CA INTERMEDIATE

COST
&
MANAGEMENT ACCOUNTING

Volume 1

By
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This book is dedicated to

Mr. Akshay Kakkar (Brother in Law)
&
Mrs. Aarzoo Kakkar (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***

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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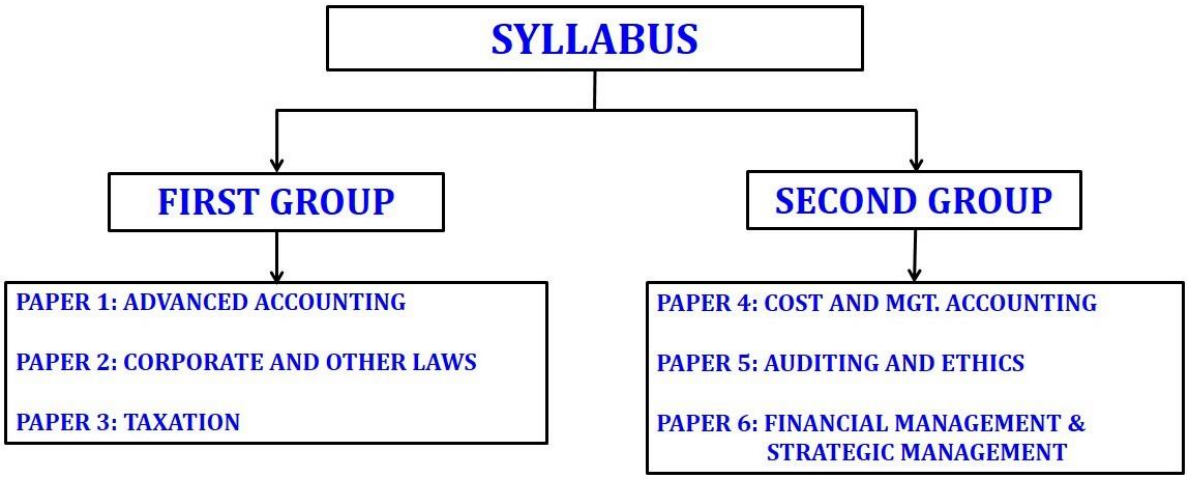
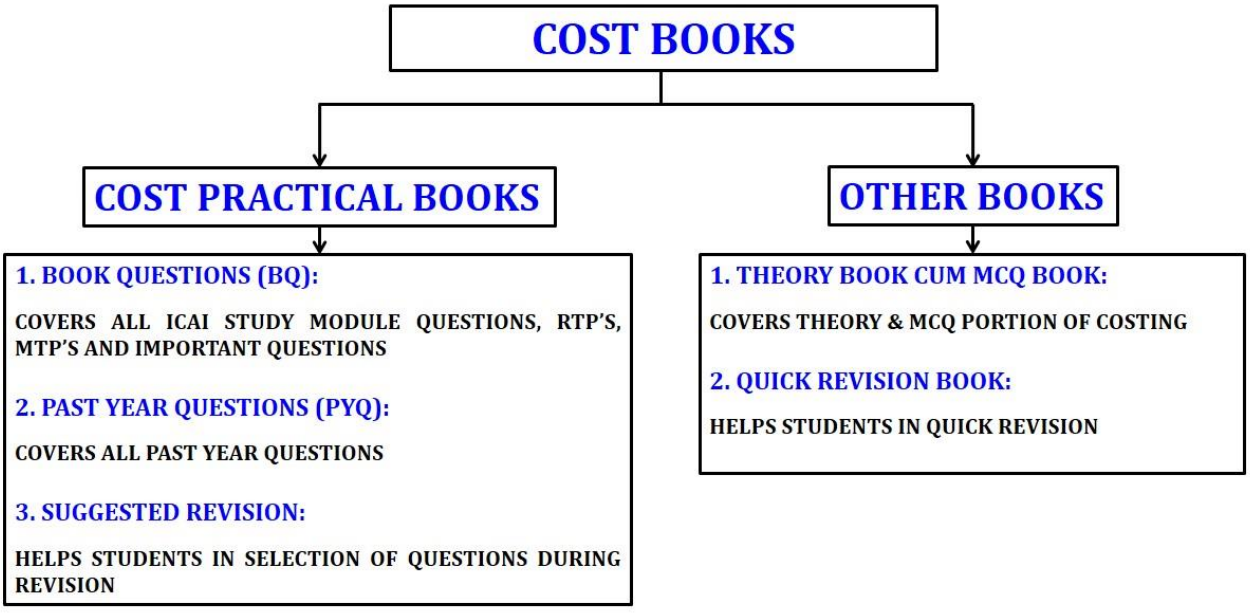
CHAPTER 0 INTRODUCTION

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.**

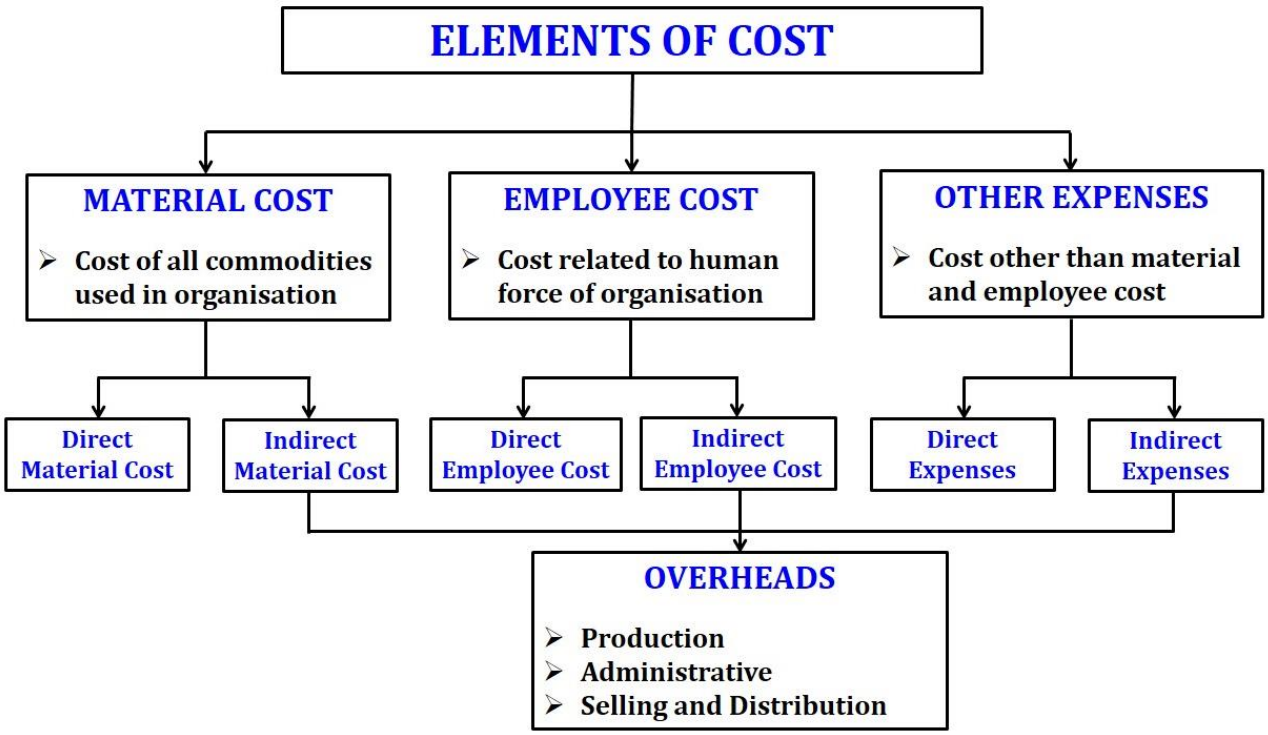
(b) ***Management Accounting:*** **Management accounting is an integral part of management function. It assists management by provision of relevant information for planning, organising, controlling, decision making etc.**

(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
Direct Cost/Prime Cost	*XXX*
Production Overheads	XXX
Administrative Overheads	XXX
Selling and Distribution Overheads	XXX
Total Cost	*XXX*
Add: Profit	XXX
Sales	*XXX*

CHAPTER 1 MATERIAL COST

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

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

No. of orders to be placed in a year = Annual consumption of RM ÷ EOQ
= 10,000 kgs ÷ 2,500 kgs = **4 orders p.a.**

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

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

Total cost = Purchase cost + Ordering cost + Carrying cost
= (5,000 units × ₹20) + $\left(\frac{A}{ROQ} \times O\right)$ + (½ × ROQ × C)
= ₹1,00,000 + $\left(\frac{5{,}000}{200} \times 16\right)$ + (½ × 200 × 20% of ₹20) = **₹1,00,800**

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

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

Total cost = Purchase cost + Ordering cost + Carrying cost
= (5,000 units × ₹12.80) + $\left(\frac{A}{ROQ} \times O\right)$ + (½ × ROQ × C)
= ₹64,000 + $\left(\frac{5{,}000}{250} \times 16\right)$ + (½ × 250 × 20% of ₹12.80) = **₹64,640**

BQ 3

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

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

A = Annual purchase
= Annual Consumption + Closing Stock – Opening Stock
= 10,500 + 500 – 1,000 = 10,000 units

BQ 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.

Answer

(1) EOQ $= \sqrt{\frac{2AO}{C}}$

EOQ for Super Grow Fertilizer $= \sqrt{\frac{2 \times 2{,}000 \times 1{,}200}{480}} =$ **100 bags**

EOQ for Nature's Own Fertilizer $= \sqrt{\frac{2 \times 1{,}280 \times 1{,}400}{560}} =$ **80 bags**

(2) Total annual relevant costs = Total annual relevant ordering costs + Total annual relevant carrying costs

Super Grow Fertilizer = (2,000/100) × 1,200 + (½ × 100 bags × 480)
= ₹24,000 + ₹24,000 = **₹48,000**

Nature's Own Fertilizer = (1,280/80) × 1,400 + (½ × 80 bags × 560)
= ₹22,400 + ₹22,400 = **₹44,800**

(3) Number of deliveries per year = $\frac{\text{Annual requiremen t}}{\text{ROQ}}$

Super Grow Fertilizer	=	2,000 ÷ 100	=	***20 orders***
Nature's Own Fertilizer	=	1,280 ÷ 80	=	***16 orders***

BQ 5

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:

Ordering cost	=	$\frac{A}{ROQ} \times O$	=	6 × ₹25	=	₹150
Carrying cost	=	½ × ROQ × C	=	½ × 6,000 × 0.20	=	₹600
Total	=	₹150 + ₹600	=	***₹750***		

2. Total Annual cost in EOQ:

Ordering cost	=	$\frac{A}{ROQ} \times O$	=	$\frac{36,000}{3,000}$ × ₹25	=	₹300
Carrying cost	=	½ × ROQ × C	=	½ × 3,000 × 0.20	=	₹300
Total	=	₹300 + ₹300	=	***₹600***		
Saving in cost	=	₹750 - ₹600	=	***₹150***		

Working Note:

EOQ = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2 \times 36,000 \times 25}{20\% \times 1}}$ = ***3,000 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 6

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?

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 units***

2. *Calculation of extra cost:*

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

Ordering Cost	=	No. of orders × Cost per order	=	$\frac{48,000}{2,400} \times 120$	=	₹2,400
Carrying Cost	=	½ × ROQ × C	=	½ × 2,400 × 2	=	₹2,400
Total	=	₹2,400 + 2,400			=	₹4,800

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

Ordering Cost	=	No. of orders × Cost per order	=	$\frac{48,000}{4,000} \times 120$	=	₹1,440
Carrying Cost	=	½ × ROQ × C	=	½ × 4,000 × 2	=	₹4,000
Total	=	₹2,400 + 2,400			=	₹5,440

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:

Minimum carrying cost = ½ × 2,400 units × 10% of ₹20 = ***₹2,400***

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%

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. EOQ = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2 \times 8,000 \times 200}{20\% \times 400}}$ = ***200 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 ($A/_{ROQ}$ × ₹200)	8,000	400
Carrying cost (½ × ROQ × C) (C = 20% of ₹400/₹384)	8,000	1,53,600
Total cost	***32,16,000***	***32,26,000***

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:		
Number of orders	1,600 ÷ 200 = 8	1,600 ÷ 500 = 3.2 or 4
Ordering cost (number of orders × ₹500)	4,000	2,000
3. Carrying cost (½ × ROQ × C) (C = 40% of ₹400/₹360)	16,000	36,000
Total cost (1+2+3)	***6,60,000***	***6,14,000***

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

Working Note:

Annual requirement of Raw Materials = 200 units × 8 orders = 1,600 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
	B: 2 to 4 weeks

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

Answer

(a) Re-ordering level = Maximum usage per week × Maximum delivery period

Component A = 75 units × 6 weeks = ***450 units***

Component B = 75 units × 4 weeks = ***300 units***

(b) Minimum level = Re-order level – (Normal usage × Average period)

Component A = 450 units – (50 units × 5 weeks) = ***200 units***

Component B = 300 units – (50 units × 3 weeks) = ***150 units***

(c) Maximum level = Re-order level + Re-order quantity – (Min. usage × Minimum period)

Component A = (450 units + 300 units) – (25 units × 4 weeks) = ***650 units***

Component B = (300 units + 500 units) – (25 units × 2 weeks) = ***750 units***

(d) Average stock level = ½ (Minimum stock level + Maximum stock level)
Component A = ½ (200 units + 650 units) = ***425 units***
Component B = ½ (150 units + 750 units) = ***450 units***

BQ 10

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

(i) Re-ordering Level = Maximum usage × Maximum lead time
= 2,000 units per day × 15 days = ***30,000 units***

(ii) Maximum Level = ROL + ROQ – (Minimum usage × Minimum lead time)
= 30,000 units + 20,000 units – (1,000 units per day × 5 days)
= ***45,000 units***

(iii) Minimum Level = ROL – (Average usage × Average lead time)
= 30,000 units – (1,500 units per day × 10 days) = ***15,000 units***

(iv) Danger Level = Average usage × Lead time for emergency purchases
= 1,500 units per day × 4 days = ***6,000 units***

Working Notes:

1. ROQ = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2 \times 5,00,000 \times 4,000}{10}}$ = ***20,000 units***

2. Average usage = $\frac{\text{Minimum usage} + \text{Maximum usage}}{2}$

1,500 units = $\frac{\text{Minimum usage} + 2,000 \text{ units}}{2}$

Minimum usage = ***1,000 units per day***

BQ 11

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?

