 10,00,000 kwh |
| Operating labour              | ₹15,00,000    |
| Repairs & maintenance         | ₹5,00,000     |
| Lubricants, spares and stores | ₹4,00,000     |
| Plant supervision             | ₹3,00,000     |
| Administration overheads      | ₹20,00,000    |

5 kwh. of electricity generated per kg. of coal consumed @ ₹4.25 per kg. Depreciation charges @ 5% on capital cost of ₹2,00,00,000.

**Answer****Cost Statement of Chambal Thermal Power Station**

| <b>Particulars</b>                                                                          | <b>Amount</b>    |
|---------------------------------------------------------------------------------------------|------------------|
| <b>(A) Fixed Costs:</b>                                                                     |                  |
| Plant supervision                                                                           | 3,00,000         |
| Administration overheads                                                                    | 20,00,000        |
| Depreciation ( $\text{₹}2,00,00,000 \times 5\%$ )                                           | 10,00,000        |
| <b>Total (A)</b>                                                                            | <b>33,00,000</b> |
| <b>(B) Variable Costs:</b>                                                                  |                  |
| Operating labour (Student can treat it as fixed also)                                       | 15,00,000        |
| Lubricant, spares and stores                                                                | 4,00,000         |
| Repairs and Maintenance                                                                     | 5,00,000         |
| Coal cost ( $10,00,000 \text{ kwh} \div 5 \text{ kwh} \times \text{₹}4.25 \text{ per kg}$ ) | 8,50,000         |
| <b>Total (B)</b>                                                                            | <b>32,50,000</b> |
| <b>Total Operating Cost (A + B)</b>                                                         | <b>65,50,000</b> |
| $\div$ Total kwh generated                                                                  | $\div 10,00,000$ |
| <b>Cost of electricity generated per kwh</b>                                                | <b>₹6.55</b>     |

**BQ 34**

A manufacturing firm facing shortage of electric power supply from the state electricity board has set up its own power generation plant for efficient running of its production units in the factory.

**The following information has been taken from the records in connection with the generation of power for a month:**

- Number of units generated was 10,00,000 for the month of which 10% was utilised by the generator departments.
- Consumption data of materials etc., for the month:
 

|                                          |                                  |
|------------------------------------------|----------------------------------|
| (a) Coal consumed                        | 300 MT @ ₹3,600 per MT           |
| (b) Oil consumed                         | 4.5 MT @ ₹40,000 per MT          |
| (c) Cost of water extraction & treatment | 6 lakhs liters @ ₹1.25 per litre |
- Steam boiler costs ₹20 lakhs with a residual value of ₹2 lakhs after a life of 10 years.
- Salaries and wages per month:
 

|                                         |                                           |
|-----------------------------------------|-------------------------------------------|
| (a) For staff of generating plant:      |                                           |
| (i) 100 skilled workers @ ₹3,000 p.m.   | (ii) 150 helpers @ ₹1,500 p.m.            |
| (b) For staff of boiler house:          |                                           |
| (i) 60 category A workers @ ₹1,500 p.m. | (ii) 100 category B workers @ ₹1,000 p.m. |
- Cost of generating plant ₹36 lakhs with no residual value and depreciation @ 10% straight line basis is to be charged.
- Repairs and maintenance of generating plant and boiler ₹50,000 p.m.
- Share of administrative charges ₹40,000 p.m.
- Sales value of ash disposed off ₹15,000 p.m.

**Calculate the cost per unit of electricity generated.**

Answer

**Cost Statement Showing per Unit Cost**

| <b>Particulars</b>                                       |                                                            | <b>Amount</b>    |
|----------------------------------------------------------|------------------------------------------------------------|------------------|
| <b>(A) Fixed Costs:</b>                                  |                                                            |                  |
| Depreciation:                                            |                                                            |                  |
| Steam boiler                                             | $[(\text{₹}20,00,000 - 2,00,000) \times 1/10 \times 1/12]$ | 15,000           |
| Generating plant                                         | $(\text{₹}36,00,000 \times 10\% \times 1/12)$              | 30,000           |
| Share of Administrative charges                          |                                                            | 40,000           |
| Salaries and wages:                                      |                                                            |                  |
| Generating plant:                                        |                                                            |                  |
| Skilled workers                                          | $(\text{₹}3,000 \times 100)$                               | 3,00,000         |
| Helpers                                                  | $(\text{₹}1,500 \times 150)$                               | 2,25,000         |
| Boiler house:                                            |                                                            |                  |
| Category A workers                                       | $(\text{₹}1,500 \times 60)$                                | 90,000           |
| Category B workers                                       | $(\text{₹}1,000 \times 100)$                               | 1,00,000         |
| <b>Total (A)</b>                                         |                                                            | <b>8,00,000</b>  |
| <b>(B) Variable Costs:</b>                               |                                                            |                  |
| Coal consumed                                            | $(\text{₹}3,600 \times 300)$                               | 10,80,000        |
| Oil consumed                                             | $(\text{₹}40,000 \times 4.5)$                              | 1,80,000         |
| Water extraction & treatment                             | $(\text{₹}1.25 \times 6,00,000)$                           | 7,50,000         |
| Repairs and maintenance                                  |                                                            | 50,000           |
| <b>Total (B)</b>                                         |                                                            | <b>20,60,000</b> |
| <b>Total Operating Cost before Sale of Ash (A + B)</b>   |                                                            | <b>28,60,000</b> |
| Less: Sale of ash                                        |                                                            | (15,000)         |
| <b>Total Operating Cost Net of Sale of Ash</b>           |                                                            | <b>28,45,000</b> |
| $\div$ Total Effective units generated (10,00,000 – 10%) |                                                            | $\div$ 9,00,000  |
| <b>Cost per unit electricity generated</b>               |                                                            | <b>₹3.161</b>    |



# PAST YEAR QUESTIONS

## PYQ 1

A transport service company is running five buses between two towns which are 50 kms apart. Seating capacity of each bus is 50 passengers.

*The following particulars were obtained from their books for April 1998:*

|                                           |                  |
|-------------------------------------------|------------------|
| Wages of drivers, conductors and cleaners | ₹24,000          |
| Salaries of office staff                  | ₹10,000          |
| Diesel oil and other oil                  | ₹35,000          |
| Repairs and maintenance                   | ₹8,000           |
| Taxation, insurance etc.                  | ₹16,000          |
| Depreciation                              | ₹26,000          |
| Insurance and other expenses              | ₹20,000          |
| <b>Total</b>                              | <b>₹1,39,000</b> |

Actually, passengers carried were 75 per cent of seating capacity. All buses ran on all days of the month. Each bus made one round trip per day.

*Find out the cost per passenger-km.*

*[(5 Marks) Nov 1998]*

**Answer**

### Operating Cost Sheet (For the month of April 1998)

| Particulars                               | Amount          |
|-------------------------------------------|-----------------|
| <b>(A) Standing Charges:</b>              |                 |
| Wages of drivers, conductors and cleaners | 24,000          |
| Salaries of office staff                  | 10,000          |
| Taxation, insurance etc.                  | 16,000          |
| Depreciation                              | 26,000          |
| Insurance and other expenses              | 20,000          |
| <b>Total (A)</b>                          | <b>96,000</b>   |
| <b>(B) Running Charges:</b>               |                 |
| Diesel oil and other oil                  | 35,000          |
| <b>Total (B)</b>                          | <b>35,000</b>   |
| <b>(C) Maintenance Charges:</b>           |                 |
| Repairs and maintenance                   | 8,000           |
| <b>Total (C)</b>                          | <b>8,000</b>    |
| <b>Total operating cost (A + B + C)</b>   | <b>1,39,000</b> |
| ÷ Total tonne-kms                         | 5,62,500        |
| <b>Cost per passenger-km</b>              | <b>₹0.2471</b>  |

**Working Notes:**

$$\begin{aligned}
 \text{Total Passenger kms} &= \text{No. of Buses} \times \text{Distance} \times \text{Round trip} \times \text{Seating capacity} \times \% \text{ of capacity utilization} \times \text{No. of days operated} \\
 &= 5 \text{ Buses} \times 50 \text{ kms} \times 2 \times 50 \text{ passengers} \times 75\% \times 30 \text{ days} = 5,62,500
 \end{aligned}$$

## PYQ 2

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 km' and 'Commercial tonnes km'.*

*[(5 Marks) Nov 1999]*

**Answer****Absolute tonne kms:**

This is the sum total of tonnes – kms, arrived at by multiplying various distances by respective load quantities carried as calculated below:

$$= 20 \text{ tonnes} \times 80 \text{ kms} + 12 \text{ tonnes} \times 120 \text{ kms} + 16 \text{ tonnes} \times 160 \text{ kms}$$

$$= \mathbf{5,600 \text{ tonnes km.}}$$

**Commercial tonne kms:**

This is computed by average load being multiplied by total distance travelled as calculated below:

$$= \text{Average load} \times \text{Total kms travelled}$$

$$= \frac{20+12+16}{3} \text{ tonnes} \times 360 \text{ kms} = \mathbf{5,760 \text{ tonnes km.}}$$

**PYQ 3**

A mineral is transported from two miners 'A' and 'B' and unloaded at plots in a railway station. Mine A is at a distance of 10 kms and B is at a distance of 15 kms from railhead plots. A fleet of lorries of 5 tonnes carrying capacity is used for the transport of mineral from the mines. Records reveal that the lorries average a speed of 30 kms 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.

Driver's wages, depreciation, insurance and taxes are found to cost ₹9 per hour operated. Fuel, oil tyres, repairs and maintenance cost ₹1.20 per km.

**Draw up a statement, showing the cost per tonne kilometer of carrying mineral from each mine.**  
**[(10 Marks) Nov 2000]**

**Answer****Statement Showing Cost per Tonne-Km**

| <b>Particulars</b>               | <b>Mine A</b>            | <b>Mine B</b>            |
|----------------------------------|--------------------------|--------------------------|
| Fixed Expenses @ ₹9 per hour     | (9.00 × 80/60)<br>12.00  | (9.00 × 90/60)<br>13.50  |
| Variable Expenses @ ₹1.20 per km | (1.20 × 20 kms)<br>24.00 | (1.20 × 30 kms)<br>36.00 |
| <b>Operating Cost</b>            | <b>36.00</b>             | <b>49.50</b>             |
| ÷ Effective tonne-kms            | ÷ 50                     | ÷ 75                     |
| <b>Cost per tonne-km</b>         | <b>₹0.72</b>             | <b>₹0.66</b>             |

**Working Notes:****1. Total operating time in 1 trip:**

|                                         | <b>Mine A</b>                                                               | <b>Mine B</b>                                                               |
|-----------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Running time (mine to plot)             | $\frac{60 \text{ Mnt}}{30 \text{ Kms}} \times 10 \text{ Kms}$<br>20 minutes | $\frac{60 \text{ Mnt}}{30 \text{ Kms}} \times 15 \text{ Kms}$<br>30 minutes |
| Loading time                            | 30 minutes                                                                  | 20 minutes                                                                  |
| Running time (plot to mine)             | 20 minutes                                                                  | 30 minutes                                                                  |
| Unloading time                          | 10 minutes                                                                  | 10 minutes                                                                  |
| <b>Total operating time in one trip</b> | <b>80 minutes</b>                                                           | <b>90 minutes</b>                                                           |

**2. Effective tonnes km per trip:**

|                                                                     |                                                                     |
|---------------------------------------------------------------------|---------------------------------------------------------------------|
| 5 tonnes × 10 kms +<br>Nil tonnes × 10 kms<br><b>= 50 tonne kms</b> | 5 tonnes × 15 kms +<br>Nil tonnes × 15 kms<br><b>= 75 tonne kms</b> |
|---------------------------------------------------------------------|---------------------------------------------------------------------|