(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 × Average lead time)
= 8,000 kg – [(200 units × 10 kg) × 2 weeks] = ***4,000 kg***

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

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

Or

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

(iv) Average level of A = Minimum stock level + ½ ROQ
= 4,000 + ½ × 10,000
= 4,000 + 5,000 = ***9,000 kg***

Or

$$= \frac{\text{Minimum stock} + \text{Maximum stock}}{2}$$

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

Working Notes:

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

BQ 12

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:

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

Answer

1. Re-order quantity (ROQ) = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2 \times *28{,}600 \times 200}{20 \times 20\%}}$ = ***1,691 kgs***

****Annual consumption (A)*** = Average Consumption per week × 52 weeks
= 550 kgs × 52 weeks = ***28,600 kgs***

2. Re-order level (ROL) = Maximum usage × Maximum re-order period
= 900 kgs × 8 weeks = ***7,200 kgs***

3. Maximum level = ROL + ROQ – (Minimum usage × Minimum re-order period)
= 7,200 kgs + 1,691 kgs – (200 kgs × 4 weeks)
= ***8,091 kgs***

4. Minimum level = ROL – (Normal usage × Normal re-order period)
= 7,200 kgs. – (550 kgs × 6 weeks) = **3,900 kgs**

5. Average stock level = ½ (Minimum level + Maximum level)
= ½ (3,900 kgs + 8,091 kgs) = **5,995.5 kgs**

Or

= (Minimum level + ½ × ROQ)
= (3,900 kgs + ½ × 1,691 kgs) = **4,745.5 kgs**

BQ 13

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

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

Calculate from the above:

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

***Annual Requirement** = 52 weeks × Normal usage of input units per week
= 52 weeks × 50 units per week = **2,600 units**

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:		
Number of orders	2,600 ÷ 186 = 13.97 or 14	2,600 ÷ 1,500 = 1.73 or 2
Ordering cost (number of orders × ₹100)	1,400	200
3. Carrying cost (½ × ROQ × C) (C = 15% of ₹100/₹95)	1,395	10,688
Total cost (1+2+3)	**2,62,795**	**2,57,888**

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

2. Re-order Level = Maximum Re-order period × Maximum Usage
= 6 weeks × 75 units = **450 units**

3. Minimum Level = ROL - (Normal usage × Average re-order period)
= 450 units - (50 units × 5 weeks)
= 450 units - 250 units = **200 units**

4. Maximum Level = ROL - (Minimum usage × Minimum re-order period) + ROQ
= 450 units - (25 units × 4 weeks) + 186 units = **536 units**

5. Average Stock Level = ½ × (Minimum Stock Level + Maximum Stock Level)

= ½ × (200 units + 536 units) = ***368 units***

Or

= ½ × ROQ + Minimum Stock Level

= ½ × 186 + 200 units = ***293 units***

BQ 14

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

(i) EOQ = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2 \times 60{,}000 \times 12 \times 240}{228 \times 10\%}}$

= ***3,893.3 or 3,893 packs***

(ii) No. of orders per year = $\frac{\text{Annual Requirement}}{\text{EOQ}}$ = $\frac{7{,}20{,}000}{3{,}893}$

= ***184.9 or 185 orders***

(iii) Total cost of ordering and carrying:

Ordering cost	=	Number of orders × O		
	=	185 × ₹240	=	₹44,400
Carrying cost	=	½ × ROQ × C		
	=	½ × 3,893 × 22.80	=	₹44,380.20
Total	=	₹44,400 + ₹44,380.20	=	***₹88,780.20***

(iv) Normal usage per day	=	7,20,000 packs ÷ 360 days	=	2,000 packs
Present inventory	=	10,000 packs		
Present inventory	=	10,000 packs ÷ 2,000 packs	=	5 days
Normal lead time	=	5 days		

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

BQ 15

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:

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

Answer

(a) Re-order quantity = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2\times 24,300\times 40}{10\times 24\%}}$ = ***900 units***

(b) Re-order level = Safety stock + Consumption during lead time
= $\frac{24,300}{360}\times 12 + \frac{24,300}{360}\times 18$
= 810 + 1,215 = ***2,025 units***

(c) Ideal Stock Level = ROL - Consumption during lead time
= 2,025 – 1,215 = ***810 units***

BQ 16

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

1. The Re-order quantity is 200 kg. less than the Economic Order Quantity (EOQ).
2. Maximum consumption per day is 20 kg. more than the average consumption per day.
3. There is an opening stock of 1,000 kg.
4. 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 = EOQ – 200 kg = $\sqrt{\frac{2\times 17,200\times 720}{125\times 13.76\%}}$ - 200 kg = ***1,000 kg***

(b) Re-order Level = Maximum consumption per day × Maximum lead time

= 70 kg × 8 days = ***560 kg***

(c) Maximum Level = ROL + ROQ - (Minimum consumption per day × Minimum lead time)
= 560 kg + 1,000 kg - (30 kg × 4 days) = ***1,440 kg***

(d) Minimum Level = ROL - (Average consumption per day × Average lead time)
= 560 kg - (50 kg × 6 days) = ***260 kg***

(e) Average Stock Level = ½ × (Minimum Stock Level + Maximum Stock Level)
= ½ × (1,440 kg + 260 kg) = ***850 kg***

Or

= ½ × ROQ + Minimum Stock Level
= ½ × 1,000 kg + 260 kg = ***760 kg***

(f) Impact on Profitability

Particulars	***At ROQ (1,000 kg)***	***At EOQ (1,200 kg)***
Number of orders	$\frac{17,200}{1,000} = 17.20$ or 18	$\frac{17,200}{1,200} = 14.33$ or 15
Ordering cost	18 × 720 = 12,960	15 × 720 = 10,800
Carrying cost (½× ROQ × C)	8,600 (½ × 1,000 × 125 × 13.76%)	10,320 (½ × 1,200 × 125 × 13.76%)
Total ordering and carrying cost	***21,560***	***21,120***
Impact on profit	***-***	***440***

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.)	***18,200 kg.***
Less: Opening Stock of 'Dee'	1,000 kg.
Annual purchase for raw material 'Dee'	***17,200 kg.***

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

Average consumption per day	=	18,200 kg ÷ 364 days	=	50 kg
Hence, Maximum consumption per day	=	50 kg + 20 kg	=	70 kg
So minimum consumption per day	=	Average × 2 – Max.	=	50 × 2 – 70
	=	30 kg		

BQ 17

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:

(a) Economic Order Quantity
(b) Re-Order Level (ROL)

(c) Maximum Stock Level
(d) Minimum Stock Level
(e) Average Stock Level
(f) Number of Orders to be placed per year
(g) Total Inventory Cost
(h) If the supplier is willing to offer 1% discount on purchase of total annual quantity in two orders, whether offer is acceptable?
(i) If the answer is no, what should be the counteroffer w.r.t. percentage of discount?

Answer

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

*Annual consumption of raw material = [{(210+350) ÷ 2} ÷ 7 days] × 365 = ***14,600 kg***

(b) Re-order Level = Maximum consumption per day × Maximum lead time
= (350 ÷ 7) × 9 days = ***450 kg***

(c) Maximum Stock Level = ROL + ROQ - (Minimum consumption per day × Minimum lead time)
= 450 kg + 646 kg – (210 ÷ 7) × 5 days]
= ***946 kg***

(d) Minimum Stock Level = ROL - (Average consumption per day × Average lead time)
= 450 kg – [{(210+350) ÷ 2} ÷ 7 days] × (5 + 9) ÷ 2}
= ***170 kg***

(e) Average Stock Level = ½ × (Minimum Stock Level + Maximum Stock Level)
= ½ × (946 kg + 170 kg) = ***558 kg***
Or
= ½ × ROQ + Minimum Stock Level
= ½ × 646 kg + 170 kg = ***493 kg***

(f) Number of Orders = Annual consumption ÷ EOQ
= 14,600 kg ÷ 646 kg = ***22.6 or 23***

(g) Total Inventory Cost = Purchase cost + Ordering cost + Carrying cost
= (Purchase Quantity × Price) + $\left(\frac{A}{ROQ} \times O\right)$ + (½ × ROQ × C)
= (14,600 × ₹100) + (23 × ₹200) + (½ × 646 × ₹14)
= ***₹14,69,122***

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

Inventory Cost at Offer Price = Purchase cost + Ordering cost + Carrying cost
= (14,600 × ₹99) + (2 × ₹200) + (½ × 7,300) × (12% of ₹99 + ₹2)
= ***₹14,96,462***

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:
Let discount rate (%) = D

Counter offer Price	=	₹100 – D	=	₹100 – D
Revised Carrying Cost	=	[(₹100 – D) × 12%] + ₹2	=	₹12 - 0.12D + ₹2
	=	₹14 – 0.12D		

Total Inventory Cost at Counter offer Price:

	=	Purchase cost + Ordering cost + Carrying cost
	=	{14,600 × (₹100 – D)}+(2 × ₹200) + (½ × 7,300) × (₹14 - .12D)
	=	₹14,60,000 – 14,600D + ₹400 + ₹51,100 – 438D
	=	₹15,11,500 – 15,038D

Now,

₹14,69,122	=	₹15,11,500 – 15,038D
₹42,378	=	15,038D
D	=	***2.82***

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

MOST ECONOMICAL PURCHASE LEVEL

BQ 18

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 (½ × ROQ × 20% of Price)*	*Purchase Cost (5,000 × Price)*	*Total Cost*
400	{(5,000/400) 12.5 or 13 × 1,200} = 15,600	48,000 (½ × 400 × 20% × 1,200)	60,00,000 (5,000 × 1,200)	60,63,600
500	{(5,000/500) 10 × 1,200} = 12,000	59,000 (½ × 500 × 20% × 1,180)	59,00,000 (5,000 × 1,180)	59,71,000
1,000	{(5,000/1,000) 5 × 1,200} = 6,000	1,16,000 (½ × 1,000 × 20% × 1,160)	58,00,000 (5,000 × 1,160)	59,22,000
2,000	{(5,000/2,000) 2.5 or 3 × 1,200} = 3,600	2,28,000 (½ × 2,000 × 20% × 1,140)	57,00,000 (5,000 × 1,140)	59,31,600
3,000	{(5,000/3,000) 1.6 or 2 × 1,200} = 2,400	3,36,000 (½ × 3,000 × 20% × 1,120)	56,00,000 (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 are no discount offer then the purchase quantity should be equal to EOQ. The EOQ is as follows:

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

OPTIMUM SAFETY STOCK LEVEL

BQ 19

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):

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

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.

$$\text{Safety stock} = \frac{\text{Annual Demand}}{360} \times (\text{Maximum lead time} - \text{Average lead time})$$

= $\frac{54,000}{360}$ × (7 days – 6 days) = ***150 castings***

Re-order point = Safety stock + Average lead time consumption
= 150 castings + (6 days × 150 casting) = ***1,050 castings***

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.

Safety stock = $\frac{\text{Annual Demand}}{360}$ × (Maximum lead time – Average lead time)
= $\frac{54,000}{360}$ × (9 days – 6 days) = ***450 castings***

Re-order point = Safety stock + Average lead time consumption
= 450 castings + (6 days × 150 casting) = ***1,350 castings***

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

Total cost of ordering = $\frac{\text{Annual Demand}}{\text{EOQ}}$ × Cost per order
= $\frac{54,000}{1,800}$ × ₹9,000 = ***₹2,70,000***

Total cost of carrying = (Safety stock + ½ EOQ) × Carrying cost per unit p.a.
= (450 units + ½ × 1,800 units) × ₹300 = ***₹4,05,000***

5. (a) Computation of new EOQ = $\sqrt{\frac{2\times 54000\times 600}{720}}$ = ***300 castings***

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

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

BQ 20

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.

Stock-out of tyres	*No. of times*
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

Safety stock (1)	Stock-out (units) (2)	Probability (3)	Stock-out cost (4) = (2) × ₹150	Expected stock-out cost (5) = (3) × (4)	Inventory carrying cost (6) = (1) × ₹50	Total cost (7) = (5) + (6)
100	0	0	0	0	5,000	**5,000**
80	20	0.02	3,000	60	4,000	**4,060**
50	50	0.02	7,500	150		
	30	0.05	4,500	225		
			12,000	375	2,500	**2,875**
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	**2,140**
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	**2,195**
0	100	0.02	15,000	300		
	80	0.05	12,000	600		
	50	0.10	7,500	750		
	20	0.20	3,000	600		
	10	0.30	1,500	450		
			39,000	2,700	0	**2,700**

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 21

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	4
2	24,000	10.9589	3.00	72,000	20.2378	2
3	1,500	0.6849	10.00	15,000	4.2162	7
4	600	0.2740	22.00	13,200	3.7103	8
5	38,000	17.3516	1.50	57,000	16.0216	3
6	40,000	18.2648	0.50	20,000	5.6216	6
7	60,000	27.3973	0.20	12,000	3.3730	9
8	3,000	1.3699	3.50	10,500	2.9513	11
9	300	0.1370	8.00	2,400	0.6746	12
10	29,000	13.2420	0.40	11,600	3.2605	10
11	11,500	5.2512	7.10	81,650	22.9502	1
12	4,100	1.8721	6.20	25,420	7.1451	5
-	2,19,000	100	-	3,55,770	100	-

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

₹50,000 & above	'A' items
₹15,000 to ₹50000	'B' items
Below ₹15,000	'C' items

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

Ranking	Item No.	% of Total units	Total cost (₹)	% of Total cost	Category
1	11	5.2512	81,650	22.9502	
2	2	10.9589	72,000	20.2378	
3	5	17.3516	57,000	16.0216	
Total	3	33.5617	2,10,650	59.2096	A
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	
Total	4	24.0181	95,420	26.8207	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	
Total	5	42.4202	49,700	13.9697	C
Grand Total	12	100	3,55,770	100	

BQ 22

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

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

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

Answer

Classification of the items of inventory as per ABC Analysis

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

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.

INVENTORY TURNOVER RATIO

BQ 23

The following data are available in respect of material X for the year ended 31st 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
Inventory turnover ratio (Materials consumed ÷ Average inventory)	***2.5 times***
Number of days for which the average inventory is held (365 ÷ IT Ratio)	***146 days***

BQ 24

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
	62,000	36,000
Less: Closing stock	(6,000)	(11,000)
Materials consumed	56,000	25,000
Average inventory (Opening stock + Closing stock) ÷ 2	8,000	10,000
Inventory turnover ratio (Materials consumed ÷ Average inventory)	***7 times***	***2.5 times***
Inventory turnover (365 ÷ IT Ratio)	***52 days***	***146 days***

Comment: Material A is moving faster than Material B.

VALUATION OF MATERIAL

BQ 25

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	@10%
(Will be given only if payment is made within 30 days.)	
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
Cost per unit (₹60,000/800 units)		**1**	**75**

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 26

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?

Invoice	₹
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
	946.00

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

Particulars	₹
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
Cost per unit	**4.25**

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 27

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

Invoice	*₹*
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
Total cost	***2,28,240***

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

Particulars	*Chemical A*	*Chemical 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	***12.04***	***15.43***

Working notes:

Calculation of Effective Quantity of each Chemical Available for Use

Particulars	*Chemical A*	*Chemical 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
Quantity available	***9,310***	***7,526.4***

STOCK VALUATION AND STORES LEDGER

BQ 28

'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 Sep'23	Receipts				Issues				Balance		
	GRN/ MRR	Qty.	Rate	Amount	Req. 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:

1. The material received as replacement from vendor is treated as fresh supply.
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 29

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.

Purchases		Cost per Unit	Issues	
Date	Units		Date	Units
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)

Date	Description	Quantity in Units	Rate (₹)	Amount
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	***2,800***

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)

Date	Description	Quantity in Units	Rate (₹)	Amount
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	-	***2,300***

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 30

The following transactions in respect of material Y occurred during the six months ended 30th 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 30th 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 1st 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 31

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

	Opening Stock	Nil
Purchases:		
	January 1	100 @ ₹1 per unit
	January 20	100 @ ₹2 per unit
Issues:		
	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	-	-	-	100 100	1 2	100 200
Jan 22	-	-	-	60	1	60	40	1	40

							100	2	200
Jan 23	-	-	-	40 20	1 2	40 40	80	2	160

Stores Ledger of Material X (LIFO 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	-	-	-	100 100	1 2	100 200
Jan 22	-	-	-	60	2	120	100 40	1 2	100 80
Jan 23	-	-	-	40 20	2 1	80 20	80	1	80

Stores Ledger of Material X (Weighted Average 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	-	-	-	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

Job	FIFO	LIFO	Weighted Average
Materials for Job W 16	60	120	90
Materials for Job W 17	80	100	90
Closing Stock	160	80	120
Total	***300***	***300***	***300***

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 32

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
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 25th 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 30th 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	Receipts			Issues			Balance of Stock		
Sep.	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:

1. 900 units is abnormal loss, hence it will be transferred to Costing Profit & Loss A/c.

2. 300 units is normal loss, hence it will be absorbed by good units.