**PYQ 4**

A transport company has a fleet of three trucks of 10 tonnes capacity each plying in different directions for transport of customer's goods. The trucks run loaded with goods and return empty. The distance travelled, number of trips made and the load carried per day by each truck are as under:

| Truck no. | One way distance | No of round trips | Load carried per trip |
|-----------|------------------|-------------------|-----------------------|
| 1         | 16               | 4                 | 6                     |
| 2         | 40               | 2                 | 9                     |
| 3         | 30               | 3                 | 8                     |

The analysis of maintenance cost and the total distance travelled during the last two years is as under:

| Year | Total distance travelled | Maintenance Cost |
|------|--------------------------|------------------|
| 1    | 1,60,200                 | ₹46,050          |
| 2    | 1,56,700                 | ₹45,175          |

The following are the details of expenses for the year under review:

|                          |   |                                               |
|--------------------------|---|-----------------------------------------------|
| Diesel                   | : | ₹10 per litre (Each litre gives 4 km mileage) |
| Drivers' salary          | : | ₹2,000 per month.                             |
| License and taxes        | : | ₹5,000 per annum per truck.                   |
| Insurance                | : | ₹5,000 per annum for all the three vehicles.  |
| Purchase price per truck | : | ₹3,00,000.                                    |
| Life                     | : | 10 years.                                     |
| Scrap value              | : | ₹10,000 at the end of economic life.          |
| Oil and sundries         | : | ₹25 per 100 km run.                           |
| General Overhead         | : | ₹11,084 per annum.                            |
| The vehicles operate     | : | 24 days per month on an average.              |

**Required:**

- (i) Prepare an annual cost statement covering the fleet of three vehicles.
- (ii) Calculate the cost per km run.
- (iii) Determine the freight rate per tonne km to yield a profit of 10% on freight.

**[(10 Marks) Nov 2001]**

**Answer**

**(i) Annual Cost Statement of 3 Vehicles**

| Particulars                                       | Amount          |
|---------------------------------------------------|-----------------|
| <b>(A) Fixed Expenses:</b>                        |                 |
| Driver's salary (2,000 × 12 × 3)                  | 72,000          |
| Licence and taxes (5,000 × 3)                     | 15,000          |
| Insurance                                         | 5,000           |
| Depreciation [(3,00,000 - 10,000) ÷ 10 Years] × 3 | 87,000          |
| General overheads                                 | 11,084          |
| <b>Total (A)</b>                                  | <b>1,90,084</b> |
| <b>(B) Variable Expenses:</b>                     |                 |
| Diesel (1,34,784 × 10 ÷ 4)                        | 3,36,960        |
| Oil and sundries (1,34,784 × 25 ÷ 100)            | 33,696          |
| <b>Total (B)</b>                                  | <b>3,70,656</b> |
| <b>(C) Maintenance Expenses:</b>                  |                 |
| Variable maintenance cost (1,34,784 kms × 0.25)   | 33,696          |
| Fixed maintenance cost                            | 6,000           |
| <b>Total (C)</b>                                  | <b>39,696</b>   |
| <b>Total operating cost (A + B + C)</b>           | <b>6,00,436</b> |

**(ii) Calculation of cost per km run:**

$$\frac{\text{Total annual cost of 3 trucks}}{\text{Total distance travelled}} = \frac{6,00,436}{1,34,784} = \text{₹4.4548}$$

**(iii) Calculation of freight per tonne km:**

$$\begin{aligned} \text{Total operating cost} &= 6,00,436 \\ \text{Profit @ 10\% on freight} &= 66,722 \\ \text{Total freight} &= 6,67,218 \end{aligned}$$

$$\text{Freight per tonne km} = \frac{\text{Total freight}}{\text{Total tonne kms}} = \frac{6,67,218}{5,25,312} = ₹1.27$$

WN:

(1) **Total km travelled & effective tones km of load carried generated by 3 trucks annually:**

| Truck                          | One way distance | No of round trips per day | Total distance per day | Load carried per trip | Total effective tonne kms |
|--------------------------------|------------------|---------------------------|------------------------|-----------------------|---------------------------|
| 1                              | 16 kms           | 4                         | 128 kms                | 6                     | 384                       |
| 2                              | 40 kms           | 2                         | 160 kms                | 9                     | 720                       |
| 3                              | 30 kms           | 3                         | 180 kms                | 8                     | 720                       |
| <b>Total tonne kms per day</b> |                  |                           |                        |                       | <b>1,824</b>              |

**Total kms travelled by 3 trucks annually:**

$$468 \text{ kms } (128 + 160 + 180) \times 24 \text{ days} \times 12 \text{ months} = 1,34,784 \text{ kms}$$

**Total effective tonne km of load carried by 3 trucks annually:**

$$1,824 \text{ tonne kms} \times 24 \text{ days} \times 12 \text{ months} = 5,25,312 \text{ tonne kms}$$

(2) **Segregation of fixed & variable component of maintenance cost:**

$$\begin{aligned} \text{Variable maintenance cost per km} &= \frac{\text{Difference in cost}}{\text{Difference in distance}} = \frac{46,050 - 45,175}{1,60,200 - 1,56,700} \\ &= ₹0.25 \text{ per km} \end{aligned}$$

$$\begin{aligned} \text{Fixed maintenance cost} &= \text{Total cost} - \text{Variable cost} \\ &= 46,050 - (1,60,200 \text{ kms} \times 0.25) = ₹6,000 \end{aligned}$$

**PYQ 5**

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 payable (for all the 12 months)      | ₹5,000 per month per driver  |
| Cleaner's salary payable (for all the 12 months)     | ₹3,000 per month per cleaner |
| (One cleaner has been employed for every five buses) |                              |
| Licence fees, Taxes etc.                             | ₹2,300 per bus per annum     |
| Insurance premium                                    | ₹15,600 per bus per annum    |
| Repairs and maintenance                              | ₹16,400 per bus per annum    |
| Purchase price of the bus                            | ₹16,50,000 each bus          |
| Life of the bus                                      | 16 years                     |
| Scrap value                                          | ₹1,50,000                    |
| Diesel cost                                          | ₹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 travelled as under:**

| Distance from the school | Bus Fee     | % of students availing facility |
|--------------------------|-------------|---------------------------------|
| 4 kms                    | 25% of Full | 15%                             |
| 8 kms                    | 50% of Full | 30%                             |
| 16 kms                   | Full        | 55%                             |

**Ignore interest. Since the bus fee 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.

**[(10 Marks) May 2004]**

**Answer**

**(i) Statement showing the expenses of operating a single bus and the fleet of 25 buses**

| Particulars                             | 1 Bus           | 25 Buses         |
|-----------------------------------------|-----------------|------------------|
| <b>(A) Standing Charges:</b>            |                 |                  |
| Driver's salary                         | 60,000          | 15,00,000        |
| Cleaner's salary                        | 7,200           | 1,80,000         |
| Licence fee, Taxes etc                  | 2,300           | 57,500           |
| Insurance                               | 15,600          | 3,90,000         |
| Depreciation                            | 93,750          | 23,43,750        |
| <b>Total (A)</b>                        | <b>1,78,850</b> | <b>44,71,250</b> |
| <b>(B) Maintenance Charges:</b>         |                 |                  |
| Repairs and maintenance                 | 16,400          | 4,10,000         |
| <b>Total (B)</b>                        | <b>16,400</b>   | <b>4,10,000</b>  |
| <b>(C) Running Charges:</b>             |                 |                  |
| Diesel                                  | 56,832          | 14,20,800        |
| <b>Total (C)</b>                        | <b>56,832</b>   | <b>14,20,800</b> |
| <b>Total operating cost (A + B + C)</b> | <b>2,52,082</b> | <b>63,02,050</b> |

**(ii) Average cost per student per month in respect of students coming from a distance of:**

|                                   |   |                                                |   |                |
|-----------------------------------|---|------------------------------------------------|---|----------------|
| <b>(a)</b> 4 kms from the school  | = | $(2,52,082 \div 12) \div 354 \text{ students}$ | = | <b>₹59.34</b>  |
| <b>(b)</b> 8 kms from the school  | = | $₹59.34 \times 2$                              | = | <b>₹118.68</b> |
| <b>(c)</b> 16 kms from the school | = | $₹59.34 \times 4$                              | = | <b>₹237.36</b> |

**Working notes:**

**1. Calculation of diesel cost per bus:**

|                                          |   |                                        |
|------------------------------------------|---|----------------------------------------|
| No of trips made by a bus each day       | = | 4                                      |
| Distance travelled in one trip both ways | = | 32 kms (16 kms × 2 trips)              |
| Distance travelled per day by a bus      | = | 128 kms (32 kms × 4 shifts)            |
| Distance travelled during a month        | = | 3,072 kms (128 kms × 24 days)          |
| Distance travelled per year              | = | 30,720 kms (3,072 × 10 months)         |
| No of litres of diesel required          | = | 3,072 litres (30,720 kms ÷ 10 kms)     |
| <b>Cost of diesel per bus per year</b>   | = | <b>₹56,832 (3,072 litres × ₹18.50)</b> |

**2. Calculation of number of 25% equivalent students per bus:**

|                                      |   |                                 |
|--------------------------------------|---|---------------------------------|
| Bus capacity of 2 trips              | = | 120 students                    |
| 25% Fare students                    | = | 18 students (120 × 15%)         |
| 50% Fare students                    | = | 36 students (120 × 30%)         |
| Full Fare students                   | = | 66 students (120 × 55%)         |
| <b>Total 25% equivalent students</b> | = | <b>18 + (36 × 2) + (66 × 4)</b> |
|                                      | = | <b>354 students</b>             |

**PYQ 6**

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 ₹7,200.

**The costs of operation of flights are:**

|                                              |                                       |
|----------------------------------------------|---------------------------------------|
| Fuel cost (variable)                         | ₹96,000 per flight                    |
| Food served on board on non-chargeable basis | ₹125 per passenger                    |
| Commission                                   | 5% of fare applicable for all Booking |
| Fixed cost:                                  |                                       |
| Aircraft lease                               | ₹3,50,000 per flight                  |
| Crew                                         | ₹72,000 per flight                    |

**Required:**

- (i) Calculate the net operating income per flight.  
(ii) The airline expects that its occupancy will increase to 108 passengers per flight if the fare is reduced to ₹6,720. Advise, whether this proposal should be implemented or not.

**[(10 Marks) May 2005]**

**Answer****(i) Statement Showing Net Operating Income per Flight**

| Particulars                                          | Amount   | Amount          |
|------------------------------------------------------|----------|-----------------|
| Fare collection (96 × 7,200)                         |          | 6,91,200        |
| <b>Variable costs:</b>                               |          |                 |
| Fuel                                                 | 96,000   |                 |
| Commission 5%                                        | 34,560   |                 |
| Food (96 × 125)                                      | 12,000   | 1,42,560        |
| <b>Contribution per Flight (6,91,200 – 1,42,560)</b> |          | <b>5,48,640</b> |
| <b>Fixed costs:</b>                                  |          |                 |
| Crew                                                 | 72,000   |                 |
| Lease                                                | 3,50,000 | 4,22,000        |
| <b>Net Income per Flight (5,48,640 – 4,22,000)</b>   |          | <b>1,26,640</b> |

$$\text{*Number of passengers } 160 \times \frac{60}{100} = \text{96 passengers}$$

**(ii) Statement Showing Net Operating Income per Flight at Reduced Fare**

| Particulars                                          | Amount   | Amount          |
|------------------------------------------------------|----------|-----------------|
| Fare collection (108 × 6,720)                        |          | 7,25,760        |
| <b>Variable costs:</b>                               |          |                 |
| Fuel                                                 | 96,000   |                 |
| Commission 5%                                        | 36,288   |                 |
| Food (108 × 125)                                     | 13,500   | 1,45,788        |
| <b>Contribution per flight (7,25,760 – 1,45,788)</b> |          | <b>5,79,972</b> |
| <b>Fixed costs:</b>                                  |          |                 |
| Crew                                                 | 72,000   |                 |
| Lease                                                | 3,50,000 | 4,22,000        |
| <b>Net Income per Flight (5,79,972 – 4,22,000)</b>   |          | <b>1,57,972</b> |

**There is an increase in net operating income by ₹31,332. Hence, the proposal is acceptable.**

**PYQ 7**

**Calculate total passenger kilometer from the following information:**

Number of buses 6, number of days operating in a month 25, trips (both side) made by each bus per day 8, distances covered 20 kilometers (one side), capacity of bus 40 passengers, normally 80% of capacity utilized.