BQ 33

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
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

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:

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

Or

= $\frac{365 \text{ days}}{20 \text{ orders}}$ = ***18 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 ($^{A}/_{ROQ}$ × O)	15,000	3,000
Carrying cost (½ × ROQ × C)	15,000	75,000

Total cost	30,000	78,000
Extra Cost or Discount to be negotiated	***-***	***48,000***
% of Discount {(48,000 ÷ 40,000 × 80) × 100}	***-***	***1.5%***

PYQ 2

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:

Re-order level = Maximum re-order period × Max consumption per day
1,60,000 units = 8 days × Maximum consumption per day
Max consumption per day = $\frac{1,60,000 \text{ units}}{8 \text{ days}}$ = ***20,000 units***

(2) Minimum consumption per day:

Maximum stock level = Re-order level + Re-order quantity - (Min lead time × Minimum consumption per day)
1,90,000 units = 1,60,000 units + 90,000 units - (4 days × Minimum consumption per day)
2,50,000 – 1,90,000 = 4 days × Minimum consumption per day
Minimum consumption = ***15,000 units per day***

Working notes:

Calculation of Minimum Lead Time:

Maximum lead time – Minimum lead time = 4 days
Or Maximum lead time = Minimum lead time + 4 days (i)

Average lead time = 6 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 Minimum lead time + 4 Days = 6 days × 2 = 12 days
Minimum lead time = (12 days – 4 days) ÷ 2 = ***4 days***

PYQ 3

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

(b) Re-ordering Level = Maximum consumption × Maximum lead time
= 400 units × 20 days = ***8,000 units***

(c) Minimum Level = ROL – (Average consumption × Average lead time)
= 8,000 units – (300 units × 14 days) = ***3,800 units***

(d) Maximum Level = ROL + ROQ – (Minimum consumption × Minimum lead time)
= 8,000 units + 3,000 units – (200 units × 8 days)= ***9,400 units***

(e) Danger Level = Average consumption × Emergency delivery time
= 300 units × 5 days = ***1,500 units***

Or

= Minimum consumption × Emergency delivery time
= 200 units × 5 days = ***1,000 units***

PYQ 4

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) EOQ = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2\times1,500\times12\times75}{1,000\times3\%}}$ = ***300 units***

(2) Re-order Level = Maximum Re-order period × Maximum Usage
= 8 weeks × 400 units = ***3,200 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 ($A/_{ROQ}$ × ₹75)	4,500	225
Carrying cost (ROQ × ½ × C) (C = 3% of ₹1,000/₹950)	4,500	85,500
Total cost	***1,80,09,000***	***1,71,85,725***

Advise: Accept the discount offer.

PYQ 5

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 31st 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) EOQ = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2\times12,000\times1,800}{640\times18.75\%}}$ = ***600 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 ($A/_{ROQ}$ × ₹1,800)	36,000	7,200
Carrying cost (½ × ROQ × C) (C = 18.75% of ₹640/₹608)	36,000	1,71,000
Total cost	***77,52,000***	***74,74,200***

Advise: Accept the discount offer.

PYQ 6

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

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* = ½ (Minimum level + Maximum level)
= ½ (600 kgs + 3,100 kgs) = ***1,850 kgs***

Or

= (Minimum level + ½ × ROQ)
= (600 kgs + ½ × 2,000 kgs) = ***1,600 kgs***

PYQ 7

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

Date	*Particulars*	*Quantity (kg)*	*Rate per kg*
April 4	Purchase	3000	₹16
April 8	Issue	1000	
April 15	Purchase	1500	₹18
April 20	Issue	1200	
April 25	Return to supplier (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)

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

(2) Value of material consumed and closing stock:

	Material Consumed	Closing Stock
Under Weighted Average	51,900	40,376
Under LIFO	53,600	38,650

PYQ 8

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

A = 4,000 litres × 4 Quarters × 2 kg of raw material = 32,000 Kgs

(2) Total Annual Inventory Cost including purchase

Annual inventory cost = Purchase cost + Carrying cost + Ordering cost

= Purchase quantity × Purchase price + ½ × EOQ × C + $\frac{A}{EOQ}$ × O

= 32,000 kgs × ₹50 + ½ × 800 × 4 + $\frac{32,000}{800}$ × 40

= ₹16,00,000 + ₹1,600 + ₹1,600 = ***₹16,03,200***

PYQ 9

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	=	$\frac{A}{ROQ}\times O$	=	$\frac{27,000}{3,000}$ × ₹240	=	₹2,160
Carrying cost	=	½ × ROQ × C	=	½ × 3,000 × ₹6.25	=	₹9,375
Total	=	₹2,160 + ₹9,375	=	***₹11,535***		

(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 or 19 × ₹240	=	₹4,560
Carrying cost	=	½ × ROQ × C	=	½ × 1,440 × ₹6.25	=	₹4,500
Total	=	₹4,560 + ₹4,500	=	***₹9,060***		
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

= $\frac{27,000}{360}$ × 12 = ***900 units***

3. Frequency of placing order:

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

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

PYQ 10

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
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***
-	*750*	*-*	*7,500*	*100*	*-*

(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	
Total	**2**	**5,250**	**70.00**	**A**
3	106	900	12	
4	104	600	8	
Total	**2**	**1,500**	**20.00**	**B**
5	105	450	6	
6	102	300	4	
Total	**2**	**750**	**10.00**	**C**
Grand Total	**6**	**7,500**	**100**	

PYQ 11

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 31st 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
a.	**Inventory turnover ratio (Materials consumed ÷ Average inventory)**	**4 times**	**3 times**
b.	**Inventory holding period (360 ÷ IT Ratio)**	**90 days**	**120 days**

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 12

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 = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2\times12,000\times750}{18}}$ = ***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 ÷ 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***

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

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

Total cost of ordering = Number of orders × Cost per order
= 12 × ₹750 = ***₹9,000***

Total cost of carrying = ½ EOQ × C
= ½ × 1,000 Kg. × ₹18 = ***₹9,000***

Total Cost = ***₹18,000***

PYQ 13

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

(a) EOQ = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2\times7,500\times12\times15}{1.50\times20\%}}$ = ***3,000 valves***

Number of orders = (7,500 × 12) ÷ 3,000 = 30 orders

Frequency of orders = 360 days ÷ 30 orders = ***12 days***

(b) Re-order point = Average consumption × Average lead time + Safety stock

= $\frac{7,500\times12}{360}$ × 45 days (1.5 months × 30 days) + 3,200

= ***14,450 valves***

(c) EOQ = $\sqrt{\frac{2AO}{C}}$ = $\sqrt{\frac{2\times7,500\times12\times15}{4.50\times20\%}}$ = ***1,732.05 valves***

SUGGESTED REVISION FOR EXAM:

BQ: 6, 7, 10, 11, 13, 14, 16, 18, 19, 20, 21, 24, 25, 33

PYQ: 1, 13

CHAPTER 2 EMPLOYEE COST

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	=	***₹351.00***
Worker B	=	450 units × ₹0.90	=	***₹405.00***
Worker C	=	600 units × ₹0.90	=	***₹540.00***

2. Calculation of earnings under Time Rate System:

Worker A	=	8 Hours × ₹54	=	***₹432***
Worker B	=	8 Hours × ₹54	=	***₹432***
Worker C	=	8 Hours × ₹54	=	***₹432***

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	=	***₹420.00***

Earning under Rowan System:

Earning = $(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$

= (6 hours × ₹60) + $\frac{6}{8}$ × (8 hours – 6 hours) × ₹60 = ***₹450.00***

BQ 3

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
Actual time taken:	***B***	:	8 hours
	C	:	6 hours
	D	:	5 hours

Answer

Earning under Halsey premium bonus system and rate earned per hour

Earning = (AH × R) + 50% (SH - AH) × R

Rate earned per hour = Earning ÷ AH

For B

Earning = (8 hours × ₹1) + 50% (10 - 8) × ₹1 = 8 + 1 = ***₹9***

Rate per hour = 9 ÷ 8 hours = ***₹1.25***

For C

Earning = (6 hours × ₹1) + 50% (10 - 6) × ₹1 = 6 + 2 = ***₹8***

Rate per hour = 8 ÷ 6 hours = ***₹1.33***

For D

Earning = (5 hours × ₹1) + 50% (10 – 5) × ₹1 = 5 + 2.50= ***₹7.50***

Rate per hour = 7.50 ÷ 5 hours = ***₹1.50***

BQ 4

(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 5

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 6

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 (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.

Answer

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

Total earnings under Halsey scheme = $(AH \times R) + 50\% (SH - AH) \times R$
= $(2{,}000 \times ₹40) + 50\% (2{,}500 - 2{,}000) \times ₹40$
= ***₹90,000***

Total earnings under Rowan scheme = $(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$
= $(2{,}000 \times ₹40) + \frac{2{,}000}{2{,}500} \times (2{,}500 - 2{,}000) \times ₹40$
= ***₹96,000***

Effective rate under Halsey Plan = ₹90,000 ÷ 2,000 hours = ***₹45 per hour***

Effective rate under Rowan Plan = ₹96,000 ÷ 2,000 hours = ***₹48 per hour***

Actual hours (AH) = 10 workers × 25 days × 8 hours per day
= 2,000 hours

Standard hours (SH) = 1,250 units × 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 × ₹40 per hour	= ₹80 per unit
Under Halsey Plan	=	₹90,000 ÷ 1,250 units	= ₹72 per unit
Under Rowan Plan	=	₹96,000 ÷ 1,250 units	= ₹76.8 per unit

Savings of direct labour cost per unit under:

Halsey Plan	=	₹80 – ₹72	=	***₹8.00 per unit***
Rowan Plan	=	₹80 – ₹76.80	=	***₹3.20 per unit***

BQ 7

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:

Effective Earnings per hour	=	[(AH × R) + AH/SH (SH - AH) × R] ÷ AH
37.50	=	[30 AH + AH/4 (4 - AH) × 30] ÷ AH
37.50 AH	=	30 AH + AH/4 (4 - AH) × 30
7.50 AH	=	AH/4 (4 - AH) × 30
7.50 AH	=	AH (4 - AH) × 7.50
1	=	4 - AH
AH	=	3 hours

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

Total earnings	=	(AH × R) + 50% (SH – AH) × R		
	=	(3 × 30) + 50% (4 – 3) × 30	=	***₹105***
Effective hourly rate	=	Total earning ÷ hours worked		
	=	₹105 ÷ 3 hours	=	***₹35***

BQ 8

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,
(ii) Piece rate,
(iii) Halsey scheme and
(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:

Worker	*Day wages*	*Actual output*	*Labour cost per 100 pieces*
A	600	180	333.33
B	600	120	500.00
C	600	100	600.00
Total	1,800	400	

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

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

*Piece rate = ₹75 per hour ÷ 10 units in one hour = ₹7.50 per unit

(iii) Halsey Scheme:

Worker	Actual output	SH	AH	Wages earned (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	-

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

(iv) Rowan Scheme:

Worker	Actual output	SH	AH	Wages earned $(AH \times R) + {}^{AH}/_{SH} \times (SH - AH) \times R$	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	-

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

BQ 9

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	=	AH/SH (SH - AH) × R		
	=	3/4 × (4 - 3) × ₹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	=	2/4 × (4 - 2) × ₹5	=	***₹5.00***
Bonus	=	1/4 × (4 - 1) × ₹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	=	3/10 × (10 - 3) × ₹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 10

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 workers 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 11

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:

Day	*Worker A paid @ ₹200 per day for 8 hours*	*Worker B paid @ ₹100 per day for 8 hours*	*Worker C paid @ ₹300 per day for 8 hours*
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
Total	***49 hours***	***48 hours***	***57 hours***

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.

Each worker has to work for 8 hours on weekdays. Saturday and Sunday will be weekly holiday, however workers may work on Saturdays due to exigency of work for 4 hours, though full payment of 8 hours will be made with no other payments.

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:

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	-	-	-	-	-
Total	***40***	***4***	***5***	***10***	***54***

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

Days	*Normal hours*	*Extra hours*	*Overtime hours*	*Equivalent normal hours for overtime worked*	*Total normal hours*
Monday	8	-	-	-	8
Tuesday	8	-	-	-	8

Wednesday	8	-	-	-	8
Thursday	8	-	-	-	8
Friday	8	-	-	-	8
Saturday	4	*4	-	-	8
Total	***44***	***4***	***-***	***-***	***48***

*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
Total	***44***	***8***	***5***	***10***	***62***

*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 (₹968 ÷ 176 hours)	₹5.50	₹5.50	₹5.50
Hourly rate	₹30.50	₹18.00	₹43.00
Total normal hours	54	48	66
Total wages payable	***₹1,647.00***	***₹864.00***	***₹2,838.00***

GROSS WAGES, NET WAGES AND LABOUR COST PER HOUR

BQ 12

'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
Labour cost per annum	**2,17,200**
÷ Effective labour hours (2,400 - 400)	÷ 2,000
Effective hourly cost	**108.60**

BQ 13

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
Total Annual Labour Cost	**1,68,000**
÷ Effective Hours {(300 – 20) × 8 hours}	÷ 2,240
Wage rate per hour	**₹75.00**

BQ 14

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
Total	**1,320**

Working:

Total available hours in one week = 6 days × 8 hrs per day = **48 hours**

Normal Idle time	=	6 days × 40 minutes per day		
	=	***240 minutes or 4 hours per week***		
Effective hours per week	=	48 hours – 4 hours	=	***44 hours***
Total wages for a week	=	(₹100+120%) × 6 days	=	₹1,320
Wage rate per hour	=	₹1,320 ÷ 44 hours	=	***₹30 per hour***
Time wasted in waiting for job (Abnormal idle time)	=	44 hrs – (15 + 12 + 13)	=	***4 hours***

BQ 15

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 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

Particulars	***Amount***
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
Total Annual Labour Cost	***1,89,240***
÷ Effective Hours {(300 – 15) × 8 hours}	÷ 2,280
Wage rate per hour	***₹83.00***

BQ 16

Calculate the earnings of A and B from the following particulars for a month and allocate the labour cost to each job X, Y and Z:

	A	***B***
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:

Jobs	***X***	***Y***	***Z***
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

Particulars	A	B
Basic Wages	₹10,000	₹16,000
Dearness Allowance (50% of Basic)	₹5,000	₹8,000
Overtime Wages (W.N.)	₹1,500	-
Gross Wages Earned	**₹16,500**	**₹24,000**
Less: Employee's Contribution to Provident Fund (8% of basic)	(₹800)	(₹1,280)
Less: Employee's Contribution ESI (2% of basic)	(₹200)	(₹320)
Net Wages Earned	**₹15,500**	**₹22,400**

Statement Showing Labour Cost Chargeable to Jobs

Particulars	Job X	Job Y	Job Z
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
Labour Cost chargeable	**₹19,200**	**₹11,420**	**₹12,480**

Working Note:

1. Statement Showing Employee Cost Excluding Overtime

Particulars	A	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
Employee Cost (Excluding overtime)	**₹16,000**	**₹25,600**

2. Overtime wages of worker A = (₹15,000 ÷ 200 hours) × 2 × 10 hours = **₹1,500**

LABOUR TURNOVER

BQ 17

The Accountant of Y Ltd. has computed rates for the quarter ending 31st 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):

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

$$= \frac{18 + \text{No.of accessions}}{600} \times 100 = 10\%$$

No. of accessions = 10% of 600 – 18 = ***42 workers***

(b) Calculation of workers left and discharged (No. of separations):

Number of separation = 3% of average workers
= 3% of 600 = ***18 workers***

(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 = ***40%***

Using Replacement method = 5% × 4 = ***20%***

Using Separation method = 3% × 4 = ***12%***

Working:

Calculation of Average no of workers:

Number of replacements = 5% of average workers = 30
∴ Average workers = 30 ÷ 5% = ***600 workers***

BQ 18

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

Separation method = $\frac{\text{No. of separation}}{\text{Average no. of workers}} \times 100 = \frac{10+40}{1,000} \times 100 =$ ***5%***

Replacement method = $\frac{\text{No. of workers replaced}}{\text{Average no. of workers}} \times 100 = \frac{25}{1,000} \times 100 =$ ***2.5%***

Flux method (Alt 1) = $\frac{\text{No. of separation + No. of replaced}}{\text{Average no. of workers}} \times 100 = \frac{50+25}{1,000} \times 100$
= ***7.5%***

New Accession method = $\frac{\text{No. of new accessions}}{\text{Average no. of workers}} \times 100 = \frac{125}{1,000} \times 100 =$ ***12.5%***

Accession method = $\frac{\text{No. of accessions}}{\text{Average no. of workers}} \times 100 = \frac{150}{1,000} \times 100 =$ ***15%***

Flux method (Alt 2) = $\frac{\text{No. of accessions + No. of separation}}{\text{Average no. of workers}} \times 100 = \frac{150+50}{1,000} \times 100$
= ***20%***

***Average no of workers** = $\frac{900+1,100}{2}$ = **1,000 workers**

BQ 19

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.