**[(2 Marks) Nov 2007]**

**Answer**

$$\begin{aligned}
 \text{Total Passengers km} &= \text{No. of buses} \times \text{Distance in one side trip} \times \text{Two way} \times \text{No. of days in a month} \\
 &\quad \times \text{No. of trips} \times \text{capacity in each bus} \times \text{capacity utilized} \\
 &= 6 \times 20 \times 2 \times 25 \times 8 \times 40 \times 80\% = \mathbf{15,36,000 \text{ Passenger kms}}
 \end{aligned}$$

**PYQ 8**

A lorry starts with a load of 24 tonnes of goods from station A. It unloads 10 tonnes at station B and rest of goods at station C. It reaches back directly to station A after setting reloaded with 18 tonnes of goods station C. The distance between A to B, B to C and then from C to A are 270 kms, 150 kms and 325 kms respectively.

**Compute Absolute tonnes km and Commercial tonnes km.**

**[(5 Marks) May 2009]**

**Answer**

$$\begin{aligned}
 \text{Absolute tonne kms} &= \text{A to B} \times \text{tonnes} + \text{B to C} \times \text{tonnes} + \text{C to A} \times \text{tonnes} \\
 &= 270 \text{ kms} \times 24 \text{ tonnes} + 150 \text{ kms} \times (24 - 10) + 325 \text{ kms} \times 18 \text{ tonnes} \\
 &= 6,480 + 2,100 + 5,850 = \mathbf{14,430 \text{ tonnes km}}
 \end{aligned}$$

$$\begin{aligned}
 \text{Commercial tonne kms} &= \text{Total distance} \times \text{Average load} \\
 &= (270 + 150 + 325) \text{ kms} \times \left( \frac{24 + 14 + 18}{3} \right) \text{ tonnes} = \mathbf{13,907 \text{ tonnes km}}
 \end{aligned}$$

**PYQ 9**

A transport company has been given a 40 kilometres long route to run 5 buses. The cost of each bus is ₹6,50,000. The buses will make 3 round trips per day carrying on average 80 percent passengers of their seating capacity. The seating capacity of each bus is 40 passengers. The buses will run on an average 25 days in a month.

**The other information for the year 2010-11 are given below:**

|                                       |                       |
|---------------------------------------|-----------------------|
| Garage rent                           | ₹4,000 per month      |
| Annual repairs and maintenance        | ₹22,500 each bus      |
| Salaries of 5 drivers                 | ₹3,000 each per month |
| Wages of 5 conductors                 | ₹1,200 each per month |
| Manager's salary                      | ₹7,500 per month      |
| Road tax, permit fee etc.             | ₹5,000 for a quarter  |
| Office expenses                       | ₹2,000 per month      |
| Cost of diesel per litre              | ₹33                   |
| Kilometres 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 kilometer, if the company wants to earn a profit of  $33\frac{1}{3}$  percent on taking (total receipts from passengers).**

**[(10 Marks) May 2010]**

**Answer****Operating Cost Sheet**

| Particulars                                      | Amount        |
|--------------------------------------------------|---------------|
| <b>(A) Standing Charges:</b>                     |               |
| Garage rent per month                            | 4,000         |
| Salaries of 5 drivers per month (3,000 × 5)      | 15,000        |
| Wages of 5 conductors per month (1,200 × 5)      | 6,000         |
| Manager's salary per month                       | 7,500         |
| Road tax, permit fee etc. (5,000 × 4 ÷ 12)       | 1,667         |
| Office expenses per month                        | 2,000         |
| Insurance per month (6,50,000 × 3% ÷ 12) × 5     | 8,125         |
| Depreciation per month (6,50,000 × 15% ÷ 12) × 5 | 40,625        |
| <b>Total (A)</b>                                 | <b>84,917</b> |



|                                                       |                  |                 |
|-------------------------------------------------------|------------------|-----------------|
| <b>(B) Running Charges:</b>                           |                  |                 |
| Diesel ( $30,000 \times 33 \div 6$ )                  |                  | 1,65,000        |
|                                                       | <b>Total (B)</b> | <b>1,65,000</b> |
| <b>(C) Maintenance Charges:</b>                       |                  |                 |
| Repairs and maintenance ( $22,500 \times 5 \div 12$ ) |                  | 9,375           |
|                                                       | <b>Total (C)</b> | <b>9,375</b>    |
| <b>Total operating cost (A + B + C)</b>               |                  | <b>2,59,292</b> |
| Add: Profit @ $33\frac{1}{3}\%$ of taking             |                  | 1,29,646        |
| <b>Taking</b>                                         |                  | <b>3,88,938</b> |
| $\div$ Total passenger kms                            |                  | $\div 9,60,000$ |
| <b>Fare per passenger km</b>                          |                  | <b>₹0.405</b>   |

**WN 1: Calculation of total traveling of 5 buses per month:**

$$= \text{No of round trips daily} \times \text{Distance two way} \times \text{No of days} \times \text{No of buses}$$

$$= 3 \times 80 \times 25 \times 5 = \mathbf{30,000 \text{ kms}}$$

**WN 2: Calculation of passenger kms per month:**

$$= \text{No of kms travelled per month} \times \text{Capacity occupied} \times \text{No of passengers}$$

$$= 30,000 \times 40 \times 80\% = \mathbf{9,60,000 \text{ kms}}$$

**PYQ 10**

A company runs a holiday home. For this purpose, it has hired a building at a rent of ₹10,000 per month along with 5% of total taking. It has three types of suites for its customers viz. single room, double room and triple room. Following information is given:

| Type of suites | Number of rooms | Occupancy percentage |
|----------------|-----------------|----------------------|
| Single room    | 100             | 100%                 |
| Double room    | 50              | 80%                  |
| Triple room    | 30              | 60%                  |

The rent of double room suite is to be fixed at 2.5 times of the single room suite and that of triple room suite as twice of the double room suite.

**The other expenses for the year 2006 are as follows:**

| Expenses                    | ₹         |
|-----------------------------|-----------|
| 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****Statement Showing Rent to be Charged**

| Particulars                 | ₹         |
|-----------------------------|-----------|
| 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  |

|                                                   |                  |
|---------------------------------------------------|------------------|
| Building rent:                                    |                  |
| Fixed                                             | 1,20,000         |
| Variable @ 5% on taking                           | 1,76,067         |
| <b>Total Cost</b>                                 | <b>28,17,067</b> |
| Add: Profit @ 20% on taking                       | 7,04,266         |
| <b>*Total Taking</b>                              | <b>35,21,333</b> |
| ÷ Equivalent single room days                     | ÷ 1,04,400       |
| <b>Rent for single room day</b>                   | <b>₹33.73</b>    |
| <b>Rent for double room day (33.73 × 2.5)</b>     | <b>₹84.32</b>    |
| <b>Rent for triple room day (33.73 × 2.5 × 2)</b> | <b>₹168.65</b>   |

**Working Notes:****1. Calculation of Taking:**

|                     |   |                                                                          |
|---------------------|---|--------------------------------------------------------------------------|
| *Total Taking       | = | Operating cost (excluding rent on taking) + 5% for rent + 20% for profit |
|                     | = | ₹26,41,000 + 25% of total takings                                        |
| 75% of Taking       | = | ₹26,41,000                                                               |
| <b>Total Taking</b> | = | <b>₹35,21,333</b>                                                        |

**2. Calculation of equivalent single room suites:**

| Type of suites                           | Room days                              | Equivalent single room suites |
|------------------------------------------|----------------------------------------|-------------------------------|
| Single room suite                        | $100 \times 360 \times 100\% = 36,000$ | $36,000 \times 1 = 36,000$    |
| Double room suite                        | $50 \times 360 \times 80\% = 14,400$   | $14,400 \times 2.5 = 36,000$  |
| Triple room suite                        | $30 \times 360 \times 60\% = 6,480$    | $6,480 \times 5 = 32,400$     |
| <b>Total equivalent single room days</b> |                                        | <b>1,04,400</b>               |

**PYQ 11****The following information relates to a bus operator:**

|                                                     |                    |
|-----------------------------------------------------|--------------------|
| Cost of the bus                                     | ₹18,00,000         |
| Insurance charges                                   | 3% p.a.            |
| Manager-cum accountant's salary                     | ₹8,000 p.m.        |
| Annual tax                                          | ₹50,000            |
| Garage rent                                         | ₹2,500 p.m.        |
| Annual repair and maintenance                       | ₹1,50,000          |
| Expected life of bus                                | 15 years           |
| Scrap value at the end of 15 years                  | ₹1,20,000          |
| Driver's salary                                     | ₹15,000 p.m.       |
| Conductor's salary                                  | ₹12,000 p.m.       |
| Stationery                                          | ₹500 p.m.          |
| Engine oil, lubricants (for 1,200 kms.)             | ₹2,500             |
| Diesel and oil (for 10 kms.)                        | ₹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 an average 40 passengers in each trip. Assume 15% profit on collections. The bus will work on an average 25 days in a month.

**Calculate fare for passenger-km.****[(8 Marks) Nov 2013]****Answer****Statement of Fare for Passenger-km**

| Particulars                                                                               | Amount |
|-------------------------------------------------------------------------------------------|--------|
| <b>(A) Standing Charges:</b>                                                              |        |
| Depreciation per month $[(18,00,000 - 1,20,000) \times \frac{1}{15} \times \frac{1}{12}]$ | 9,333  |
| Insurance per month $[(18,00,000 \times 3\%) \times \frac{1}{12}]$                        | 4,500  |
| Manager-cum accountant's salary                                                           | 8,000  |
| Annual Tax for one month $(50,000 \times \frac{1}{12})$                                   | 4,167  |

|                                                                  |                 |
|------------------------------------------------------------------|-----------------|
| Garage Rent                                                      | 2,500           |
| Driver's salary                                                  | 15,000          |
| Conductor's salary                                               | 12,000          |
| Stationery                                                       | 500             |
| <b>Total (A)</b>                                                 | <b>56,000</b>   |
| <b>(B) Running Charges:</b>                                      |                 |
| Diesel and oil ( $\frac{52}{10} \times 3,000$ kms)               | 15,600          |
| Engine oil, lubricants ( $\frac{2,500}{1,200} \times 3,000$ kms) | 6,250           |
| Commission @ 10% of collections 'WN'                             | 12,047          |
| <b>Total (B)</b>                                                 | <b>33,897</b>   |
| <b>(C) Maintenance Charges:</b>                                  |                 |
| Repairs and maintenance ( $1,50,000 \times \frac{1}{12}$ )       | 12,500          |
| <b>Total (C)</b>                                                 | <b>12,500</b>   |
| <b>Total operating cost (A + B + C)</b>                          | <b>1,02,397</b> |
| Add: Profit @ 15% of collections                                 | 18,070          |
| <b>Collections (WN 3)</b>                                        | <b>1,20,467</b> |
| ÷ Total Passenger-kms                                            | ÷ 1,20,000      |
| <b>Fare for per passenger-km</b>                                 | <b>₹1.004</b>   |

**WN 1: Calculation of total travelling of bus in one month:**

$$= 2 \times \text{No of round trips daily} \times \text{Distance one way} \times \text{No of days}$$

$$= 2 \times 3 \times 20 \times 25 = 3,000 \text{ kms}$$

**WN 2: Calculation of passenger-kms per month:**

$$= \text{No of kms travelled per month} \times \text{No of passengers}$$

$$= 3,000 \times 40 = 1,20,000 \text{ passenger-kms}$$

**WN 3: Calculation of collections:**

$$\begin{aligned} \text{Total collections} &= \text{Operating cost (excluding commission on collections) + 10\% for} \\ &\quad \text{commission + 15\% for profit} = 90,350 + 25\% \text{ of collections} \end{aligned}$$

$$\text{Collections} = ₹1,20,467$$

**PYQ 12**

A mini-bus, having a capacity of 32 passengers, operates between two places – 'A' and 'B'. The distance between the place 'A' and 'B' is 30 km. The bus makes 10 round trips in a day for 25 days in a month. On an average, the occupancy ratio is 70% and is expected throughout the year.

**The details of other expenses are as under:**

|                                               |                    |
|-----------------------------------------------|--------------------|
| Insurance                                     | ₹15,600 per annum  |
| Garage Rent                                   | ₹2,400 per quarter |
| Road Tax                                      | ₹5,000 per annum   |
| Repairs                                       | ₹4,800 per quarter |
| Salary of Operating Staff                     | ₹7,200 per month   |
| Tyres and Tubes                               | ₹3,600 per quarter |
| Diesel (one litre is consumed for every 5 km) | ₹13 per litre      |
| Oil and Sundries                              | ₹22 per 100 km run |
| Depreciation                                  | ₹68,000 per annum  |

Passenger tax @ 22% on total taking is to be levied and bus operator requires a profit @ 25% on total taking.

**Prepare operating cost statement on the annual basis and find out the cost per passenger kilometer and one way fare per passenger.**

**[(8 Marks) May 2015]**

**Answer****Operating Cost Statement**

| <b>Particulars</b>                             | <b>Amount</b>    |
|------------------------------------------------|------------------|
| <b>(A) Fixed Charges:</b>                      |                  |
| Insurance                                      | 15,600           |
| Garage Rent (2,400 × 4 quarters)               | 9,600            |
| Road Tax                                       | 5,000            |
| Salary of Operating Staff (7,200 × 12 months)  | 86,400           |
| Depreciation                                   | 68,000           |
| <b>Total (A)</b>                               | <b>1,84,600</b>  |
| <b>(B) Variable Charges:</b>                   |                  |
| Diesel [(1,80,000 km ÷ 5 km) × 13]             | 4,68,000         |
| Oil and Sundries [(1,80,000 km ÷ 100 km) × 22] | 39,600           |
| <b>Total (B)</b>                               | <b>5,07,600</b>  |
| <b>(C) Maintenance Charges:</b>                |                  |
| Repairs (4,800 × 4 quarters)                   | 19,200           |
| Tyres and Tubes (3,600 × 4 quarters)           | 14,400           |
| <b>Total (C)</b>                               | <b>33,600</b>    |
| <b>Total Operating Cost (A + B + C)</b>        | <b>7,25,800</b>  |
| Add: Profit @ 25% of Taking                    | 3,42,359         |
| Add: Passenger Tax @ 22% Taking                | 3,01,275         |
| <b>Total Taking</b>                            | <b>13,69,434</b> |

**Calculation of cost per passenger km and one way fare per passenger:**

$$\text{Cost per passenger km} = \frac{\text{Total Operating Cost}}{\text{Total Passenger Km}} = \frac{7,25,800}{40,32,000} = \text{₹}0.18$$

$$\begin{aligned} \text{One way fare per passenger} &= \frac{\text{Total Taking}}{\text{Total Passenger Km}} \times 30 \text{ km} = \frac{13,69,434}{40,32,000} \times 30 \text{ km} \\ &= \text{₹}10.19 \end{aligned}$$

**WN 1: Calculation of total travelling of bus in one year:**

$$30 \text{ km} \times 2 \text{ sides} \times 10 \text{ trips} \times 25 \text{ days} \times 12 \text{ months} = 1,80,000 \text{ kms}$$

**WN 2: Calculation of passenger-kms per year:**

$$1,80,000 \text{ km} \times 32 \text{ passengers} \times 70\% = 40,32,000 \text{ passenger-kms}$$

**WN 3: Calculation of Taking:**

$$\begin{aligned} \text{Total taking} &= \text{Operating cost} + 25\% \text{ for profit} + 22\% \text{ for passenger tax} \\ &= 7,25,800 + 47\% \text{ of Total taking} \\ \text{Total Taking} &= \text{₹}13,69,434 \end{aligned}$$

**PYQ 13**

'RP' Resort (P) Ltd. offers three types of rooms to its guests, viz. deluxe room, super deluxe room and luxury suite.

**You are required to ascertain the tariff to be charged to the customers for different types of rooms on the basis of following information:**

| <b>Type of Rooms</b> | <b>Number of Rooms</b> | <b>Occupancy</b> |
|----------------------|------------------------|------------------|
| Deluxe Room          | 100                    | 90%              |
| Super Deluxe Room    | 60                     | 75%              |
| Luxury Suite         | 40                     | 60%              |

Rent of 'super deluxe' room is to be fixed at 2 times of the 'deluxe room' and that of 'luxury suite' is three times of 'deluxe room'.

**Annual expenses are as follows:**

| <b>Particulars</b>                  | <b>₹ in Lakhs</b> |
|-------------------------------------|-------------------|
| Staff salaries                      | 680.00            |
| Lighting, heating and power         | 300.00            |
| Repairs, maintenance and renovation | 180.00            |
| Linen                               | 30.00             |
| Laundry charges                     | 24.00             |
| Interior decoration                 | 75.00             |
| Sundries                            | 30.28             |

An attendant for each room was provided when the room was occupied and he was paid ₹500 per day towards wages. Further depreciation is to be provided on building @ 5% on ₹900 lakhs, furniture and fixtures @ 10% on ₹90 lakhs and air conditioners @ 10% on ₹75 lakhs.

**Profit is to be provided @ 25% on total taking and assume 360 days in a year.**

**[(8 Marks) June 2015]**

**Answer**

**Statement Showing Tariff to be Charged**

| <b>Particulars</b>                              | <b>₹ in Lakhs</b> |
|-------------------------------------------------|-------------------|
| Staff salaries                                  | 680.00            |
| Lighting, heating and power                     | 300.00            |
| Repairs, maintenance and renovation             | 180.00            |
| Linen                                           | 30.00             |
| Laundry charges                                 | 24.00             |
| Interior decoration                             | 75.00             |
| Sundries                                        | 30.28             |
| Room attendant's wages                          | 286.20            |
| Depreciation :                                  |                   |
| Building 5% on ₹900 lakhs                       | 45.00             |
| Furniture and fixtures 10% on ₹90 lakhs         | 9.00              |
| Air conditioners 10% on ₹75 lakhs               | 7.50              |
| <b>Total Cost</b>                               | <b>1,666.98</b>   |
| Add: Profit @ 25% on taking                     | 555.66            |
| <b>Total Taking</b>                             | <b>2,222.64</b>   |
| ÷ Equivalent single room days                   | ÷ 90,720          |
| <b>Tariff for Deluxe Room</b>                   | <b>₹2,450</b>     |
| <b>Tariff for Super Deluxe Room (2,450 × 2)</b> | <b>₹4,900</b>     |
| <b>Tariff for Luxury Suite (2,450 × 3)</b>      | <b>₹7,350</b>     |

**Working Notes:**

**1. Calculation of Attendant wages:**

$$\begin{array}{llll} \text{Wages} & = & \text{No of rooms occupied in a year} \times \text{₹500 per room per day} & \\ & = & 57,240 \times \text{₹500} & = \text{₹286.20 lakhs} \end{array}$$

**2. Calculation of equivalent single room suites:**

| <b>Name of Room</b> | <b>Room Days</b>                      | <b>Equivalent Deluxe Room p.a.</b> |
|---------------------|---------------------------------------|------------------------------------|
| Deluxe Room         | $100 \times 360 \times 90\% = 32,400$ | $32,400 \times 1 = 32,400$         |
| Super Deluxe Room   | $60 \times 360 \times 75\% = 16,200$  | $16,200 \times 2 = 32,400$         |
| Luxury Suite        | $40 \times 360 \times 60\% = 8,640$   | $8,640 \times 3 = 25,920$          |
| <b>Total</b>        | <b>57,240</b>                         | <b>90,720</b>                      |

**PYQ 14**

Royal transport company has been given a 50 kilometre long route to run 6 buses. The cost of each bus is ₹7,50,000. The buses will make 3 round trips per day carrying on an average 75 percent passengers of their seating capacity. The seating capacity of each bus is 48 passengers. The buses will run on an average 25 days in a month. The other information for the year 2016-17 is given below:

|                                                 |                       |
|-------------------------------------------------|-----------------------|
| Garage Rent                                     | ₹6,000 per month      |
| Annual Repairs & Maintenance                    | ₹24,000 each bus      |
| Salaries of 6 drivers                           | ₹4,000 each per month |
| Wages of 6 conductors                           | ₹1,600 each per month |
| Wages of 6 cleaners                             | ₹1,000 each per month |
| Manager's salary                                | ₹10,000 per month     |
| Road Tax, Permit fee, etc.                      | ₹6,000 for a quarter  |
| Office expenses                                 | ₹2,500 per month      |
| Cost of diesel per litre                        | ₹66                   |
| Kilometer run per litre for each bus            | 6 kilometres          |
| Annual Depreciation                             | 20% of cost           |
| Annual Insurance                                | 4% of cost            |
| Engine oils & lubricants (for 1,000 kilometres) | ₹2,000                |

*You are required to calculate the bus fare to be charged from each passenger per kilometer (upto four decimal points), if the company wants to earn profit of 33- $\frac{1}{3}$ % on taking (total receipts from passengers).*

**[(8 Marks) Nov 2016]**

**Answer**

**Operating Cost Sheet**

| Particulars                                         | Amount             |
|-----------------------------------------------------|--------------------|
| <b>(A) Fixed Expenses:</b>                          |                    |
| Garage rent (6,000 × 12)                            | 72,000             |
| Salaries of 6 drivers (4,000 × 6 × 12)              | 2,88,000           |
| Wages of 6 conductors (1,600 × 6 × 12)              | 1,15,200           |
| Wages of 6 cleaners (1,000 × 6 × 12)                | 72,000             |
| Manager's salary (10,000 × 12)                      | 1,20,000           |
| Road tax, permit fee etc. (6,000 × 4)               | 24,000             |
| Office expenses (2,500 × 12)                        | 30,000             |
| Depreciation (7,50,000 × 20% × 6)                   | 9,00,000           |
| Insurance (7,50,000 × 4% × 6)                       | 1,80,000           |
| <b>Total (A)</b>                                    | <b>18,01,200</b>   |
| <b>(B) Variable Expenses:</b>                       |                    |
| Diesel (5,40,000 × 66 ÷ 6)                          | 59,40,000          |
| Engine oils & lubricants (2,000 ÷ 1,000) × 5,40,000 | 10,80,000          |
| <b>Total (B)</b>                                    | <b>70,20,000</b>   |
| <b>(C) Maintenance Expenses:</b>                    |                    |
| Repairs and maintenance (24,000 × 6)                | 1,44,000           |
| <b>Total (C)</b>                                    | <b>1,44,000</b>    |
| <b>Total operating cost (A + B + C)</b>             | <b>89,65,200</b>   |
| Add: Profit @ 33- $\frac{1}{3}$ % of taking         | 44,82,600          |
| <b>Taking</b>                                       | <b>1,34,47,800</b> |
| ÷ Total passenger kms                               | ÷ 1,94,40,000      |
| <b>Fare per passenger km</b>                        | <b>₹0.6918</b>     |