Answer

Statement Showing Profit Foregone on Account of Labour Turnover

Particulars	Amount
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
Profit Foregone	**5,57,930**

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	**4,30,000**

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)	**₹3.862**

MISCELLANEOUS

BQ 20

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 × 15/60 = 1,800 Hours	1,800 hours ÷ 40 = 45 Operators	0.65 × 15/60 × 12 = 1.95	1,800 hours × 0.65 = 1,170
2	7,200 × 25/60 = 3,000 Hours	3,000 hours ÷ 40 = 75 Operators	0.50 × 25/60 × 12 = 2.50	3,000 hours × 0.50 = 1,500
3	7,200 × 10/60 = 1,200 Hours	1,200 hours ÷ 40 = 30 Operators	0.40 × 10/60 × 12 = 0.80	1,200 hours × 0.40 = 480
4	7,200 × 30/60 = 3,600 Hours	3,600 hours ÷ 40 = 90 Operators	0.35 × 30/60 × 12 = 2.10	3,600 hours × 0.35 = 1,260
5	7,200 × 20/60 = 2,400 Hours	2,400 hours ÷ 40 = 60 Operators	0.30 × 20/60 × 12 = 1.20	2,400 hours × 0.30 = 720
Total	***-***	***300***	***₹8.55***	***₹5,130***

Number of units = 600 dozens × 12 units in one dozen = 7,200 units

BQ 21

P Ltd. manufactures two products by using one grade of employees. The following estimates are available:

	Product A	*Product 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

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:

Separation Method = $\frac{\text{Number of separations}}{\text{Average number of workers}} \times 100$ = $\frac{50 \text{ workers}}{1000 \text{ workers}} \times 100$

= ***5%***

Flux Method (Alternative 1) = $\frac{\text{No of separations} + \text{No of accessions}}{\text{Average number of workers}} \times 100$

= $\frac{50+70}{1000} \times 100$ = ***12%***

Flux Method (Alternative 2) = $\frac{\text{No of separations} + \text{No of replacements}}{\text{Average number of workers}} \times 100$

= $\frac{50+30}{1000} \times 100$ = ***8%***

Working Notes:

Average no of workers = (Opening workers + Closing workers) ÷ 2
= (990 + 1,010) ÷ 2 = ***1000***

Number of Separations = Opening + Accession - Closing
= 990 + 70 – 1,010 = ***50 workers***

Number of Accessions = Replaced + New Joined
= 3% of 1,000 + 40 = ***70 workers***

PYQ 2

RST Company Ltd. had computed labour turnover rates for the quarter ended 31st 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 = ***75 workers***

Or

Number of accessions = Flux - Separated
= (20% - 5%) 15% of average workers
= 15% of 500 = ***75 workers***

(ii) Calculation of workers left and discharged:

Number of workers separated	=	5% of average workers		
	=	5% of 500	=	***25 workers***

(iii) Calculation of average number of workers on roll:

Number of workers replaced	=	10% of average workers	=	50 workers
Therefore, Average workers	=	50 ÷ 10%	=	***500 workers***

PYQ 3

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:

Effective Earnings per hour	=	[(AH × R) + AH/SH (SH - AH) × R] ÷ AH
180	=	[150 AH + AH/50 (50 - AH) × 150] ÷ AH
30 AH	=	AH/50 (50 - AH) × 150
30 AH	=	AH (50 - AH) × 3
10 AH	=	AH (50 - AH)
∴ AH	=	40 Hours

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

Total earnings	=	(AH × R) + 50% (SH – AH) × R		
	=	(40 × 150) + 50% (50 – 40) × 150	=	***₹6,750***
Effective hourly rate	=	Total earning ÷ hours worked		
	=	₹6,750 ÷ 40 hours	=	***₹168.75***

PYQ 4

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

Factory cost = Materials + Labour + Factory Overheads

(i)	Under Rowan Plan	=	50 + 93.75 + 93.75	=	***₹237.50***
(ii)	Under Halsey Plan	=	50 + 87.50 + 87.50	=	***₹225***

Working Notes:

Earning of workers under Halsey's and Rowan's premium scheme:

Wages under Halsey = (AH × R) + 50% (SH – AH) × R
= (15 hours × 5) + 50% (20 – 15) × 5 = ***₹87.50***

Wages under Rowan = $(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$
= (15 hours × 5) + 15/20 (20 – 15) × 5 = ***₹93.75***

PYQ 5

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
Annual Cost of Each Employee	***5,07,780***

(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 6

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 Shoeing Conversion Cost

Particulars	***Nasik (₹)***	***Satara (₹)***
Labour Cost	4,608	4,200
Overheads (32 Hours × ₹25) and (30 Hours × ₹25)	800	750
Conversion Cost	***5,408***	***4,950***

Working Note:

(a) Calculation of wage rate (R):

Using data of Nasik:

Conversion cost = Labour cost + Overheads

$5,408 = [AH \times R + \frac{AH}{SH}(SH - AH) \times R] + Overheads$

$5,408 = [32 \times R + \frac{32}{40}(40 - 32) \times R] + (32 \text{ hours} \times 25)$

$5,408 - 800 = 38.4\ R$

Wage rate 'R' = ***₹120***

(b) Calculation of Labour Cost:

Nasik = $AH \times R + \frac{AH}{SH}(SH - AH) \times R$

= $32 \times ₹120 + \frac{32}{40}(40 - 32) \times ₹120$ = ***₹4,608***

Satara = $AH \times R + 50\%\ (SH - AH) \times R$

= $30 \times ₹120 + 50\%\ (40 - 30) \times ₹120$ = ***₹4,200***

(c) Standard Hours = 5 days × 8 hours per day = ***40 hours***

PYQ 7

Following are the particulars of two workers 'R 'and 'S' for a month:

	R	***S***
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:

Jobs	A	B	C
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

Particulars	R	S
Basic Wages	₹15,000	₹30,000
Dearness Allowance (50% of Basic)	₹7,500	₹15,000
Gross Wages (excluding overtime)	***₹22,500***	***₹45,000***
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
Ordinary Wages Earned	***₹23,850***	***₹47,850***
÷ Effective Hours	200	200
Ordinary Wage Rate per Hour	***₹119.25***	***₹239.25***

Working Note:

Overtime wages of worker R = (₹22,500 ÷ 200 hours) × 2 × 20 hours = ***₹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
Allocation of Labour Cost	***₹41,527.50***	***₹11,955***	***₹22,717.50***

PYQ 8

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 = $\frac{56.48 - 50}{50} \times 100$ = ***12.96%***

Under Rowan = $\frac{60.29 - 50}{50} \times 100$ = ***20.58%***

Working Notes:

Total earnings under Halsey scheme = (AH × R) + 50% (SH – AH) × R
= (9,600 × ₹50) + 50% (12,087 – 9,600) × ₹50
= ***₹5,42,175***

Total earnings under Rowan scheme = $(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$
= $(9{,}600 \times ₹50) + \frac{9{,}600}{12{,}087} \times (12{,}087 - 9{,}600) \times ₹50$
= ***₹5,78,764***

Effective rate under Halsey Plan = ***₹56.48 per hour*** (₹5,42,175 ÷ 9,600 hours)

Effective rate under Rowan Plan = ***₹60.29 per hour*** (₹5,78,764 ÷ 9,600 hours)

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:

Halsey Plan = ***₹10.16*** (₹98.75 – ₹88.59)

Rowan Plan = ***₹4.18*** (₹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 9

Following information is given of a newly setup organization for the year ended on 31st 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 31st January, 2021.

[(5 Marks) July 2021]

Answer

(1) Separation Rate = $\frac{\text{No. of Separations}}{\text{Average number of workers}} \times 100 = \frac{25}{500} \times 100$ = ***5%***

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%***

(2) Equivalent Rates = Turnover rates × 12/2

Equivalent Separation Rate = 5% × 12/2 = ***30%***

Equivalent Flux Rate = 15% × 12/2 = ***90%***

PYQ 10

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) Effective Hourly Rate = $\frac{\text{Total Earning}}{\text{Actual Hours}} = \frac{1,440}{8}$ = ***₹180 Per Hour***

Calculation of total earning under Rowan Incentive Plan:

Earning under Rowan Plan = $(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$

= $(8 \times 150) + \frac{8}{10} \times (10 - 8) \times 150$ = ***₹1,440***

(b) Actual hours to maintain same effective rate under Halsey Incentive scheme (50%):

Effective rate under Halsey	=	[(AH × R) + 50% × (SH – AH) × R] ÷ AH		
180	=	[(AH × 150) + 50% × (10 – AH) × 150] ÷ AH		
180 AH	=	150 AH + 750 – 75 AH		
105 AH	=	750		
∴ AH	=	750 ÷ 105	=	***7.1428 hours***

PYQ 11

PQR Limited has replaced 72 workers during the quarter ended 31st 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:

Number of workers replaced	=	8% of Average workers	=	72 workers
∴ Average workers	=	72 ÷ 8%	=	***900 Workers***

(b) Number of workers left an discharged:

No. of workers left & discharged	=	5% of Average workers		
	=	5% of 900	=	***45 Workers***

(c) Number of workers recruited and joined:

No. of workers recruited & joined	=	Flux – Separation	=	16% - 5%
	=	11% of 900	=	***99 Workers***

(d) Equivalent turnover rates for the year:

Equivalent turnover rate	=	Turnover for quarter × 4 quarters		
Using Flux Method	=	16% × 4	=	***64%***
Using Replacement Method	=	8% × 4	=	***32%***
Using Separations Method	=	5% × 4	=	***20%***

PYQ 12

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	=	Number of hours × Wage rate per hour			
	=	48 Hours × ₹15	=		***₹720***

(b) Piece rate with guaranteed weekly wages:

Wages as per piece rate	=	Number of units produced × Piece rate		
	=	200 units × ₹4.50	=	₹900

Or

Guaranteed weekly wages	=	Weekly hours × Wage rate per hour		
	=	48 Hours × ₹15	=	₹720

Worker will get whatever is higher i.e. ***₹900***

(c) Halsey System	=	(AH × R) + 50% (SH - AH) × R		
	=	(48 hours × ₹15) + 50% (60 – 48) × ₹15	=	***₹810***

(d) Rowan System	=	$(AH \times R) + \frac{AH}{SH} \times (SH - AH) \times R$		
	=	$(48 \text{ hours} \times ₹15) + \frac{48}{60} \times (60 - 48) \times ₹15$	=	***₹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. Standard Hours (SH) = 200 units × 18/60 = 60 hours

PYQ 13

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) Earning under Existing Time Rate = (48 hours × ₹150) + (12 hours × ₹300)
= ***₹10,800***

(b) 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) Earning under Halsey Plan = $(AH \times R) + 50\% (SH - AH) \times R$
= $(48 \times ₹150) + 50\% (75 - 48) \times ₹150$
= ***₹9,225***

Working Notes:

Standard hours for 100 units = $\frac{7.5 \text{ hours}}{10 \text{ units}} \times 100 \text{ units}$ = 75 hours

SUGGESTED REVISION FOR EXAM:

BQ: 5, 7, 10, 11, 14, 16, 17, 18, 19

PYQ: 5, 6, 8, 10

CHAPTER 3 OVERHEADS – ABSORPTION COSTING METHOD

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
Total	***-***	***12,600***	***15,950***	***15,800***	***12,650***	***13,100***	***12,250***

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

The expenses of service departments D and E are to be apportioned as follows:

	A	B	C	D	E
Expenses of department D:	40	20	30	-	10
Expenses of department E:	30	30	40	-	-

Answer

Statement Showing Overhead Rate per Labour Hour

Items	Basis of Charge	Production Departments			Service Departments	
		A	B	C	D	E
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
Total Overheads	***Prim. Dist.***	***29,400***	***30,350***	***17,850***	***15,550***	***19,350***
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)
Total OH	***Secon. Dist.***	***41,892***	***39,731***	***30,877***	***-***	***-***
÷ Labour hours	-	5,000	5,000	2,000	-	-
OH rate per labour hour		***₹8.3784***	***₹7.9462***	***₹15.4385***	***-***	***-***

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:

Production Departments:	***(₹)***	***(₹)***
A	30,00,000	
B	26,00,000	
C	24,00,000	80,00,000
Service Departments:	***(₹)***	***(₹)***
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:

	Dept. A	Dept. B	Dept. C
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

Particulars	Basis	Total	Production Departments		
			A	B	C
Cost as per primary distribution	Given	80,00,000	30,00,000	26,00,000	24,00,0000
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
Total OH	-	***89,60,000***	***34,20,000***	***29,00,000***	***26,40,000***

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 (Ft^2)
Production:				
X	1,93,000	4,000	100	3,000
Y	64,000	3,000	125	1,500
Z	83,000	4,000	85	1,500
Service:				
P	45,000	1,000	10	500
Q	75,000	5,000	50	1,500
R	1,05,000	6,000	40	1,000
S	30,000	3,000	50	1,000

The overhead costs of the four service departments are distributed in the same order, viz. P, Q, R and S respectively on the following basis:

Department	Basis
P	Number of employees
Q	Direct labour hours
R	Area in square metres
S	Direct labour hours

You are required to:

(a) Prepare a schedule showing the distribution of overhead costs of the four service departments to the three production departments; and

(b) Calculate the overhead recovery rate per direct labour hour for each of 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
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
Total OH	**-**	**-**	**-**	**4,60,000**	**5,10,000**

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 it's 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

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
Total Overheads	-	***2,70,000***	***3,70,000***	***6,00,000***	***4,75,000***	***5,35,000***

(2) Statement Showing Redistribution of Overheads
(Trial and Error Method)

Items	Basis of Charge	Production Departments			Service Departments	
		A	B	C	X	Y
Total Overheads	-	***2,70,000***	***3,70,000***	***6,00,000***	***4,75,000***	***5,35,000***
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)
Total Overheads	-	***8,48,178***	***6,50,541***	***7,51,281***	-	-

(3) Machine Hour Rate:

$$\text{Machine Hour rate} = \frac{\text{Budgeted Overheads}}{\text{Machine Hours}}$$

Department A = 8,48,178 ÷1,000 = ***₹848.18***

Department B = 6,50,541 ÷2,000 = ***₹325.27***

Department C = 7,51,281 ÷4,000 = ***₹187.82***

Working Note:

Calculation of expenses under Trial and Error Method

Items	%	X	Y
Total Overheads		**4,75,000**	**5,35,000**
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	-
Total Overheads	**-**	**5,04,272**	**5,85,428**

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
H.P. used (H.P. × Machine hours)	50,000	80,000	80,000	15,000	25,000

BQ 8

The ABC Company has the following account balances and distribution of direct charges on 31st 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				

The following data were compiled by means of the factory survey made in the previous year:

Details	Floor space in Sq. ft.	Radiator sections	No. of employees	Investment 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
Total	**4,800**	**225**	**38**	**10,00,000**	**5,000**

Expenses charged to the stores and maintenance departments are to be distributed to the other departments by the following percentages:

Machine shop 50%; Packing 20%; General Plant 30%; General Plant overheads is distributed on the basis of number of employees:

Requirements:

(a) Prepare an overhead distribution statement with supporting schedules to show computations and basis of distribution including distribution of the service department expenses to producing department.