**WN 1: Calculation of total traveling of 5 buses per annum:**

$$\begin{aligned}
 &= \text{No of round trips daily} \times \text{Distance two way} \times \text{No of days} \times \text{No of buses} \times 12 \\
 &= 3 \times 100 \times 25 \times 6 \times 12 = \mathbf{5,40,000 \text{ kms}}
 \end{aligned}$$

**WN 2: Calculation of passenger kms per annum:**

$$= \text{No of kms travelled per annum} \times \text{Capacity occupied} \times \text{No of passengers}$$

$$= 5,40,000 \times 48 \times 75\% = \mathbf{1,94,40,000 \text{ kms}}$$

**PYQ 15**

A group of 'Health Care Services' has decided to establish a Critical Care Unit in a metro city with an investment of ₹85 Lakhs in hospital equipments. The unit's capacity shall be of 50 beds and 10 more beds, if required, can be added.

|                                                         |                                |
|---------------------------------------------------------|--------------------------------|
| Building rent                                           | ₹2,25,000 per month            |
| Manager salary (Number of manager-03)                   | ₹50,000 per month each         |
| Nurses salary (Number of nurses-24)                     | ₹18,000 per month each         |
| Ward boy's salary (Number of ward boys-24)              | ₹9,000 per month each          |
| Doctor's payment (based on number of patients attended) | ₹5,50,000 per month            |
| Food to laundry services (Variable)                     | ₹39,53,000                     |
| Medicines to patients (Variable)                        | ₹22,75,000 per year            |
| Administration overheads                                | ₹28,00,000 per year            |
| Depreciation on equipments                              | 15% per annum on original cost |

It was reported that for 200 days in a year 50 beds were occupied, for 105 days 30 beds were occupied and for 60 days 20 beds were occupied.

The hospital hired 250 beds at a charge of ₹950 per bed to accommodate the flow of patients. However, this never exceeded the normal capacity of 50 beds on a day.

**Find out:**

(a) Profit per Patient day, if the hospital charges on an average ₹2,500 per day from each patient.

(b) Breakeven point per patient day (make calculation on annual basis).

**[(10 Marks) May 2018]**

**Answer****(a) Statement Showing Profit Per Patient Day**

| <b>Particulars</b>                                            |                    | <b>Amount</b>      |
|---------------------------------------------------------------|--------------------|--------------------|
| <b>(A) Variable Cost:</b>                                     |                    |                    |
| Food and laundry Services                                     |                    | 39,53,000          |
| Medicines to Patients                                         |                    | 22,75,000          |
| Doctor's Payment                                              | (5,50,000 × 12)    | 66,00,000          |
| Hire Charges of Beds                                          | (250 × 950)        | 2,37,500           |
| <b>Total (A)</b>                                              |                    | <b>1,30,65,500</b> |
| <b>(B) Fixed Expenses:</b>                                    |                    |                    |
| Building Rent                                                 | (2,25,000 × 12)    | 27,00,000          |
| Manager's Salary                                              | (3 × 50,000 × 12)  | 18,00,000          |
| Nurse's Salary                                                | (24 × 18,000 × 12) | 51,84,000          |
| Ward Boy's Salary                                             | (24 × 9,000 × 12)  | 25,92,000          |
| Administration Overheads                                      |                    | 28,00,000          |
| Depreciation on Equipment                                     | (15% of 85,00,000) | 12,75,000          |
| <b>Total (B)</b>                                              |                    | <b>1,63,51,000</b> |
| <b>Total cost (A + B)</b>                                     |                    | <b>2,94,16,500</b> |
| <b>Collection from patients (2,500 × 14,600 patient days)</b> |                    | <b>3,65,00,000</b> |
| <b>Profit (Collection - Total cost)</b>                       |                    | <b>70,83,500</b>   |
| <b>Profit per patient day (Profit ÷ Patient days)</b>         |                    | <b>485.17</b>      |

**(b) Calculation of BEP for the hospital:**

$$\text{BEP} = \frac{\text{Fixed cost}}{\text{Contribution per patient day}}$$

$$= \frac{1,63,51,000}{1,605.10} = \mathbf{10,186.90 \text{ patient days}}$$



**Working Notes:****1. Calculation of number of Patient days:**

$$= (50 \text{ beds} \times 200 \text{ days}) + (30 \text{ beds} \times 105 \text{ days}) + (20 \text{ beds} \times 60 \text{ days}) + 250 \text{ beds} = \mathbf{14,600}$$

**2. Calculation Contribution per patient day:**

$$\begin{aligned} \text{Contribution} &= \text{Sales} - \text{Variable cost} \\ &= 3,65,00,000 - 1,30,65,500 = 2,34,34,500 \\ \text{Contribution per patient day} &= 2,34,34,500 \div 14,600 = \mathbf{1,605.10} \end{aligned}$$

**PYQ 16**

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 cost likely to be incurred. His analysis is given below:

|                                          |                       |
|------------------------------------------|-----------------------|
| Cereals                                  | ₹8 per plate          |
| Veg items                                | ₹5 per plate          |
| Non-veg items                            | ₹15 per plate         |
| Spices                                   | ₹1 per plate          |
| Cooking oil                              | ₹4 per plate          |
| One cook salary                          | ₹13,000 per month     |
| Three helpers salary                     | ₹7,000 per month each |
| Fuel (two commercial cylinder per month) | ₹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:**

- (a) The price per meal (veg and non-veg separately) that contractor should quote if he wants a profit of 20% on his takings.
- (b) The price per meal (veg and non-veg separately) that a worker will be required to pay if the company provides 60% subsidy for meals out of welfare fund.

**[(8 Marks) May 2018]****Answer****(a) Statement Showing Price Per Meal Quoted By Contractor**

| Particulars                                  |              | Amount          |
|----------------------------------------------|--------------|-----------------|
| <b>(A) Variable Cost:</b>                    |              |                 |
| Cereals                                      | (7,500 × 8)  | 60,000          |
| Veg items                                    | (7,500 × 5)  | 37,500          |
| Cooking oil                                  | (7,500 × 4)  | 30,000          |
| Spices                                       | (7,500 × 1)  | 7,500           |
| Non-veg items                                | (3,000 × 15) | 45,000          |
| <b>Total (A)</b>                             |              | <b>1,80,000</b> |
| <b>(B) Fixed Cost:</b>                       |              |                 |
| Salary of cook                               |              | 13,000          |
| Salaries of helpers                          | (7,000 × 3)  | 21,000          |
| Fuel                                         | (1,000 × 2)  | 2,000           |
| <b>Total (B)</b>                             |              | <b>36,000</b>   |
| <b>Total Cost (A + B)</b>                    |              | <b>2,16,000</b> |
| Add: Profit @ 20% on taking or 25% on cost   |              | 54,000          |
| <b>Total Takings</b>                         |              | <b>2,70,000</b> |
| ÷ Equivalent Veg-meals (4,500 + 1.5 × 3,000) |              | ÷ 9,000         |

|                                                 |             |
|-------------------------------------------------|-------------|
| <b>Price meal per meal (Veg)</b>                | <b>₹ 30</b> |
| <b>Price meal per meal (Non-veg) (1.5 × 30)</b> | <b>₹ 45</b> |

**(b) Price per meal payable by worker:**

|              |   |          |   |             |
|--------------|---|----------|---|-------------|
| Veg Meal     | = | 30 – 60% | = | <b>₹ 12</b> |
| Non-veg Meal | = | 45 – 60% | = | <b>₹ 18</b> |

**Working Notes:****1. Calculation of number of meals per month:**

|   |                                               |                |
|---|-----------------------------------------------|----------------|
| = | Veg Meals + Non-veg Meals                     |                |
| = | 180 workers × 25 days + 120 workers × 25 days |                |
| = | 4,500 + 3,000                                 | = <b>7,500</b> |

**PYQ 17**

M/s XY Travels has been given a 25 km long route to run an air-conditioned Mini Bus. The cost of bus is ₹20,00,000. It has been insured at 3% p.a. while annual road tax amounts to ₹36,000. Annual repairs will be ₹50,000 and the bus is likely to last for 5 years. The driver's salary will be ₹2,40,000 per annum and the conductor's salary will be ₹1,80,000 per annum in addition to 10% of takings as commission (to be shared by the driver and the conductor equally). Office and administration overheads will be ₹3,18,000 per annum. Diesel and oil will be ₹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 the bus will run on an average 25 days in a month.

**You are required to:**

- (a) Prepare operating cost sheet (for the month).  
 (b) Calculate fare to be charged per passenger km.

**[(10 Marks) Nov 2018]****Answer****(a) Operating Cost Sheet (for the month)**

| <b>Particulars</b>                                  | <b>Amount</b>   |
|-----------------------------------------------------|-----------------|
| <b>(A) Standing Charges:</b>                        |                 |
| Depreciation (20,00,000 ÷ 5 Years × 1/12)           | 33,333          |
| Insurance [(20,00,000 × 3%) ÷ 12]                   | 5,000           |
| Annual Tax for (36,000 ÷ 12)                        | 3,000           |
| Driver's salary (2,40,000 ÷ 12)                     | 20,000          |
| Conductor's salary (1,80,000 ÷ 12)                  | 15,000          |
| Office and administration overheads (3,18,000 ÷ 12) | 26,500          |
| <b>Total (A)</b>                                    | <b>1,02,833</b> |
| <b>(B) Running Charges:</b>                         |                 |
| Diesel and oil (1,500/100 × 5,000 kms)              | 75,000          |
| Commission @ 10% of collections 'WN'                | 28,000          |
| <b>Total (B)</b>                                    | <b>1,03,000</b> |
| <b>(C) Maintenance Charges:</b>                     |                 |
| Repairs (50,000 × 1/12)                             | 4,167           |
| <b>Total (C)</b>                                    | <b>4,167</b>    |
| <b>Total operating cost (A + B + C)</b>             | <b>2,10,000</b> |
| Add: Profit @ 25% of collections                    | 70,000          |
| <b>Total Takings (WN 3)</b>                         | <b>2,80,000</b> |

**(b) Calculation of fare to be charged per passenger-km:**

|                       |   |                                     |                 |
|-----------------------|---|-------------------------------------|-----------------|
| Fare per passenger km | = | Total Takings ÷ Total Passenger-kms |                 |
|                       | = | 2,80,000 ÷ 2,00,000                 | = <b>₹ 1.40</b> |

**WN 1: Calculation of total travelling of bus in one month:**

$$\begin{aligned}
 &= 2 \times \text{No of round trips daily} \times \text{Distance one way} \times \text{No of days} \\
 &= 2 \times 4 \times 25 \times 25 = \mathbf{5,000 \text{ kms}}
 \end{aligned}$$

**WN 2: Calculation of passenger-kms per month:**

$$\begin{aligned}
 &= \text{No of kms travelled per month} \times \text{No of passengers} \\
 &= 5,000 \times 40 = \mathbf{2,00,000 \text{ passenger-kms}}
 \end{aligned}$$

**WN 3: Calculation of Takings:**

$$\begin{aligned}
 \text{Total takings} &= \text{Operating cost (excluding commission on takings)} + 10\% \text{ for commission} + 25\% \text{ for profit} \\
 &= 1,82,000 + 35\% \text{ of takings} \\
 \mathbf{\text{Total Takings}} &= \mathbf{₹2,80,000}
 \end{aligned}$$

**PYQ 18**

X Ltd. distributes its goods to a regional dealer using single lorry. The dealer premises are 40 kms away by road. The capacity of the lorry is 10 tonnes. The lorry makes the journey twice a day fully loaded on the outward journey and empty on return journey.