(b) Determine the service department distribution by the method of continued distribution. Carry through 3 cycles. Show all calculations to the nearest rupees.

Answer

(a) Overhead Distribution Statement

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	-
Apportioned overheads (see schedule below)	1,29,000	77,720	25,800	2,830	22,650
Total	**1,64,420**	**83,920**	**30,500**	**20,000**	**30,000**

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
Total	**-**	**77,720**	**25,800**	**2,830**	**22,650**

(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
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)
Total	**-**	**1,18,399**	**46,021**	**-**	**-**

BQ 9

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
Total overheads	***Primary Dist.***	***7,700***	***7,300***	***9,800***	***4,700***	***929***
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)
Total OH	-	***9,233***	***9,035***	***12,161***	-	-
÷ Working hours	-	3,070	4,475	2,419	-	-
OH rate per hour		***₹3.01***	***₹2.02***	***₹5.03***	-	-

Calculation of cost of product X:

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
Cost of product X		***₹117.23***

RECOVERY RATE

BQ 10

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	5	
Prime Cost	15	
Production Overhead	30	
Production Cost	45	
Administrative, Selling and Distribution Overhead	15	60
Profit		***15***

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:

(a) Calculate by different methods, six overhead absorption rates for absorption of production overhead.
(b) 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:

1. Direct labour hour rate $= \frac{\text{Production overheads}}{\text{Direct labour hours}} = \frac{30,00,000}{2,500} =$ ***1,200 per hour***

2. Machine hour rate $= \frac{\text{Production overheads}}{\text{Machine hours}} = \frac{30,00,000}{1,500} =$ ***2,000 per hour***

3. % of direct material cost $= \frac{\text{Production overheads}}{\text{Direct material cost}} \times 100 = \frac{30,00,000}{10,00,000} \times 100 =$ ***300%***

4. % of labour cost $= \frac{\text{Production overheads}}{\text{Direct labour cost}} \times 100 = \frac{30,00,000}{5,00,000} \times 100 =$ ***600%***

5. % of prime cost $= \frac{\text{Production overheads}}{\text{Prime cost}} \times 100 = \frac{30,00,000}{15,00,000} \times 100 =$ ***200%***

6. Job rate $= \frac{\text{Production overheads}}{\text{No. of jobs}} = \frac{30,00,000}{300} =$ ***10,000 per job***

(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	=	***₹9,600***
2.	Under machine hour rate	=	No. of machine hours × Rate per hour		
		=	5 hours × 2,000	=	***₹10,000***
3.	Under % of direct material cost	=	Direct material cost × % of material cost		
		=	2,500 × 300%	=	***₹7,500***
4.	Under % of direct labour cost	=	Direct labour cost × % of labour cost		
		=	2,000 × 600%	=	***₹12,000***
5.	Under % of prime cost	=	Prime cost × % of prime cost		
		=	4,500 × 200%	=	***₹9,000***
6.	Under job rate	=	No. of jobs × Rate per job		
		=	1 job × 10,000	=	***₹10,000***

BQ 11

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:

		Job A	***Job B***	***Job C***
Number of hours the machine was used:				
(a)	Without the use of the computer	600	900	-
(b)	With the use of the computer	400	600	1,000

You are required to compute the machine hour rate:

(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]

UNDER/OVER ABSORPTION OF OVERHEADS

BQ 12

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)
Net production overheads actually incurred	***60,000***
Production overheads recovered (10,000 hours × ₹5)	50,000
Under Recovery of production overheads	***₹10,000***

(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.

Supplementary OH Rate = Under Recovered OH ÷ Equivalent Units
= ₹4,000 ÷ 40,000 units = ***₹0.1 per unit***

Distribution of unabsorbed overheads of ₹4,000:

Cost of Sales (30,000 × ₹0.1) = ₹3,000
Finished Goods (10,000 × ₹0.1) = ₹1,000

BQ 13

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:

Recovered Overheads (1,50,000 man days × ₹25)	₹37,50,000
Actual Overheads Incurred	₹41,50,000
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.

Supplementary OH Rate = Under Recovered OH ÷ Equivalent Units
= ₹1,60,000 ÷ 40,000 units = ***₹4 per unit***

Distribution of unabsorbed overheads of ₹1,60,000:

Cost of Sales (30,000 × ₹4) = ₹1,20,000
Finished Goods (10,000 × ₹4) = ₹40,000

BQ 14

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.

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.

$$\textbf{Supplementary Rate} = \frac{40{,}000}{8{,}000 \text{ Units}} = \textbf{₹5 per unit}$$

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 units	Rate	Share of unabsorbed OH
Cost of Sales A/c	7,000	₹5	₹35,000
Stock of Finished	800	₹5	₹4,000
WIP A/c	200	₹5	₹1,000
Total			**₹40,000**

(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
Unabsorbed OH	**80,000**

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
Total Equivalent Completed Units	**8,000 units**

BQ 15

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. In applying overheads, the predetermined rates are multiplied by actual 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 budgeted and actual data are available:

Annual Budget:

Factory overheads budgeted for the year:

	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

Average wage rates budgeted in department P2 are:

	Product A	₹72 per hour	Product B	₹75 per hour

All materials and used in department P1 only.

Actual data (for the month of July, 2022):

Units actually produced:

	Product A	4,000 units	Product B	3,000 units

Actual direct machine hours worked in department P1:

	Product A	6,100 hours	Product B	4,150 hours

Actual direct labour hours worked in department P2:

	Product A	8,200 hours	Product B	7,400 hours

Costs actually incurred:		***Product A***		***Product B***
Raw Materials		₹4,89,000		₹4,56,000
Wages		₹5,91,000		₹5,52,000
Overheads:				
Department	P1	₹2,31,000	S2	₹60,000
	P2	₹2,04,000	S2	₹48,000

You are required to:

(i) Compute the pre-determined overhead rate for the each production department.
(ii) Prepare a performance report for July, 2022 that will reflect the budgeted costs and actual costs.

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)
Total OH	-	31,50,000	26,25,000	-	-
÷ Budget Machine hours	-	÷ 1,05,000	-	-	-
÷ Budget Labour hours	-	-	÷1,75,000	-	-
Recovery rate	-	₹30	₹15	-	-

(ii) Performance report for July 2022

(When 4,000 and 3,000 units of products A and B respectively were actually produced)

Particulars	Budgeted	Actual	Performance
Raw materials:			
A: 4,000 units @ ₹120	4,80,000	4,89,000	Adverse
B: 3,000 units @ ₹150	4,50,000	4,56,000	Adverse
Direct labour:			
A: 4,000 × 2 hours × ₹72	5,76,000	5,91,900	Adverse
B: 3,000 × 2.5 hours × ₹75	5,62,500	5,52,000	Favorable
Overheads:			
Department P1			
A: 4,000 × 1.5 × ₹30	1,80,000	*1,74,400	Favorable
B: 3,000 × 1 hour × ₹30	90,000	*1,18,649	Adverse
Department P2			
A: 4,000 × 2 hours × ₹15	1,20,000	*1,31,364	Adverse
B: 3,000 × 2.5 hours × ₹15	1,12,500	*1,18,548	Adverse
Total	***25,71,000***	***26,31,861***	***Adverse***

Computation of actual overhead rates for each production department from actual data

Items	Basis of Charge	Production Departments		Service Departments	
		P1	P2	S1	S2
Actual OH	Given	2,31,000	2,04,000	60,000	48,000
Apportionment:					
Expenses of S1	1:1	30,000	30,000	(60,000)	-
Expenses of S2	2:1	32,000	16,000	-	(48000)
Total OH	-	2,93,000	2,50,000	-	-
÷ Actual Machine hours	-	÷ 10,250	-	-	-
÷ Actual Labour hours	-	-	÷15,600	-	-
Recovery rate	-	₹28.59	₹16.02	-	-

*A: 6,100 × ₹28.59 = ₹1,74,400; B: 4,150 × ₹28.59 = ₹1,18,649

*A: 8,200 × ₹16.02 = ₹1,31,364; B: 7,400 × ₹16.02 = ₹1,18,548

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 1,05,000	75,000 hours	30,000 hours	
	(50,000 × 1.5 hours)	(30,000 × 1 hours)	
Budgeted labour hours in department P2 1,75,000	1,00,000 hours	75,000 hours	
	(50,000 × 2 hours)	(30,000 × 2.5 hours)	
Actual output (units)	4,000 units	3,000 units	
Actual machine hours in department P1	6,100 hours	4,150 hours	10,250
Actual labour hours in department P2	8,200 hours	7,400 hours	15,600

MISCELLANEOUS

BQ 16

A light engineering factory fabricates machine parts to customers. The factory commenced fabrication of 12 Nos. machine parts to customers' specifications and the expenditure incurred on the job for the week ending 21st August, 20X1 is given below:

Particulars	*₹*	*₹*
Direct materials (all items)		780
Direct labour (manual) 20 hours @ ₹15 per hour		300
Machine facilities:		
Machine No I: 4 hours @ ₹45	180	570
Machine No II: 6 hours @ ₹65	390	
Total		1650
Overheads @ ₹8 per hour on 20 manual hours		160
Total cost		***1810***

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

Machine facilities:		
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
Total cost		***1810***
Supplementary Rates		
Overheads @ ₹2 per hour on 20 manual hours	40	
Machine No I: 4 hours @ ₹15	60	
Machine No II: 6 hours @ ₹15	90	190
Total cost		***2,000***

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		=	***₹2 (₹10 – ₹8) per hour***

(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		=	***₹15 (₹60 – ₹45) per hour***

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		=	***₹15 (₹80 – ₹65) per hour***

BQ 17

A factory has three production departments. The policy of the factory is to recover the production overheads of the entire factory by adopting a single blanket rate based on the percentage of total factory overheads to total factory wages. The relevant data for a month are given below:

Department	***Direct Materials (₹)***	***Direct Wages (₹)***	***Factory OH (₹)***	***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 (₹)	Direct Wages (₹)	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):

$$\text{Blanket rate} = \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Direct Wages}} \times 100 = \frac{3,60,000 + 1,40,000 + 1,25,000}{80,000 + 3,50,000 + 70,000} \times 100$$

= ***125% of Direct Wages***

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
Prime Cost	***2,760***
Overheads (125% × ₹660)	825
Factory Cost	***3,585***
Mark-up (30% × ₹3,585)	10,75.50
Selling Price	***4,660.50***

(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:

$$\text{Machine hour rate} = \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Machine Hours}} = \frac{3,60,000}{80,000 \text{ hours}} = \text{₹4.50 per hour}$$

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:

$$\text{Direct labour hour rate} = \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Direct Labour Hours}} = \frac{1,25,000}{50,000 \text{ hours}} = ₹2.50 \text{ per hour}$$

(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
Prime Cost	**2,760**
Overheads:	
Machining (180 machine hours × ₹4.50)	810
Assembly (120 labour hours × ₹1.40)	168
Packing (40 labour hours × ₹2.50)	100
Factory Cost	**3,838**
Mark-up (30% × ₹3,838)	1,151.40
Selling Price	**4,989.40**

(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
(Under)/over recovery (1 - 2)	**(2,70,000)**	**2,53,500**	**(22,500)**	**(39,000)**

(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
(Under)/over recovery (1 - 2)	**42,000**	**42,000**	**15,000**	**99,000**

BQ 18

A company which sells four products, some of them unprofitable, proposes discontinuing the sale of one of them. The following information is available regarding income, costs and activity for the year ended 31st March, 2023.

Details	A	B	C	D
Sales (₹)	30,00,000	50,00,000	25,00,000	45,00,000
Cost of sales (₹) (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:

Details	₹	Basis of allocation to products
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

Details	Total (₹)	A (₹)	B (₹)	C (₹)	D (₹)
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
Total Variable cost (A)	***1,28,50,000***	***24,00,000***	***51,40,000***	***24,10,000***	***29,00,000***
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
Total Fixed cost (B)	***15,00,000***	***3,15,000***	***4,65,000***	***3,10,000***	***4,10,000***
Total cost (A + B)	***1,43,50,000***	***27,15,000***	***56,05,000***	***27,20,000***	***33,10,000***
Profit or Loss (Sales – Total cost)	***6,50,000***	***2,85,000***	***(6,05,000)***	***(2,20,000)***	***11,90,000***
% of Profit or Loss to sales	***4.33%***	***9.5%***	***(12.10%)***	***(8.80%)***	***26.44%***

MACHINE HOUR RATE

BQ 19

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

Machine Hour Rate

Particulars		Amount
(A) Standing charges/ Fixed costs		
Depreciation	[(₹1,00,00,000 – 9,00,000) × 1/10 years × 1/12]	75,833.33
Rent	(₹30,000 × ¼)	7,500
Lighting charges	(₹8,000 × 2/10)	1,600
Foreman's salary	(₹19,200 × 1/6)	3,200
Insurance Premium	(₹1,00,00,000 × 1% × 1/12)	8,333.33
Total (A)		**96,466.66**
(B) Running charges/ Variable costs		
Repairs	(₹18,00,000 × 1/10 years × 1/12)	15,000
Electricity	[(15 units × 4,380 hours × ₹5) × 1/12]	27,375
Sundry expenses (oil etc.)		900
Total (B)		**43,275**
Total Cost (A + B)		**1,39,741.66**
÷ Productive Machine Hours in a month (4,380 ÷ 12)		**÷ 365**
Machine Hour Rate		**₹382.85**

BQ 20

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:

(i) Budgeted working hours is 2,400 based on 8 hours per day for 300 days. This includes 400 hours for plant maintenance.

(ii) Electricity used by the machine is 15 units per hour at a cost of ₹2.00 per unit. No current is drawn during maintenance.

(iii) The machine requires special oil for heating which is replaced once in every month at a cost of ₹2,500 on each occasion.

(iv) Estimated cost of maintenance of the machine is ₹500 per week of 6 working days.

(v) 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.

(vi) 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

Machine Hour Rate

Particulars		Amount
(A) Standing charges/ Fixed costs		
Depreciation	[(₹7,50,000 – 30,000) × 1/15 years]	48,000
Operators wages and fringe benefits	[(₹450 × 300/6 × 3 × 1/6) + 40%]	15,750
Departmental and general overheads	[(₹60,000 + 12.5%) × 1/6]	11,250
Total (A)		**75,000**
(B) Running charges/ Variable costs		
Maintenance	(₹500 × 300/6)	25,000
Electricity	(15 units × 2,000 hours × ₹2)	60,000
Special oil	(₹2,500 × 12)	30,000
Total (B)		**1,15,000**

Total Cost (A + B)	***1,90,000***
÷ Productive Machine Hours (2,400 - 400)	÷ 2,000
Machine Hour Rate	***₹95.00***

BQ 21

A machine shop has 8 identical drilling machines manned by 6 operators. The machine cannot be worked without an operator wholly engaged on it. The original cost of all these 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	18
Leave (with pay) hours	20
Normal idle time (unavoidable) hours	10
Average rate of wages per day of 8 hours	₹800
Production bonus	15% on wages
Power and fuel consumption	₹80,500
Supervision & indirect labour	₹33,000
Lighting and electricity	₹12,000

The particulars are for a year:

Repairs and maintenance	3% of value of machines
Insurance	₹40,000
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.

Answer

Computation of Comprehensive Machine Hour Rate for the "Machine Shop" (6 Months)

Particulars		***Amount***
(A) Standing Charges:		
Operators wages	[(800 ÷ 8 hours) × 7,380]	7,38,000
Production bonus	(7,38,000 × 15%)	1,10,700
Supervision & indirect labour		33,000
Lighting and electricity		12,000
Insurance	(40,000 × 6/12)	20,000
Depreciation	(8,00,000 × 10% × 6/12)	40,000
Other sundry works expense	(12,000 × 6/12)	6,000
General management expense allocated	(54,530 × 6/12)	27,265
Total (A)		***9,86,965***
(B) Running Charges		
Repairs and maintenance	(8,00,000 × 3% × 6/12)	12,000
Power consumed		80,500
Total (B)		***92,500***
Total OH for the shop (i.e. for all machineries) for 6 month (A+B)		***10,79,465***
÷ Total machine hours		÷ 7,200
Machine Hour Rate		***₹149.93***

Working Notes:

Calculation of effective productive hours available to the machine shop and paid hours for 6 months:

Particulars	***Hours***
Normal Available hours (208 hours × 6 months × 6 operators)	7,488
Less: Absenteeism hours (18 hours × 6 operators)	(108)
Paid Hours per month	***7,380***
Less: Leave hours (20 hours × 6 operators)	(120)
Less: Normal idle time (10 hours × 6 operators)	(60)
Effective Productive Hours	***7,200***

As machines cannot be worked without an operator wholly engaged on them therefore, hours for which 6 operators are available for 6 months are the hours for which machines can be used. Hence 7,200 hours represent effective working hours.

PAST YEAR QUESTIONS

PYQ 1

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.
- 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 other miscellaneous expenditure per annum ₹18,000.

Required

(i) Calculate the cost of running one machine for a four week period.
(ii) Calculate machine hour rate.

[(8 Marks) May 2015]

Answer

(i) Computation of Cost of Running One Machine for a Four Week Period

Particulars		Amount
(A) Standing Charges:		
Rent	(5,400 × ⅓ × 4/52)	138
Heat and light	(9,720 × ⅓ × 4/52)	249
Forman's salary	(12,960 × ⅓ × 4/52)	332
Depreciation	(52,000 × 10% × 4/52)	400
Wages	(48 hours × 4 weeks × ₹20 per hour × 3 operators per machine)	11,520
Bonus 10% of	(44 hours × 4 weeks × ₹20 per hour × 3 operators)	1,056
Other miscellaneous expenditure	(18,000 × ⅓ × 4/52)	462
Total Standing Charges (A)		**14,157**
(B) Running Expenses:		
Repairs and maintenance	(₹60 × 4 weeks)	240
Consumable stores	(₹75 × 4 weeks)	300
Power	(44 hours × 4 weeks × 20 units × .80)	2,816
Total Running expenses (B)		**3,356**
Total Expenses of one machine for four week (A+B)		**17,513**

(ii) Machine hour rate = Total Expenses for 4 weeks ÷ Effective Hours for 4 weeks
= ₹17,513 ÷ 176 hours (44 hours × 4 weeks)
= **₹99.51 per hour**

PYQ 2

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).

(ii) Electricity used by the machine during production is 16 units per hour at cost of a 9 paisa 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*
(A) Standing Charges:	
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
Total Standing Charges (A)	***3,900***
(B) Running Expenses:	
Electricity (1900 hours × 16 units per hour × 0.09)	2,736
Chemical solution (₹20 × 50 weeks)	1,000
Maintenance	1,200
Total Running expenses (B)	***4,936***
Total Expenses of one machine for four week (A+B)	***8,836***
÷ Productive Machine Hours (Running and setting up)	÷ 2000
Machine Hour Rate	***₹4.418***

PYQ 3

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 overheard:

Absorbed OH	=	1,50,000 × 30	=	₹45,00,000
Actual OH	=	51,00,000		

Under absorption	=	51,00,000 – 45,0000	=	***₹6,00,000***

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 = ***₹4 per unit***

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

PYQ 4

Delta Ltd. Is a manufacturing concern having two production departments P_1 and P_2 and two service departments S_1 and S_2. After making a primary distribution of factory overheads of all departments are as under:

P_1	=	₹4,02,000
P_2	=	₹2,93,000
S_1	=	₹3,52,000
S_2	=	₹33,000

Overheads of service departments are apportioned as below:

	P_1	***P_2***	***S_1***	***S_2***
Department S_1	40%	50%	-	10%
Department S_2	50%	40%	10%	-

A product 'Z' passes through all the two production departments – P_1 and P_2 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

Particulars	***Basis***	***Production Departments***		***Service Departments***	
		P_1	***P_2***	***S_1***	***S_2***
Overheads	Primary distribution	4,02,000	2,93,000	3,52,000	33,000
Apportionment:					
Department S_1	(40:50:10)	1,43,555	1,79,445	(3,58,889)	35,889
Department S_2	(50:40:10)	34,445	27,555	6,889	(68,889)
Total Overheads		***5,80,000***	***5,00,000***	-	-
÷ Production Hours		5,840	5,840	-	-
Recovery rate per hour	-	***99.32***	***85.62***	-	-

Calculation of adjusted expenses of service department by using Simultaneous Equation method:

Expenses of Department S_1 = 3,52,000 + 10% of Expenses of S_2
Expenses of Department S_2 = 33,000 + 10% of Expenses of S_1

Now:

Expenses of Department S_1 = 3,52,000 + 10% (33,000 + 10% of S_1)
Expenses of Department S_1 = 3,52,000 + 3,300 + 1% of S_1

Expenses of Department S_1 = 3,55,300 ÷ 99% = ***3,58,889***

Expenses of Department S_2 = 33,000 + 10% of S_1
= 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
Prime Cost	***850***
Production Overheads:	
Department P_1 (2 hours × 99.32)	198.64
Department P_2 (3 hours × 85.62)	256.86
Total Cost	***1,305.50***

Working Notes:

Calculation of production hours = 365 × 16 hours = 5,840 hours

PYQ 5

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 (50% complete in all respects)	5,000 units

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)
Net production overheads actually incurred	**4,44,250**
Production overheads absorbed (2,65,000 hours × ₹1.45)	3,84,250
Under Recovery of production overheads	**₹60,000**

(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.

$$\text{Supplementary OH Rate} = \frac{\text{Under Absorbed Overhead}}{\text{Equivalent Units}} = \frac{42,000}{12,500+5,000+2,500}$$

= **₹2.10 per unit**

Distribution of unabsorbed overheads of ₹42,000:

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 6

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
Total overheads	-	**3,60,000**	**4,50,000**	**2,70,000**	**1,80,000**
Apportionment of expenses of:					
Department X	6 : 4 : 2	1,35,000	90,000	(2,70,000)	45,000
Department Y	4 : 1	1,80,000	45,000	-	(2,25,000)
Total overheads	-	**6,75,000**	**5,85,000**	-	-

(2) Calculation of factory overhead per hour:

Department A	=	6,75,000 ÷ 67,500 hours	=	**₹10 per hour**
Department B	=	5,85,000 ÷ 48,750 hours	=	**₹12 per hour**

PYQ 7

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

Machine Hour Rate

Particulars		Amount
(A) Standing charges/ Fixed costs		
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
Total (A)		**3,38,616**
(B) Running charges/ Variable costs		
Repairs	(₹5,40,000 × 1/15 years)	36,000
Power	(10 units × 4,200 hours × ₹7)	2,94,000
Oil and lubricants		87,384
Total (B)		**4,17,384**
Total Cost (A + B)		**7,56,000**
÷ Productive Machine Hours (4,500 - 300)		÷ 4,200
Machine Hour Rate		**₹180.00**

PYQ 8

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:

Finished goods	30,000 units
Sale of finished goods	27,000 units

The analysis of cost information reveals that ⅓ 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)
Net production overheads actually incurred	***7,51,500***
Production overheads absorbed (₹10,35,000 ÷ 90,000 hours) × 45,000 hours	5,17,500
Under Recovery of production overheads	***₹2,34,000***

(2) Accounting treatment of under-absorption of production overheads:

(a) ₹78,000 (i.e., ₹2,34,000 × ⅓) 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., ₹2,34,000 × ⅔) of under absorbed overheads should be distributed over finished goods and cost of sales by using supplementary rate.

$$\text{Supplementary Rate} = \frac{\text{Under Absorbed Overheads}}{\text{Total Units}} = \frac{1,56,000}{30,000} = ₹5.20 \text{ per unit}$$

(3) Apportionment of ₹1,56,000 Under Absorbed Overheads:

Finished goods (3,000 units × ₹5.20)	=	₹15,600
Cost of sales (27,000 units × ₹5.20)	=	₹1,40,400

PYQ 9

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

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:

Departments	P	Q	R	X	Y
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:

(i) Prepare a statement showing distribution of overheads among the production and service departments.

(ii) Calculate recovery rate per hour of each production department after redistributing the service department costs.

(iii) Find out the total cost of 'Product A'.

[(10 Marks) Nov 2020]

Answer

(i) Statement Showing Distribution of Overheads among Production and Service Departments

Items	Basis of Charge	Production Departments			Service Departments	
		P	Q	R	X	Y
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
Total overheads	***Primary Dist.***	***29,450***	***21,275***	***30,275***	***9,750***	***13,400***

(ii) Statement Showing Recovery Rate Per Hour

Items	Basis	Production Departments			Service Departments	
		P	Q	R	X	Y
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)	-
Total OH	-	**39,573**	**26,585**	**37,992**	-	-
÷ Working hours	-	13,191	7,598	14,995	-	-
OH rate per hour		**₹3.00**	**₹3.50**	**₹2.53**	-	-

Note: Cost of service departments are redistributed by using Repeated Distribution Method.

(iii) Calculation of cost of Product A:

Direct material cost	₹65.00
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
Cost of Product A	**₹145.56**

PYQ 10

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"

Particulars		Amount
(A) Standing Charges:		
Operators wages	(100 ÷ 8) × 7,380 hours	92,250
Production bonus	(92,250 × 10%)	9,225
Supervision & indirect labour		16,500
Lighting and electricity		6,000
Insurance	(3,60,000 × 6/12)	1,80,000
Depreciation	(32,00,000 × 10% × 6/12)	1,60,000
Sundry works expense	(50,000 × 6/12)	25,000
Management expenses allocated	(5,00,000 × 6/12)	2,50,000
Total (A)		**7,38,975**
(B) Running Charges		
Repairs and maintenance	(32,00,000 × 5% × 6/12)	80,000
Power consumed		40,250
Total (B)		**1,20,250**
Total OH for the shop (i.e. for all machineries) for 6 month (A+B)		**8,59,225**
÷ Total machine hours		÷ 7,200
Machine Hour Rate		**₹119.34**

Working Notes:

Calculation of effective productive hours available to the machine shop and paid hours for 6 months:

Particulars	6 Operators (Hours)
Normal Available hours (208 hours × 6 months × 6 operators)	7,488
Less: Absenteeism hours (18 hours × 6 operators)	(108)
Paid Hours per month	**7,380**
Less: Leave hours (20 hours × 6 operators)	(120)
Less: Normal idle time (10 hours × 6 operators)	(60)
Effective Productive Hours	**7,200**

PYQ 11

SNS Trading Company has three Main Departments and two Service Departments. The data for each department is given below:

Departments	Expenses (in ₹)	Area in (Sq. Mtr)	No. of Employees
Main Departments:			
Purchase Department	5,00,000	12	800
Packing Department	8,00,000	15	1700
Distribution Department	3,50,000	7	700
Service Departments:			
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

Particulars	Basis	Production Departments			Service Departments	
		Purchase	Packing	Distribution	Maintenance	Personnel
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)
Total OH	-	**7,96,000**	**12,61,000**	**5,53,000**	-	-

(2) Calculation of rate per hour:

Rate per hour	=	Total Overheads ÷ Total Hours		
Purchase Department	=	7,96,000 ÷ (12 hours × 365 days)	=	**₹181.74**
Packing Department	=	12,61,000 ÷ (24 hours × 365 days)	=	**₹143.95**
Distribution Department	=	5,53,000 ÷ (8 hours × 365 days)	=	**₹189.38**

PYQ 12

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 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)
Net production overheads actually incurred	**32,50,000**
Production overheads absorbed (1,50,000 man-days × ₹20)	30,00,000
Unabsorbed overheads	**₹2,50,000**

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.

Supplementary OH Rate = Unabsorbed overheads ÷ Equivalent Units
= ₹1,50,000 ÷ 75,000 units (50,000 + 12,000 + 65% of 20,000)
= ***₹2 per unit***

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 13

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.

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

Jobs	***Without the aid of the robot***	***With the aid of the robot***
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:

Particulars	Vulcanising		Brushing		Striping	
	Hours	₹	Hours	₹	Hours	₹
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
Machine Hour Rate	**-**	***22.00***	**-**	***18.43***	**-**	***34.50***

Working note:

1. Total machine hours used (500 + 1,000 + 400 + 400 + 1,200) 3,500

2. Total machine hours without the use of robot (500 + 1,000) 1,500

3. Total machine hours with the use of robot (400 + 400 + 1,200) 2,000

4. 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
Total	***₹42,000.00***

5. Robot hire charges for a month (₹2,70,000 ÷ 6 months) = ₹45,000

6. Overheads for using machines without Robot = $\frac{42,000}{3,500 \text{ hrs}}$ × 1,500 hrs. = ₹18,000

7. Overheads for using machines with Robot = $\frac{42,000}{3,500 \text{ hrs}}$ × 2,000 hrs. + ₹45,000

= ₹69,000

SUGGESTED REVISION FOR EXAM:

BQ: 2, 7, 8, 11, 12, 15, 16, 21

PYQ: 1, 5, 6

CHAPTER 4 COST SHEET & 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

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:

	April 1	April 30
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

Particulars	Amount
Cost of Goods Sold excluding Administrative Expenses	***56,000***
Add: Closing Finished Goods	19,000

Less: Opening Finished Goods	(17,600)
Factory Cost	***57,400***
Add: Closing WIP	14,500
Less: Opening WIP	(10,500)
Gross Factory Cost	***61,400***
Less: Factory Overheads	(10,000)
Prime Cost	***51,400***
Less Direct Wages	(17,500)
Raw Material Consumed	***33,900***
Add: Closing Raw Materials	10,600
Less Opening Raw Materials	(8,000)
Raw Materials Purchased	***36,500***

(2) Cost Sheet

Particulars	***Amount***
Raw Materials Purchased (W.N.)	36,500
Add: Opening stock of Raw Materials	8,000
Less: Closing stock of Raw Materials	(10,600)
Materials Consumed	***33,900***
Direct Wages	17,500
Prime Cost	***51,400***
Factory Overheads (17,500 ÷ 175%)	10,000
Add: Opening WIP	10,500
Less: Closing WIP	(14,500)
Factory Cost	***57,400***
Add: Opening Finished Goods	17,600
Less: Closing Finished Goods	(19,000)
Cost of Goods Sold	***56,000***
General Administrative Expenses	2,500
Selling and Distribution Overheads	3,500
Cost of Sales	***62,000***
Profit (b.f.)	13,000
Sales	***75,000***

BQ 3

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 4

The following data relate to the manufacture of a standard product during the four week ended 28th 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 5

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	***1,42,00,000***	***73.19***
Wages paid to production workers	36,64,000	18.89
Expenses paid for utilities	1,45,600	0.75
Prime Cost	***1,80,09,600***	***92.83***
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)	-
Cost of Production	***1,83,78,400***	***94.73***
Add: Value of opening finished stock	9,60,000	-
Less: Value of closing finished stock (₹94.734× 44,000)	(41,68,296)	-
Cost of Goods Sold	***1,51,70,104***	***94.81***
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
Cost of Sales	***1,85,89,104***	***116.18***
Add: Profit @15% on sales	32,80,430	20.50
Sales (1,85,89,104÷85%)	***2,18,69,534***	***136.68***

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 6

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
Prime Cost	***85,62,000***
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)
Factory Cost	***94,42,400***
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
Cost of Production	***1,05,22,000***

Notes:

1. Other administrative overhead does not form part of cost of production.
2. Salary paid to Director (Technical) is an administrative cost.

BQ 7

The following details are available from the books of R Ltd. for the year ending 31st March 2023:

Particulars	*Amount (₹)*
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 31st March 2023.