**The following information is available:**

|                                                         |                   |
|---------------------------------------------------------|-------------------|
| Diesel consumption                                      | 8 km per litre    |
| Diesel cost                                             | ₹60 per litre     |
| Engine oil                                              | ₹200 per week     |
| Driver's wages (fixed)                                  | ₹2,500 per week   |
| Repairs                                                 | ₹600 per week     |
| Garage rent                                             | ₹800 per week     |
| Cost of lorry (excluding cost of type)                  | ₹9,50,000         |
| Life of lorry                                           | 1,60,000 kms      |
| Insurance                                               | ₹18,200 per annum |
| Cost of tyres                                           | ₹52,500           |
| Life of tyres                                           | 25,000 kms        |
| Estimated sale value of the lorry at end of its life is | ₹1,50,000         |
| Vehicle license cost                                    | ₹7,800 per annum  |
| Other overheads cost                                    | ₹41,600 per annum |
| The lorry operates                                      | 5 days a week     |

**Required:**

- (1) A statement to show the total cost of operating the vehicle for the four week period analysed into Running cost and Fixed cost.
- (2) Calculate the vehicle operating cost per km and per tonne km. (assume 52 weeks in a year.)

**[(10 Marks) May 2019]****Answer**

**(1) Statement Showing Total Cost of Operating  
(For the four weekly period)**

| <b>Particulars</b>        |                    | <b>Amount</b> |
|---------------------------|--------------------|---------------|
| <b>(A) Fixed Costs:</b>   |                    |               |
| Driver's wages            | (2,500 × 4)        | 10,000        |
| Garage rent               | (800 × 4)          | 3,200         |
| Insurance                 | (18,200 × 4/52)    | 1,400         |
| Vehicle license           | (7,800 × 4/52)     | 600           |
| Other overheads           | (41,600 × 4/52)    | 3,200         |
| <b>Total (A)</b>          |                    | <b>18,400</b> |
| <b>(B) Running Costs:</b> |                    |               |
| Diesel                    | (3,200 Kms × 60/8) | 24,000        |
| Engine oil                | (200 × 4)          | 800           |
| Repairs                   | (600 × 4)          | 2,400         |

|                                                                                           |               |
|-------------------------------------------------------------------------------------------|---------------|
| Cost of tyres                                                                             | 6,720         |
| Depreciation $[(9,50,000 - 1,50,000) \div 1,60,000 \text{ Kms}] \times 3,200 \text{ Kms}$ | 16,000        |
| <b>Total (B)</b>                                                                          | <b>49,920</b> |
| <b>Total operating cost (A + B)</b>                                                       | <b>68,320</b> |

|                                       |   |                              |   |               |
|---------------------------------------|---|------------------------------|---|---------------|
| <b>(2) Vehicle cost per kilometer</b> | = | Total cost ÷ Total Kms       | = |               |
|                                       | = | 68,320 ÷ 3,200 kms           | = | <b>₹21.35</b> |
| <b>Cost per tonne kilometer</b>       | = | Total cost ÷ Total tonne kms | = |               |
|                                       | = | 68,320 ÷ 16,000 kms          | = | <b>₹4.27</b>  |

**Working notes:****1. Distance travelled in 4 weeks period:**

$$40 \text{ kms one way} \times 2 \text{ (return)} \times 2 \text{ trips} \times 5 \text{ days} \times 4 \text{ weeks} = \mathbf{3,200 \text{ kms}}$$

$$\mathbf{2. \text{ Total tonne kilometers}} = 1,600 \text{ kms} \times 10 + 1,600 \text{ kms} \times \text{Nil} = \mathbf{16,000}$$

$$\mathbf{3. \text{ Tyres cost}} = (52,500 \div 25,000 \text{ kms}) \times 3,200 \text{ kms} = \mathbf{₹6,720}$$

**PYQ 19**

A hotel is being run in a hill station with 200 single rooms. The hotel offers concessional rates during six off-season (Winters) 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 31<sup>st</sup> March, 2019:

- (1)** Occupancy during the season is 80% while in the off-season it is 40%.
- (2)** Total investment in the hotel is ₹300 lakhs of which 80% relates to Building and the balance to Furniture and other Equipment.
- (3)** Room attendants are paid ₹15 per room per day on the basis of occupancy of rooms in a months.
- (4)** Expenses:
 

|                                                  |           |
|--------------------------------------------------|-----------|
| Staff Salary (excluding that of room attendants) | ₹8,00,000 |
| Repairs to Buildings                             | ₹3,00,000 |
| Laundry Charges                                  | ₹1,40,000 |
| Interior Charges                                 | ₹2,50,000 |
| Miscellaneous Expenses                           | ₹2,00,200 |
- (5)** Annual depreciation is to be provided on Building @ 5% and 15% on Furniture and other Equipments on straight line method.
- (6)** Monthly lighting charges are ₹110, except in four months in winter when it is ₹30 per room.

**You are required to work out the room rent chargeable per day both during the season and the off-season months using the foregoing information. Assume a month to be of 30 days.**

**[(10 Marks) Nov 2019]**

**Answer****Statement Showing Per Day Chargeable Rent**

| Particulars                                                 | ₹         |
|-------------------------------------------------------------|-----------|
| Staff Salary                                                | 8,00,000  |
| Repairs to Building                                         | 3,00,000  |
| Laundry Charges                                             | 1,40,000  |
| Interior Charges                                            | 2,50,000  |
| Miscellaneous Expenses                                      | 2,00,200  |
| Depreciation:                                               |           |
| On Building $(₹300 \text{ lakhs} \times 80\% \times 5\%)$   | 12,00,000 |
| On Furniture $(₹300 \text{ lakhs} \times 20\% \times 15\%)$ | 9,00,000  |

|                                               |                                                         |                  |
|-----------------------------------------------|---------------------------------------------------------|------------------|
| Room attendant's wages:                       |                                                         |                  |
| In Season                                     | (200 rooms × 80% × 30 days × 6 months × ₹15)            | 4,32,000         |
| In Off-Season                                 | (200 rooms × 40% × 30 days × 6 months × ₹15)            | 2,16,000         |
| Lighting charges:                             |                                                         |                  |
| Season                                        | (200 rooms × 80% × 6 months × ₹110)                     | 1,05,600         |
| Off-Season & Non Winter                       | (200 rooms × 40% × 2 months × ₹110)                     | 17,600           |
| Off-Season & Winter                           | (200 rooms × 40% × 4 months × ₹30)                      | 9,600            |
|                                               | <b>Total Cost</b>                                       | <b>45,71,000</b> |
| Add: Profit @ 20% on Room rent or 25% on Cost |                                                         | 11,42,750        |
|                                               | <b>Total Rent to be Charged</b>                         | <b>57,13,750</b> |
| ÷ Equivalent Off-Season room days             |                                                         | ÷ 72,000         |
|                                               | <b>Rent for one room per day in Off-Season</b>          | <b>₹79.356</b>   |
|                                               | <b>Rent for one room per day in Season (₹79.36 × 2)</b> | <b>₹158.72</b>   |

**Working Notes:**

**Equivalent Off-Season room days** =  $200 \times 80\% \times 30 \text{ days} \times 6 \text{ months} \times 2$  (double of Off-Season) +  $200 \times 40\% \times 30 \text{ days} \times 6 \text{ months} \times 1$

=  $28,800 \times 2 + 14,400 \times 1$  = **72,000 Room days**

**PYQ 20**

SEZ Ltd. built a 120 km. long highway and now operates a toll plaza to collect tolls. The company has invested ₹900 crore to build the road and has estimated that a total of 120 crore vehicles will be using the highway during the 10 years toll collection tenure. The other costs for the month of June 2020 are as follows:

**(i) Salary:**

|                                                         |                         |
|---------------------------------------------------------|-------------------------|
| Collection Personnel (3 Shifts and 5 persons per shift) | ₹200 per day per person |
| Supervisor (3 Shifts and 2 person per shift)            | ₹350 per day per person |
| Security Personnel (2 Shifts and 2 persons per shift)   | ₹200 per day per person |
| Toll Booth Manager (3 Shifts and 1 person per shift)    | ₹500 per day per person |

|                                                          |           |
|----------------------------------------------------------|-----------|
| <b>(ii)</b> Electricity                                  | ₹1,50,000 |
| <b>(iii)</b> Telephone                                   | ₹1,00,000 |
| <b>(iv)</b> Maintenance cost                             | ₹50 Lakhs |
| <b>(v)</b> The company needs 30% profit over total cost. |           |

**Required:**

1. Calculate cost per kilometer.
2. Calculate the toll rate per vehicle.

**[(10 Marks) Nov 2020]**

**Answer**

**1. Statement of Cost per Kilometer  
(for the month June 2020)**

| Particulars                                                                    | Amount             |
|--------------------------------------------------------------------------------|--------------------|
| Apportionment of capital cost/ Depreciation [(₹900 crores ÷ 10 years) × 1/12]  | 7,50,00,000        |
| Salary to Collection personnel (3 shifts × 5 persons × 30 days × ₹200 per day) | 90,000             |
| Salary to Supervisor (3 shifts × 2 person × 30 days × ₹350 per day)            | 63,000             |
| Salary to Security personnel (2 shifts × 2 persons × 30 days × ₹200 per day)   | 24,000             |
| Salary to Toll booth manager (3 shifts × 1 persons × 30 days × ₹500 per day)   | 45,000             |
| Electricity                                                                    | 1,50,000           |
| Telephone                                                                      | 1,00,000           |
| Maintenance cost                                                               | 50,00,000          |
| <b>Total Cost</b>                                                              | <b>8,04,72,000</b> |
| ÷ Total kilometers                                                             | ÷ 120 kms          |
| <b>Cost per Kilometer</b>                                                      | <b>₹6,70,600</b>   |

**2. Calculation of toll rate per vehicle:**

|                                    |   |                                                    |   |                      |
|------------------------------------|---|----------------------------------------------------|---|----------------------|
| Total Toll Collection in June 2020 | = | Total Cost + 30%                                   | = |                      |
|                                    | = | ₹8,04,72,000 + 30 %                                | = | <b>₹10,46,13,600</b> |
| Toll Rate per vehicle              | = | Total collection for June ÷ Total vehicles in June |   |                      |
|                                    | = | ₹10,46,13,600 ÷ 1,00,00,000                        | = | <b>₹10.46</b>        |

**Working Notes:****Calculation of number of vehicles using the highway per month:**

|                                                              |   |                    |
|--------------------------------------------------------------|---|--------------------|
| Total estimated number of vehicles using highway in 10 years | = | 120 crores         |
| ∴ Total number of vehicles using highway in 1 year           | = | 12 crores          |
| ∴ Total number of vehicles using highway in 1 month          | = | <b>1,00,00,000</b> |

**PYQ 21**

ABC Health care runs an Intensive Medical Care Unit. For this purpose, it has hired a building at a rent of ₹50,000 per month with the agreement to bear the repairs and maintenance charges also.

The unit consists of 100 beds and 5 more beds can comfortably be accommodated when the situation demands. Though the unit is open for patients all the 365 days in a year, scrutiny of accounts for the year 2020 reveals that only for 120 days in the year, the unit had the full capacity of 100 patients per day and for another 80 days, it had, on an average only 40 beds occupied per day. But, there were occasions when the beds were full, extra beds were hired at a charge of ₹50 per bed per day. This did not come to more than 5 beds above the normal capacity on any one day. The total hire charges for the extra beds incurred for the whole year amounted to ₹20,000.

The unit engaged expert doctors from outside to attend on the patients and the fees were paid on the basis of the number of patients attended and time spent by them which on an average worked out to ₹30,000 per month in the year 2020.

**The permanent staff expenses and other expenses of the unit were as follows:**

| <b>Particulars</b>                                                      | <b>Amount</b> |
|-------------------------------------------------------------------------|---------------|
| 2 Supervisors each at a per month salary of                             | 5,000         |
| 4 Nurses each at a per month salary of                                  | 3,000         |
| 2 Ward boys each at a per month salary of                               | 1,500         |
| <b>Other Expenses for the year were as under:</b>                       |               |
| Repairs and Maintenance                                                 | 28,000        |
| Food supplied to patients                                               | 4,40,000      |
| Caretaker and Other services for patients                               | 1,25,000      |
| Laundry charges for bed linen                                           | 1,40,000      |
| Medicines supplied                                                      | 2,80,000      |
| Cost of Oxygen etc. other than directly borne for treatment of patients | 75,000        |
| General Administration Charges allocated to the unit                    | 71,000        |

**Required:**

- (1) What is the profit per patient day made by the unit in the year 2020, if the unit recovered an overall amount of ₹200 per day on an average from each patient.
- (2) The unit wants to work on a budget for the year 2021, but the number of patients requiring medical care is a very uncertain factor. Assuming that same revenue and expenses prevail in the year 2021 in the first instance, work out the number of patient days required by the unit to break even.

**[(10 Marks) Jan 2021]****Answer****(1) Statement Showing Profit Per Patient Day**

| <b>Particulars</b>                        | <b>Amount</b> |
|-------------------------------------------|---------------|
| <b>(A) Variable Cost:</b>                 |               |
| Doctor Fee (30,000 × 12)                  | 3,60,000      |
| Food to Patients                          | 4,40,000      |
| Caretaker and Other services for patients | 1,25,000      |

|                                                                         |                  |                  |
|-------------------------------------------------------------------------|------------------|------------------|
| Laundry charges                                                         |                  | 1,40,000         |
| Medicines                                                               |                  | 2,80,000         |
| Bed hire charges                                                        |                  | 20,000           |
| <b>Total (A)</b>                                                        |                  | <b>13,65,000</b> |
| <b>(B) Fixed Expenses:</b>                                              |                  |                  |
| Rent                                                                    | (50,000 × 12)    | 6,00,000         |
| Supervisors                                                             | (2 × 5,000 × 12) | 1,20,000         |
| Nurses                                                                  | (4 × 3,000 × 12) | 1,44,000         |
| Ward Boys                                                               | (2 × 1,500 × 12) | 36,000           |
| Repairs and Maintenance                                                 |                  | 28,000           |
| Cost of Oxygen etc. other than directly borne for treatment of patients |                  | 75,000           |
| General Administration Charges allocated to the unit                    |                  | 71,000           |
| <b>Total (B)</b>                                                        |                  | <b>10,74,000</b> |
| <b>Total cost (A + B)</b>                                               |                  | <b>24,39,000</b> |
| <b>Collection from patients (200 × 15,600 patient days)</b>             |                  | <b>31,20,000</b> |
| <b>Profit (Collection – Total cost)</b>                                 |                  | <b>6,81,000</b>  |
| <b>Profit per patient day (Profit ÷ Patient days)</b>                   |                  | <b>43.65</b>     |

**(2) Calculation of BEP for the hospital:**

$$\begin{aligned} \text{BEP} &= \text{Fixed cost} \div \text{Contribution per patient day} \\ &= 10,74,000 \div 112.50 = \mathbf{9,547 \text{ patient days}} \end{aligned}$$

**Working Notes:****1. Calculation of number of Patient days:**

$$\begin{aligned} &= (100 \text{ beds} \times 120 \text{ days}) + (40 \text{ beds} \times 80 \text{ days}) + (20,000 \div 50) \\ &= \mathbf{15,600} \end{aligned}$$

**2. Calculation Contribution per patient day:**

$$\begin{aligned} \text{Contribution} &= \text{Sales} - \text{Variable cost} \\ &= 31,20,000 - 13,65,000 = 17,55,000 \\ \text{Contribution per patient day} &= 17,55,000 \div 15,600 = \mathbf{112.50} \end{aligned}$$

**PYQ 22**

MRS L Healthcare Ltd. has incurred the following expenditure during the last year for its newly launched 'COVID-19' Insurance policy:

|                                 |               |
|---------------------------------|---------------|
| Office administration cost      | ₹48,00,000    |
| Claims management cost          | ₹3,80,000     |
| Employees cost                  | ₹16,20,000    |
| Postage and logistics           | ₹32,40,000    |
| Policy issuance cost            | ₹29,50,000    |
| Facilities cost                 | ₹46,75,000    |
| Cost of marketing of the policy | ₹1,38,90,000  |
| Policy development cost         | ₹35,00,000    |
| Policy servicing cost           | ₹96,45,000    |
| Sales support expenses          | ₹32,00,000    |
| IT cost                         | ?             |
| Number of policy sold           | 2,800         |
| Total insured value of policies | ₹3,500 Crores |
| Cost per rupee of insured value | ₹0.002        |

**Required:**

- Calculate total cost for "Covid-19" insurance policy segregating the costs into four main activities namely (a) Product development, Marketing and Sales support, (b) Operations, (c) IT cost and (d) Support functions.
- Calculate cost per policy.

**[(5 Marks) July 2021]**



**Answer****1. Statement Showing Total Cost for "Covid-19" Insurance Policy**

| Particulars                                                  | Amount             |
|--------------------------------------------------------------|--------------------|
| <b>(a) Product development, Marketing and Sales support:</b> |                    |
| Policy development cost                                      | 35,00,000          |
| Cost of marketing of the policy                              | 1,38,90,000        |
| Sales support expenses                                       | 32,00,000          |
| <b>Total (a)</b>                                             | <b>2,05,90,000</b> |
| <b>(b) Operations:</b>                                       |                    |
| Policy issuance cost                                         | 29,50,000          |
| Policy servicing cost                                        | 96,45,000          |
| Claims management cost                                       | 3,80,000           |
| <b>Total (b)</b>                                             | <b>1,29,75,000</b> |
| <b>(c) IT Cost:</b>                                          |                    |
| IT cost                                                      | 2,21,00,000        |
| <b>Total (c)</b>                                             | <b>2,21,00,000</b> |
| <b>(d) Support functions:</b>                                |                    |
| Postage and logistics                                        | 32,40,000          |
| Facilities cost                                              | 46,75,000          |
| Employees cost                                               | 16,20,000          |
| Office administration cost                                   | 48,00,000          |
| <b>Total (d)</b>                                             | <b>1,43,35,000</b> |
| <b>Total Cost (a + b + c + d)</b>                            | <b>7,00,00,000</b> |

2. Cost per policy = Total Cost ÷ No. of Policies  
= ₹7,00,00,000 ÷ 2,800 = **₹25,000**

**Working note: Calculation of IT cost:**

Cost per rupee of insured value = Total Cost ÷ Total insured value  
0.002 = Total Cost ÷ ₹3,500 crores  
Total Cost = ₹3,500 crores × 0.002 = ₹7,00,00,000  
IT cost = Total cost – other costs  
IT cost = 7,00,00,000 – 2,05,90,000 – 1,29,75,000 – 1,43,35,000  
= **2,21,00,000**

**PYQ 23**

Paras Travels provides mini buses to an IT company for carrying its employees from home to office and dropping back after office hours. It runs a fleet of 8 mini buses for this purpose. The buses are parked in a garage adjoining the company's premises. Company is operating in two shifts (one shift in the morning and one shift in the afternoon). The distance travelled by each mini bus one way is 30 km. The company works for 20 days in a month. The seating capacity of each mini bus is 30 persons. The seating capacity is normally 80% occupied during the year. The details of expenses incurred for a year are as under:

|                                                                               |                                 |
|-------------------------------------------------------------------------------|---------------------------------|
| Driver's salary                                                               | ₹20,000 per driver per month    |
| Lady attendant's salary (mandatorily required for each mini bus)              | ₹10,000 per attendant per month |
| Cleaner's salary (One cleaner for 2 mini buses)                               | ₹15,000 per cleaner per month   |
| Diesel (Avg. 8 km per liter)                                                  | ₹80 per liter                   |
| Insurance charges (per annum)                                                 | 2% of Purchase Price            |
| License fees and taxes                                                        | ₹5,080 per mini bus per month   |
| Garage rent paid                                                              | ₹24,000 per month               |
| Repair & maintenance including engine oil and lubricants (for every 5,760 km) | ₹2,856 per mini bus             |
| Purchase Price of mini bus                                                    | ₹15,00,000 each                 |
| Residual life of mini bus                                                     | 8 Years                         |
| Scrap value per mini bus at the end of residual life                          | ₹3,00,000                       |

Paras Travels charges two types of fare from the employees. Employees coming from a distance of beyond 15 km away from the office are charged double the fare which is charged from employees coming from a distance of up to 15 km away from the office. 50% of employees travelling in each trip are coming from a distance beyond 15 km from the office. The charges are to be based on average cost.

**You are required to:**

1. Prepare a statement showing expenses of operating a single mini bus for a year,
2. Calculate the average cost per employee per month in respect of:
  - (a) Employees coming from a distance up to 15 km from the office.
  - (b) Employees coming from a distance beyond 15 km from the office.