Answer

Cost Sheet of R Ltd.
(for the year ended at 31st March, 2023)

Particulars	*Amount (₹)*	*Amount (₹)*
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
Prime Cost		***1,87,32,600***
Works/ Factory overheads:		
Wages to foreman and store keeper	8,40,000	
Other indirect wages to factory staffs	1,35,000	9,75,000
Gross Factory Cost		***1,97,07,600***
Add: Opening value of WIP		7,84,000
Less: Closing value of WIP		(6,64,000)
Factory Cost		***1,98,27,600***
Research & development cost paid for improvement in production process		9,60,000
Production planning office expenses		12,60,000
Cost of Production		***2,20,47,600***
Add: Opening stock of finished goods		14,40,000
Less: Closing stock of finished goods		(9,80,000)
Cost of Goods Sold		***2,25,07,600***
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
Cost of Sales		***2,58,57,600***
Add: Profit (b.f.)		24,02,400
Sales		***2,82,60,000***

Notes: Income tax and Donation to PM National Relief Fund is avoided in the cost sheet.

BQ 8

Arnav Inspat Udyog Ltd. has the following expendiures for the year ended 31st March, 2023:

Sl. No.	*Particulars*	*Amount (₹)*	*Amount (₹)*
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		1,26,000
14	Repairs & maintenance paid for:		
	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
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 mangers:		
	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 1st 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 31st 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 31st March, 2023, showing:

(a) Prime cost,
(b) Factory cost,
(c) Cost of production,
(d) Cost of goods sold and
(e) Cost of sales.

Answer

Statement of Cost of Arnav Ispat Udyog Ltd
For the year ended 31st March, 2023

Particulars	Amount	Amount
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
Prime Cost		***10,74,25,200***
Works/Factory overheads:		
Stores and spares consumed	1,12,000	
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 for pollution control & 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)
Works / Factory Cost		***10,80,83,100***
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
Cost of Production		***10,93,05,700***
Add: Opening stock of Finished goods		11,00,000
Less: Closing stock of Finished goods		(18,00,000)
Cost of Goods Sold		***10,86,05,700***
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	
Selling overheads:		27,69,600
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
Cost of Sales		***11,35,03,300***

Notes:
GST paid of purchase of raw materials would not be part of cost of materials as it eligible for input credit.

BQ 9

The following figures are extracted from the Trial Balance of G.K Co. on 31st March:

Name of Account	*Dr. (₹)*	*Cr. (₹)*
Inventories:		
Finished Stock	80,000	-
Raw Materials	1,40,000	-
Work-in-Process	2,00,000	-
Office Appliances	17,400	-
Plant & Machinery	4,60500	-
Building	2,00,000	-
Sales	-	7,68,000
Sales Return and Rebates	14,000	-
Materials Purchased	3,20,000	-
Freight incurred on Materials	16,000	-
Purchase Returns	-	4,800
Direct employee cost	1,60,000	-
Indirect employee cost	18,000	-
Factory Supervision	10,000	-
Repairs and Upkeep Factory	14,000	-
Heat, Light and Power	65,000	-
Rates and Taxes	6,300	-
Miscellaneous Factory Expenses	18,700	-
Sales Commission	33,600	-
Sales Travelling	11,000	-
Sales Promotion	22,500	-
Distribution Department: Salaries and Expenses	18,000	-
Office Salaries and Expenses	8,600	-
Interest on Borrowed Funds	2,000	-

Further details are available as follows:

(a) Closing Inventories:

Finished Goods	1,15,000
Raw Materials	1,80,000
Work-in-Process	1,92,000

(b) Outstanding expenses on:

Direct employee cost	8,000
Indirect employee cost	1,200
Interest on Borrowed Funds	2,000

(c) Depreciation to be provided on:

Office Appliances	5%
Plant and Machinery	10%
Buildings	4%

(d) Distribution of the following costs: Heat, Light and Power to Factory, Office and Distribution in the ratio 8 : 1 : 1. Rates and Taxes two-thirds to Factory and one-third to Office. Depreciation on Buildings to Factory, Office and Selling in the ratio 8 : 1 : 1.

With the help of the above information, you are required to prepare a condensed Profit and Loss Statement of G.K. Company for the year ended 31st March along with supporting schedules of:

(1) Cost of Sales.
(2) Selling and Distribution Expenses.
(3) Administration Expenses.

Answer

Profit and Loss Statement of G.K Company for the year ended 31st March

Particulars	*(₹)*	*(₹)*
Gross Sales	7,68,000	
Less: Returns	(14,000)	7,54,000
Less: Cost of Sales [Refer to Schedule (1)]		(7,14,020)
Net Operating Profit		39,980
Less: Interest on borrowed funds (2,000 + 2,000)		(4,000)
Net Profit		***35,980***

(1) Schedule of Cost of Sales

Particulars	*(₹)*	*(₹)*
Materials consumed in Production		
Raw Material (Inventory opening balance)	1,40,000	
Add: Material Purchased	3,20,000	
Add: Freight on Material	16,000	
Less: Purchase Returns	(4,800)	
Less: Closing Raw Material Inventory	(1,80,000)	2,91,200
Direct employee cost (₹1,60,000 + ₹8,000)		1,68,000
Prime Cost		***4,59,200***
Factory Overheads:		
Indirect employee cost (₹18,000 + ₹1,200)	19,200	
Factory Supervision	10,000	
Repairs and Factory Upkeep	14,000	
Heat, Light and Power (₹65,000 × 8/10)	52,000	
Rates and Taxes (₹6,300 × 2/3)	4,200	
Miscellaneous Factory Expenses	18,700	
Depreciation of Plant (10% of ₹4,60,500)	46,050	
Depreciation of Buildings (4% of ₹2,00,000 × 8/10)	6,400	1,70,550
Add: Opening Work-in-Process inventory		2,00,000
Less: Closing Work-in-Process inventory		(1,92,000)
Works Cost/Cost of Production		***6,37,750***
Add: Opening Finished Goods inventory		80,000
Less: Closing Finished Goods inventory		(1,15,000)
Cost of Goods Sold		6,02,750
Add: Administration Expenses [See Schedule (3)]		18,870
Add: Selling and Distribution Expenses [See Schedule (2)]		92,400
Cost of Sales		***7,14,020***

(2) Schedule of Selling and Distribution Expenses

Particulars	(₹)
Sales Commission	33,600
Sales Travelling	11,000
Sales Promotion	22,500
Distribution Department: Salaries and Expenses	18,000
Heat, Light and Power	6,500
Depreciation of Buildings	800
Selling and Distribution Expenses	**92,400**

(3) Schedule of Administration Expenses

Particulars	(₹)
Office Salaries and Expenses	8,600
Depreciation of Office Appliances	870
Depreciation of Buildings	800
Heat, Light and Power	6,500
Rates and Taxes	2,100
Administration Expenses	**18,870**

BQ 10

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:

Level	Works cost per unit (₹)
10%	400
20%	390
30%	380
40%	370
50%	360
60%	350
70%	340
80%	330
90%	320
100%	310

Its fixed administration expenses amount to ₹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.
(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)

Particulars	*30% (30,000 units)*	*100% (1,00,000 units)*
Works Cost @ ₹380/₹310 per unit	1,14,00,000	3,10,00,000
Administrative overheads (Fixed)	1,50,000	1,50,000
Cost of Production	***1,15,50,000***	***3,11,50,000***
Fixed marketing expenses	2,50,000	2,50,000
Variable distribution cost @ ₹30 per unit	9,00,000	30,00,000
Additional expenses:		
Gifts @ ₹30 per unit	-	30,00,000
Customers prizes	-	1,00,000
Refreshment	-	1,00,000
Sponsorship cost	-	20,00,000
Cost of Sales	***1,27,00,000***	***3,96,00,000***
Profit	38,00,000	1,04,00,000
Sales @ ₹550/₹500 per unit	***1,65,00,000***	***5,00,00,000***

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 11

Atharva Pharmacare Limited produced a uniform type of product and has a manufacturing capacity of 3,000 units per week of 48 hours. From the records of the company, the following data are available relating to output and cost of 3 consecutive weeks

Week	*Units Manufactured*	*Direct Materials*	*Direct Wages*	*Factory Overheads*
1	1,200	₹9,000	₹3,600	₹31,000
2	1,600	₹12,000	₹4,800	₹33,000
3	1,800	₹13,500	₹5,400	₹34,000

Assuming that the company charges a profit of 20% on selling price, find out the selling price per unit when the weekly output is 2,000 units

[Sale Price ₹35.00 per unit]

BQ 12

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.

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

Particulars	*First 3 Months*	*Next 9 Months*	*Total*
Number of Units (W.N. 1)	*15,000*	*72,000*	*87,000*
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
Prime Cost	*22,50,000*	*1,08,00,000*	*1,30,50,000*
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
Total Cost	*50,00,000*	*2,23,50,000*	*2,73,50,000*
Add: Profit			20,00,000
Sales Value			*2,93,50,000*
Average Sales Price (2,93,50,000 ÷ 87,000)			*₹337.36*

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
Total production for the year	=	***87,000 units***

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 13

The Fancy Toys Company are manufacturer of two types of toys, x and y. The manufacturing costs for the year ended 31st March, 2023 were:

Direct material	2,00,000
Direct wages	1,12,000
Production Overhead	48,000
	3,60,000

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
Prime Cost	1,20,000	3.00	1,92,000	1.60
Production overheads	12,000	0.30	36,000	0.30
Factory Cost	1,32,000	3.30	2,28,000	1.90
Administrative overheads @ 200% of wages	80,000	2.00	1,44,000	1.20
Cost of Production	2,12,000	5.30	3,72,000	3.10
Less: Closing stock	(21,200)	-	(62,000)	-
Cost of Goods Sold	1,90,800	5.30	3,10,000	3.10
Selling Expenses	9,000	0.25	25,000	0.25
Cost of Sales	1,99,800	5.55	3,35,000	3.35
Profit	52,200	1.45	1,65,000	1.65
Sales	2,52,000	7.00	5,00,000	5.00

BQ 14

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:

	Physical units	Sales value
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)

Particular	***Car (Amount)***	***Insurance (Amount)***	***Finance (Amount)***	***Total***
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:				
Direct expenses:				
Sales exp. Per car	500	-	-	500
Document cost per insurance policy	-	6	-	6
Document cost for each loan	-	-	16	16
Indirect Expenses:				
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
Total	***750***	***156***	***216***	***1,122***
Profit (C–D)	***150***	***144***	***168***	***462***

(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%***

PAST YEAR QUESTIONS

PYQ 1

Following information relate to a manufacturing concern for the year ended 31st 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
Prime Cost	**56,46,000**
Factory Overheads (20% of 56,46,000)	11,29,200
Add: Opening WIP	1,92,500
Less: Closing WIP	(1,40,700)
Works Cost	**68,27,000**
Administrative Overheads	1,73,000
Cost of Production	**70,00,000**
Add: Opening Finished goods	6,08,500
Less: Closing Finished Goods [(70,00,000 ÷ 14,000) × 1,064 units]	(5,32,000)
Cost of Goods Sold	**70,76,500**
Selling expenses (₹16 × 14,153)	2,26,448
Cost of Sales	**73,02,948**
Profit (b.f.)	14,43,606
Sales (14,153 × 618)	**87,46,554**

Working Note:

Units in closing finished goods = Opening units + Units produced – Units sold
= 1,217 + 14,000 – 14,153 = ***1,064 units***

PYQ 2

Following details are provided by M/s ZIA Private Limited for the quarter ended 30th 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:

	30.06.2018	30.09.2018
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

Particulars	Amount
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)
Materials Consumed	**12,60,250**
Direct Wages	2,57,250
Direct Expenses	1,80,000
Prime Cost	**16,97,500**
Factory Overheads (2,57,250 ÷ 175%)	1,47,000
Add: Opening WIP	1,70,800
Less: Closing WIP	(1,90,000)
Factory Cost	**18,25,300**
Administrative Overheads (10% of 1,47,000)	14,700
Add: Opening Finished Goods	3,10,000
Less: Closing Finished Goods	(2,75,000)
Cost of Goods Sold	**18,75,000**
Selling and Distribution Overheads	60,000
Cost of Sales	**19,35,000**
Profit (b.f.)	2,75,000
Sales	**22,10,000**

Working Note:

Statement Showing Material Purchased

Particulars	Amount
Cost of Goods Sold	**18,75,000**

Add: Closing Finished Goods	2,75,000
Less: Opening Finished Goods	(3,10,000)
Cost Of Production	***18,40,000***
Less: Administrative Overheads	(14,700)
Factory Cost	***18,25,300***
Add: Closing WIP	1,90,000
Less: Opening WIP	(1,70,800)
Gross Factory Cost	***18,44,500***
Less: Factory Overheads	(1,47,000)
Prime Cost	***16,97,500***
Less: Direct Expenses	(1,80,000)
Less Direct Wages	(2,57,250)
Raw Material Consumed	***12,60,250***
Add: Closing Raw Materials	2,08,000
Less Opening Raw Materials	(2,45,600)
Raw Materials Purchased	***12,22,650***

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

Particulars	***First 3 Months***	***Next 9 Months***	***Total***
Number of Units (W.N. 1)	***4,500***	***21,600***	***26,100***
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)
Raw Materials Consumed	***1,57,500***	***7,56,000***	***9,13,500***
Direct Labour (W.N. 2)	1,44,000	6,48,000	7,92,000
Prime Cost	***3,01,500***	***14,04,000***	***17,05,500***
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
Works Cost	***4,63,500***	***20,41,200***	***25,04,700***
Administrative Overheads	1,29,600	3,88,800	5,18,400
Cost of Production	***5,93,100***	***24,30,000***	***30,23,100***
Selling and Distribution OH @ ₹8 per unit	36,000	1,72,800	2,08,800
Cost of Sales	***6,29,100***	***26,02,800***	***32,31,900***

(2) Statement Showing Selling Price Per Unit

Particulars	***Amount***
Sales Value for First Three Months (4,500 × 145)	6,52,500
Less: Cost of Sales for First Three Months	(6,29,100)
Profit for First Three Months	***23,400***
Required Profit from Next Nine Months (8,76,600 – 23,400)	8,53,200
Cost of Sales for Next Nine Months	26,02,800
Sales Value for Next Nine months	***34,56,000***
÷ Number of Units for Next Nine Months	÷ 21,600
Selling Price Per Unit for Next Nine Months	***₹160.00***

Working Notes:

1. Calculation of production per annum:

50% for 3 months (36,000 units × 50% × 3/12)	=	4,500 units
80% for 9 months (36,000 units × 80% × 9/12)	=	21,600 units
Total production for the year	=	***26,100 units***

2. Calculation of Labour cost:

First Three Months (4,500 × 30 or 48,000 × 3) whichever is higher	=	1,44,000
Next Nine Months (21,600 × 30 or 48,000 × 9) whichever is higher	=	6,48,000

3. Calculation of Semi-variable cost:

First Three Months (1,08,000 × 3/12)	=	27,000
Next Nine Months [(1,08,000 + 46,800 + 46,800) × 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 :

	1st September	***30th 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 ½ 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

Particulars	***Amount***
Cost of Goods Sold (91,000 units)	***78,26,000***
Add: Closing Finished Goods [(78,26,000 ÷ 91,000 units) × 5,000 units]	4,30,000
Less: Opening Finished Goods	(Nil)
Cost of Production	***82,56,000***
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)
Factory Cost	***80,50,000***
Add: Closing WIP	5,00,000
Less: Opening WIP	(2,00,000)
Gross Factory Cost	***83,50,000***
Less: Factory Overheads:	
Consumable Stores and Spares of Factory	(3,50,000)
Lease Rent of Production Asset	(2,00,000)
Prime Cost	***78,00,000***
Less Direct Employee Cost [(78,00,000 ÷ 1.5) × 0.5]	(26,00,000)
Raw Material Consumed	***52,00,000***
Add: Closing Raw Materials	2,92,000
Less Opening Raw Materials	(2,42,000)
Raw Materials Purchased	***52,50,000***