**[(10 Marks) Dec 2021]**

**1. Statement Showing Expenses of Operating a Single Mini Bus for a Year**

| Particulars                                                               | ₹                |
|---------------------------------------------------------------------------|------------------|
| <b>(A) Standing Charges:</b>                                              |                  |
| Driver's salary ( $\text{₹}20,000 \times 12 \text{ months}$ )             | 2,40,000         |
| Lady attendant's salary ( $\text{₹}10,000 \times 12 \text{ months}$ )     | 1,20,000         |
| Cleaner's salary ( $\text{₹}15,000 \times 12 \text{ months} \times 1/2$ ) | 90,000           |
| Insurance charges (2% of $\text{₹}15,00,000$ )                            | 30,000           |
| Licence fees and taxes ( $\text{₹}5,080 \times 12 \text{ months}$ )       | 60,960           |
| Garage rent ( $\text{₹}24,000 \times 12 \text{ months} \times 1/8$ )      | 36,000           |
| Depreciation $\{(\text{₹}15,00,000 - \text{₹}3,00,000) \times 1/8\}$      | 1,50,000         |
| <b>Total (A)</b>                                                          | <b>7,26,960</b>  |
| <b>(B) Maintenance Charges:</b>                                           |                  |
| Repairs and maintenance $\{(\text{₹}2,856 \div 5,760) \times 57,600\}$    | 28,560           |
| <b>Total (B)</b>                                                          | <b>28,560</b>    |
| <b>(C) Running Charges:</b>                                               |                  |
| Diesel $\{(\text{₹}80 \div 8) \times 57,600\}$                            | 5,76,000         |
| <b>Total (C)</b>                                                          | <b>5,76,000</b>  |
| <b>Total operating cost (A + B + C)</b>                                   | <b>13,31,520</b> |

**2. Calculation of average cost per employee per month:**

Operating cost of Mini Bus per month =  $\text{₹}13,31,520 \div 12 = \text{₹}1,10,960$

No. of employees per bus in two trips =  $30 \text{ persons} \times 2 \text{ trips} \times 80\%$   
= 48

Let the fare charged from employee within 15 km be = X  
∴ Fare for employee beyond 15 km = 2X

Total Cost or fare ( $\text{₹}1,10,960$ ) =  $(48 \times 50\% \times X) + (48 \times 50\% \times 2X) = 72X$   
X =  $\text{₹}1,10,960 \div 72 = \text{₹}1,541.11$

**(a) Average cost per employee per month coming from a distance up to 15 kms. = ₹1,541.11**

**(b) Average cost per employee per month coming from a distance beyond 15 kms. = 2X**  
=  $\text{₹}1,541.11 \times 2$   
= **₹3,082.22**

**Working notes:**

**Calculation of kms. run by a mini bus in a year:**

= One way distance  $\times 2$  (both ways)  $\times$  No of trips  $\times$  No of days in a month  $\times 12$  months in a year  
=  $30 \text{ kms.} \times 2 \times 4$  (two shifts and two trips in each shift)  $\times 20 \text{ days} \times 12 \text{ months}$   
= **57,600 kms.**

**PYQ 24**

Coal is transported from two mines X & Y and unloaded at plots in a railway station. X is at distance of 15 kms and Y is at a distance of 20 kms from the rail head plots. A fleet of lorries having carrying capacity of 4 tonnes is used to transport coal from the mines. Records reveal that average speed of the lorries is 40 kms per hour when running and regularly take 15 minutes to unload at the rail head.

At Mine X average loading time is 30 minutes per load, while at mine Y average loading time is 25 minutes per load.

**Additional Information:**

Drivers' wages, depreciation, insurance and taxes, etc. ₹12 per hour

Operated Fuel, oil, tyres, repairs and maintenance, etc. ₹1.60 per km

**You are required to prepare a statement showing the cost per tonne kilometre of carrying coal from each mine 'X' and 'Y'.**

**[(5 Marks) May 2022]**

**Answer****Statement Showing Cost per Tonne-Km**

| <b>Particulars</b>                                                                    | <b>Mine X</b>                           | <b>Mine Y</b>                           |
|---------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------|
| Drivers wages, license, insurance, depreciation, garage rent and taxes @ ₹12 per hour | $(12.00 \times 90/60)$<br>18.00         | $(12.00 \times 100/60)$<br>20.00        |
| Fuel, oil, tyres, repairs and maintenance @ ₹1.60 per Km                              | $(1.60 \times 30 \text{ kms})$<br>48.00 | $(1.60 \times 40 \text{ kms})$<br>64.00 |
| <b>Operating Cost</b>                                                                 | <b>66.00</b>                            | <b>84.00</b>                            |
| ÷ Effective tonne-kms                                                                 | ÷ 60                                    | ÷ 80                                    |
| <b>Cost per tonne-km</b>                                                              | <b>₹1.10</b>                            | <b>₹1.05</b>                            |

**Working Notes:****(1) Total operating time in 1 trip:**

|                         | <b>Mine X</b>                               | <b>Mine Y</b>                               |
|-------------------------|---------------------------------------------|---------------------------------------------|
| Running time (to & fro) | $60/40 \times 30 \text{ Kms}$<br>45 minutes | $60/40 \times 40 \text{ Kms}$<br>60 minutes |
| Unloading time          | 15 minutes                                  | 15 minutes                                  |
| Loading time            | 30 minutes                                  | 25 minutes                                  |

**Total operating time in one trip**                      **90 minutes**                      **100 minutes**

**(2) Effective tonnes km per trip:**

|                                            |                                            |
|--------------------------------------------|--------------------------------------------|
| 4 tonnes × 15 kms +<br>Nil tonnes × 15 kms | 4 tonnes × 20 kms +<br>Nil tonnes × 20 kms |
|--------------------------------------------|--------------------------------------------|

**= 60 tonne kms**

**= 80 tonne kms**

**PYQ 25**

ABC Bank is having a branch which is engaged in processing of 'Vehicle Loan' and 'Education Loan' applications in addition to other services to customers. 30% of the overhead costs of the branch are estimated to be applicable to the processing of 'Vehicle Loan' applications and 'Education Loan' applications each.

Branch is having four employees at a monthly salary of ₹50,000 each, exclusively for processing of Vehicle loan applications and two employees at a monthly salary of ₹70,000 each, exclusively for processing of Education Loan applications.

**In addition to above, following expenses are incurred by the Branch:**

- Branch Manager who supervises all the activities of branch, is paid at ₹90,000 per month.
- Legal charges, Printing & stationery and Advertising Expenses are incurred at ₹30,000, ₹12,000 and ₹18,000 respectively for a month,

- Other Expenses are ₹10,000 per month.

**You are required to:**

- Compute the cost of processing a Vehicle Loan Application on the assumption that 496 Vehicle Loan applications are processed each month.
- Find out the number of Education Loan Applications processed, if the total processing cost per Education Loan Application is same as in the Vehicle Loan Application as computed in (a) above.

**[(5 Marks) Nov 2022]**

**Answer**

**(a) Statement of Cost of Processing One Vehicle Loan Application**

| Particulars                                            | Amount          |
|--------------------------------------------------------|-----------------|
| Direct labour cost (4 employees × 50,000)              | 2,00,000        |
| Allocation of branch overhead cost (30% of 1,60,000)   | 48,000          |
| <b>Total processing cost per month</b>                 | <b>2,48,000</b> |
| ÷ Number of applications processed per month           | ÷ 496           |
| <b>Cost of Processing One Vehicle Loan Application</b> | <b>₹500</b>     |

**(b) Statement Showing Number of Education Loan Application**

| Particulars                                            | Amount          |
|--------------------------------------------------------|-----------------|
| Direct labour cost (2 employees × 70,000)              | 1,40,000        |
| Allocation of branch overhead cost (30% of 1,60,000)   | 48,000          |
| Total processing cost per month                        | <b>1,88,000</b> |
| ÷ Total processing cost per Education Loan Application | ÷ 500           |
| <b>Number of Education Loan Application</b>            | <b>376</b>      |

**Working Notes:**

Overheads costs of the branch = 90,000 + 30,000 + 12,000 + 18,000 + 10,000 = **₹1,60,000**

**PYQ 25**

RST Toll Plaza Limited built a 80 kilometer long highway between two cities and operates a toll plaza to collect tolls from passing vehicles using the highway. The company has estimated that 50,000 light weight, 12,000 medium weight and 10,000 heavy weight vehicles will be using the highway in one month in outward journey and the same number for return journey.

As per government notification, vehicles used for medical emergencies, members of parliament, and essential services are exempt from toll charges. It is estimated that 10% of light weight vehicles will pass the highway for such use.

It is the policy of the company that if vehicles return within 24 hours of their outward journey. The toll fare will be reduced by 25 percent automatically. It is estimated 30% of chargeable light weight vehicles return within the specified time frame.

The toll charges for medium weight vehicles is to be fixed as 2.5 times of the light weight vehicles and that of heavy weight vehicles as 2 times of the medium weight vehicles.

The toll operating and maintenance cost for a month is ₹59,09,090. The company requires a profit of 10% over the total cost to cover interest and other costs.

**Required:**

- Calculate the toll rate for each type of vehicles if concession facilities are not available on the return journey.
- Calculate the toll rate that will be charged from light weight vehicles if a return journey concession facility is available, assuming that the revenue earned from light weight vehicles calculate in option (a) remains the same.

**[(5 Marks) May 2023]**

**Answer****(a) Calculation of toll rate for each type of vehicles:**

$$\begin{aligned} \text{Total collection from toll} &= \text{Cost} + 10\% = ₹59,09,090 + 10\% \\ &= ₹64,99,999 \end{aligned}$$

Let, toll rate for Light weight vehicle be 'T' then toll rate for Medium weight vehicle will 2.5T and for Heavy weight vehicles will 5T

Now,

$$\begin{aligned} \text{Total Toll collection} &= (45,000 \times 2 \times T) + (12,000 \times 2 \times 2.5T) + (10,000 \times 2 \times 5T) \\ ₹64,99,999 &= 2,50,000T \\ T &= ₹26 \end{aligned}$$

$$\begin{aligned} \text{Toll rate for light vehicles} &= ₹26 \\ \text{Toll rate for light vehicles} &= 2.5T = ₹26 \times 2.5 = ₹65 \\ \text{Toll rate for light vehicles} &= 5T = ₹26 \times 5 = ₹130 \end{aligned}$$

**Note:** Toll plaza collects toll from 45,000 light weight vehicles one side journey (50,000 – 10% Exempt vehicles).

**(b) Calculation of toll rate of Light weight vehicles with concession facility:**

$$\text{Revenue earned from Light weight vehicles under (a)} = 45,000 \times 2 \times ₹26 = ₹23,40,000$$

Let, toll rate for Light weight vehicle be 'T' then toll rate for return Light weight vehicle be '0.75T'

$$\begin{aligned} \text{Revenue from Light weight vehicles} &= (45,000 \times T) + (45,000 \times 70\% \times T + 45,000 \times 30\% \times 0.75T) \\ ₹23,40,000 &= 86,625T \\ T &= ₹27.013 \end{aligned}$$

# SUGGESTED REVISION

| Ques. No.                                                                                          | Observations or KEY Points<br>(Note down during revisions) | Page No. of<br>Practical<br>Register | 1 <sup>st</sup> & 2 <sup>nd</sup><br>Revision | 3 <sup>rd</sup> , 4 <sup>th</sup> &<br>5 <sup>th</sup><br>Revision | Revision<br>during<br>Exams |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------|-----------------------------------------------|--------------------------------------------------------------------|-----------------------------|
| <b>BQ (Book Questions covering Study Module of ICAI, PM, RTP's, MTP's and Important Questions)</b> |                                                            |                                      |                                               |                                                                    |                             |
| 1                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 2                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 3                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 4                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 5                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 6                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 7                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 8                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 9                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 10                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 11                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 12                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 13                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 14                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 15                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 16                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 17                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 18                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 19                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 20                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 21                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 22                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 23                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 24                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 25                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 26                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 27                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 28                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 29                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 30                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 31                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 32                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 33                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 34                                                                                                 |                                                            |                                      | Y                                             | -                                                                  | -                           |
| <b>PYQ (Past Year Questions)</b>                                                                   |                                                            |                                      |                                               |                                                                    |                             |
| 1                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 2                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 3                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 4                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 5                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 6                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 7                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 8                                                                                                  |                                                            |                                      | Y                                             | -                                                                  | -                           |
| 9                                                                                                  |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 10                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | Y                           |
| 11                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |
| 12                                                                                                 |                                                            |                                      | Y                                             | Y                                                                  | -                           |

**SERVICE COSTING 8.61**

|           |  |  |          |          |          |
|-----------|--|--|----------|----------|----------|
| <b>13</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>14</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>15</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>16</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>17</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>18</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>19</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>20</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>21</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>22</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |
| <b>23</b> |  |  | <b>Y</b> | <b>Y</b> | <b>-</b> |
| <b>24</b> |  |  | <b>Y</b> | <b>-</b> | <b>-</b> |
| <b>25</b> |  |  | <b>Y</b> | <b>Y</b> | <b>Y</b> |