(2) Cost Sheet

Particulars	***Amount***
Raw Materials Purchased	52,50,000
Add: Opening stock of Raw Materials	2,42,000
Less: Closing stock of Raw Materials	(2,92,000)
Materials Consumed	***52,00,000***
Add: Direct Employee Cost	26,00,000
Prime Cost	***78,00,000***
Add: Factory Overheads:	
Consumable Stores and Spares of Factory	3,50,000
Lease Rent of Production Asset	2,00,000

Gross Factory Cost	***83,50,000***
Add: Opening WIP	2,00,000
Less: Closing WIP	(5,00,000)
Factory Cost	***80,50,000***
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)
Cost of Production	***82,56,000***
Add: Opening Finished Goods	Nil
Less: Closing Finished Goods	(4,30,000)
Cost of Goods Sold	***78,26,000***
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
Cost of Sales	***86,45,000***
Profit (b.f.)	13,65,000
Sales (91,000 units × ₹110)	***1,00,10,000***

Working Note:
Calculation of number of units produced and sold:

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 30th September, 2019 is as follows:

Direct material	8,00,000
Direct wages	4,48,000
Production Overhead	1,92,000
	14,40,000

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:

Production		***Sales***	
	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

Particulars		Super Pen	
		Total	Per unit
Direct Materials	[(8,00,000 ÷ 40,000 × 2 + 1,20,000 × 1) × 40,000 × 2]	3,20,000	8.00
Direct Labour	[(4,48,000 ÷ 40,000 × 1 + 1,20,000 × .6) × 40,000 × 1]	1,60,000	4.00
	Prime Cost	***4,80,000***	***12.00***
Production OH	[(1,92,000 ÷ 40,000 × 1 + 1,20,000 × 1) × 40,000 × 1]	48,000	1.20
	Factory Cost	***5,28,000***	***13.20***
Administrative overheads @ 200% of wages		3,20,000	8.00
	Cost of Production	***8,48,000***	***21.20***
Less: Closing stock	[(8,48,000 ÷ 40,000) × 4,000]	(84,800)	-
	Cost of Goods Sold	***7,63,200***	***21.20***
Selling Expenses	(36,000 × 1)	36,000	1.00
	Cost of Sales	***7,99,200***	***22.20***
Profit (b.f.)		2,80,800	7.80
	Sales (36,000 × 30)	***10,80,000***	***30.00***

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:

	1st April 2020	***30th April 2020***
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

Particulars	Amount
Raw Materials Purchased (W.N.)	1,65,000
Add: Opening stock of Raw Materials	20,000

Less: Closing stock of Raw Materials	(25,000)
Materials Consumed	***1,60,000***
Add: Direct Wages	1,20,000
Prime Cost	***2,80,000***
Add: Factory Overheads (1,20,000 ÷ 120%)	1,00,000
Add: Opening WIP	20,000
Less: Closing WIP	(30,000)
Works Cost/Cost of Production	***3,70,000***
Add: Opening Finished Goods	50,000
Less: Closing Finished Goods	(60,000)
Cost of Goods Sold	***3,60,000***
Add: General Administrative Expenses	18,000
Add: Selling Expenses	22,000
Cost of Sales	***4,00,000***
Profit (b.f.)	1,00,000
Sales	***5,00,000***

Working Note:

Statement Showing Material Purchased

Particulars	***Amount***
Cost of Sales	4,00,000
Less: Selling Expenses	22,000
Less: General Administrative Expenses	18,000
Cost of Goods Sold	***3,60,00***
Add: Closing Finished Goods	60,000
Less: Opening Finished Goods	(50,000)
Works Cost	***3,70,000***
Add: Closing WIP	30,000
Less: Opening WIP	(20,000)
Gross Works Cost	***3,80,000***
Less: Factory Overheads	(1,00,000)
Prime Cost	***2,80,000***
Less Direct Wages	(1,20,000)
Raw Material Consumed	***1,60,000***
Add: Closing Raw Materials	25,000
Less Opening Raw Materials	(20,000)
Raw Materials Purchased	***1,65,000***

PYQ 7

The following data relates to manufacturing of a standard product during the month of March, 2021:

Particulars	***Amount***
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 31st March, 2021)

Particulars	***Amount (₹)***
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)
	2,30,000
Direct Wages	1,20,000
Direct Expenses:	
Cost of special drawing	30,000
Hire charges paid for plant	24,000
Prime Cost	***4,04,000***
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
Gross Factory Cost	***5,15,960***
Add: Opening value of WIP	50,000
Less: Closing value of WIP	(24,000)
Factory Cost	***5,41,960***
Less: Sales of scrap	(5,000)
Cost of Production	***5,36,960***
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
Cost of Sales	***5,81,960***

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
Cost of Raw Material Consumed	***3,43,500***	***343.50***
Direct wages (₹80 × 2,000 hours)	1,60,000	160.00
Direct expenses (₹10 × 2,000 hours)	20,000	20.00
Prime Cost	***5,23,500***	***523.50***
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
Works Cost	***6,38,000***	***638.00***
Less: Realisable value of cuttings (₹150×35 kg.)	(5,250)	(5.25)
Cost of Production	***6,32,750***	***632.75***
Less: Closing stock of bags (100 bags × ₹632.75)	(63,275)	-
Cost of Goods Sold	***5,69,475***	***632.75***
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
Cost of Sales	***7,26,475***	***807.19***

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

The following data are available from the books and records of A Ltd. for the month of April 2022:

Particulars	***Amount***
Stock of raw materials on 1st 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 30th 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 1st 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 30th 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

Particulars	***Amount***
Raw Materials Purchased	2,80,000
Add: Opening stock of Raw Materials	10,000
Less: Closing stock of Raw Materials	(40,000)
Materials Consumed	***2,50,000***
Add: Direct Wages	70,000
Prime Cost	***3,20,000***
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
Factory Cost	***3,46,000***
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
Cost of Production	***3,78,000***
Add: Opening Finished Goods	28,000
Less: Closing Finished Goods [(3,78,000 ÷ 3,000) × 400]	(50,400)
Cost of Goods Sold	***3,55,600***
Add: Administrative Expenses	1,300
Add: Packing cost for redistribution of finished goods	1,500
Cost of Sales	***3,58,400***

(2) Selling Price per unit:

Cost per unit = 3,58,400 ÷ 2,800 units (200 + 3,000 - 400) = 128

Selling price per unit = 128 ÷ 80% = ***160***

PYQ 10

PNME Ltd. manufactures two types of masks- 'Disposable Masks' and 'Cloth Masks'. The cost data for the year ended 31st March, 2022 is as follows:

Direct Materials	₹12,50,000
Direct Wages	₹7,00,000

Production Overheads	₹4,00,000
Total	***₹23,50,000***

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

Particulars		***Cloth Mask***	
		Total	***Per unit***
Direct Materials	[(12,50,000 ÷ 50,000 × 2 + 1,50,000 × 1) × 50,000 × 2]	5,00,000	10.00
Direct Labour	[(7,00,000 ÷ 50,000 × 1 + 1,50,000 × .6) × 50,000 × 1]	2,50,000	5.00
	Prime Cost	***7,50,000***	***15.00***
Production OH	[(4,00,000 ÷ 50,000 × 1 + 1,50,000 × 1) × 50,000 × 1]	1,00,000	2.00
	Factory Cost	***8,50,000***	***17.00***
Administrative overheads @ 50% of production overheads		50,000	1.00
	Cost of Production	***9,00,000***	***18.00***
Less: Closing stock	[(9,00,000 ÷ 50,000) × 5,000]	(90,000)	-
	Cost of Goods Sold	***8,10,000***	***18.00***
Selling Expenses	(45,000 × 2)	90,000	2.00
	Cost of Sales	***9,00,000***	***20.00***
Profit (b.f.)		6,75,000	15.00
	Sales (45,000 × 35)	***15,75,000***	***35.00***

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.

Particulars	***April 1***	***April 30***
Opening and closing inventories data:		
Stock of finished goods	2,500 units	?
Stock of raw materials	₹42,500	₹38,600
Work-in-progress	₹42,500	₹42,800

Other data are:		
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
Prime Cost		***11,77,100***
Factory overheads:		
Salary and wages for supervisor and foremen		28,000
Add: Opening value of WIP		42,500
Less: Closing value of WIP		(42,800)
Factory Cost		***12,04,800***
Research & development cost for improvement in production process	31,680	

Primary packing cost	6,920	38,600
Cost of Production		***12,43,400***
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)
Cost of Goods Sold		***12,47,983***
Administrative Overheads		46,765
Selling and Distribution Overheads (1,52,600 × 0.20)		30,520
Cost of Sales		***13,25,268***

*Closing Stock Units = Opening Units + Produced Units – Units Sold
= 2,500 + 1,52,000 – 1,52,600 = 1,900 units

(2) Sale Price Per unit:

Cost per unit = 13,25,268 ÷ 1,52,600 = 8.6846
Sale Price per unit = 8.6846 ÷ 80% = ***₹10.86***

SUGGESTED REVISION FOR EXAM:

BQ: 7, 8, 9, 10, 11, 12, 13

PYQ: 2, 4, 6, 7, 8, 11

CHAPTER 5 JOB & BATCH COSTING

JOB COSTING

BQ 1

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
	Prime Cost	***200***
Production Overheads:		
Variable overheads	(20 hours × ₹2)	40
Fixed Overheads	[(1,00,000 ÷ 10,000) × 20]	200
	Factory Cost	***440***
Selling, Distribution and Administration Overheads		50
	Cost of Production	***490***
Profit (30% on sales)		210
	Quoted Price for Job (490 ÷ 70%)	***700***

BQ 2

A factory used job costing. The following cost data is obtained from its books for the year ended 31st 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
Prime cost	**16,50,000**
Factory overhead	4,50,000
Works cost/ Cost of production	**21,00,000**
Administration overhead	4,20,000
Selling and distribution overhead	5,25,000
Cost of sales	**30,45,000**
Profit	6,09,000
Sales value	**36,54,000**

Working Notes:

1.	% of Factory OH to direct wages	=	(4,50,000/7,50,000) × 100	=	**60%**
2.	% of Administration OH to works cost	=	(4,20,000/21,00,000) × 100	=	**20%**
3.	% of Selling & distribution OH to works cost	=	(5,25,000/21,00,000) × 100	=	**25%**
4.	% of Profit to sales	=	(6,09,000/36,54,000) × 100	=	**16.67%**

(b) Cost Sheet for the job order in 2023

Particulars	Amount
Direct material	12,00,000
Direct wages	7,50,000
Prime cost	**19,50,000**
Factory overhead (60% on direct wages)	4,50,000
Works cost/ Cost of production	**24,00,000**
Administration overhead (20% on works cost)	4,80,000
Selling and distribution overhead (25% on works cost + 15%)	6,90,000
Cost of sales	**35,70,000**
Profit (16.6.7% on sales or 20% on cost of sales)	7,14,000
Sales value (35,70,000 ÷ 83.33%)	**42,84,000**

BQ 3

A shop floor supervisor of a small factory presented the following cost for Job No. 303, to determine the selling price:

Particulars	Per Unit
Materials	70
Direct wages 18 hours @ 2.50 per hour	45
(Department X 8 hours; department Y 6 hours and department Z 4 hours)	
Chargeable expenses (stores)	5
	120
Overheads @ 33⅓%	40
Cost	**160**

Analysis of the profit and loss account for the year 2022:

Particulars	Amount	Particulars	Amount
Materials	1,50,000	Sales net of returns	2,50,000
Direct wages:			
Department X 10,000			
Department Y 12,000			
Department Z 8,000	30,000		
Stores expenses	4,000		
Overheads:			
Department X 5,000			
Department Y 9,000			
Department Z 2,000	16,000		
Selling expenses	20,000		
Gross profit	30,000		
	2,50,000		***2,50,000***

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 4

In a factory following the job costing method, an abstract from the work in process as at 30th September was prepared as under:

Job no.	Materials cost	Labour hours	Labour cost	Factory OH Applied
115	1,325	400	800	640
118	810	250	500	400
120	765	300	475	380
Total	***2,900***	***950***	***1,775***	***1,420***

Materials used in October were as follows:

Material Requisition	Job No.	Cost
54	118	300
55	118	425
56	118	515
57	120	665
58	121	910
59	124	720
		3,535

A summary of Labour Hours deployed during October is as under:

Job No.	Numbers of hours	
	Shop A	Shop 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.

Answer

Factory Cost Statement for Completed Jobs

Month	*Job No.*	*Materials*	*Direct Labour*	*Factory OH*	*Factory Cost*
September	115	1,325	800	640	2,765
October	115	-	125	100	225
Total	-	1,325	925	740	***2,990***
September	118	810	500	400	1,710
October	118	515	330	264	1,109
Total	-	1,325	830	664	***2,819***
September	120	765	475	380	1,620
October	120	665	245	196	1,106
Total	-	1,430	720	576	***2,726***

Statement Showing Invoice Price of Completed Jobs

Particulars	*Job 115*	*Job 118*	*Job 120*
Factory Cost	2,999.00	2,819.00	2,726.00
Admin and selling OH @10% of Factory Cost	299.00	281.90	272.60
Total Cost	3,289.00	3,100.90	2,998.60
Profit @ 20% on Cost	657.80	620.18	599.72
Invoice Price	***3,946.80***	***3,721.08***	***3,598.32***

Working Note:

Recovery rate of Factory Overheads $= \frac{\text{Factory OH}}{\text{Direct Labour Cost}} \times 100$

$= \frac{1,420}{1,775} \times 100 =$ 80% of Direct Labour Cost

Assumption: Indirect labour costs have been included in the factory overhead.

BQ 5

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

Particulars	Amount
Material	600
Direct labour	400
Prime cost	***1,000***
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
Works Cost	***1,348***

Woking notes:

1. 6 welders × 5 days × 8 hours = 240 hours
2. Unapportioned expenses (General overheads) ₹2,000 which works out at 10% of direct wages.

BQ 6

Ares Plumbing and Fitting Ltd. (APFL) deals in plumbing materials and also provides plumbing services to its customers. On 12th August, 2022, APFL received a job order for supply and fitting of plumbing materials. The work is to be done on the basis of specification provided by the hostel owner. Hostel will be inaugurated on 5th September, 2022 and the work is to be completed by 3rd September, 2022. Following are the details related with the job work:

Direct Materials: APFL uses a weighted average method for the pricing of materials issues.

Opening stock of materials as on 12th August 2022:

15mm GI Pipe, 12 units of (15 feet size) @ ₹600 each
20mm GI Pipe, 10 units of (15 feet size) @ ₹ 660 each
Other fitting materials, 60 units @ ₹ 26 each
Stainless Steel Faucet, 6 units @ ₹ 204 each
Valve, 8 units @ ₹ 404 each

Purchases:

On 16th August 2022:

20mm GI Pipe, 30 units of (15 feet size) @ ₹ 610 each
10 units of Valve @ ₹ 402 each

On 18th August 2022:

Other fitting materials, 150 units @ ₹ 28 each
Stainless Steel Faucet, 15 units @ ₹ 209 each

On 27th August 2022:

15mm GI Pipe, 35 units of (15 feet size) @ ₹ 628 each
20mm GI Pipe, 20 units of (15 feet size) @ ₹ 660 each
Valve, 14 units @ ₹ 424 each

Issues for the hostel job:

On 12th August 2022:
20mm GI Pipe, 2 units of (15 feet size)
Other fitting materials, 18 units

On 17th August 2022:
15mm GI Pipe, 8 units of (15 feet size)
Other fitting materials, 30 units

On 28th August 2022:
20mm GI Pipe, 2 units of (15 feet size)
15mm GI Pipe, 10 units of (15 feet size)
Other fitting materials, 34 units
Valve, 6 units

On 30th August 2022:
Other fitting materials, 60 units
Stainless Steel Faucet, 15 units

Direct Labour:
Plumber: 180 hours @ ₹50 per hour (includes 12 hours overtime)
Helper: 192 hours @ ₹35 per hour (includes 24 hours overtime)
Overtimes are paid at 1.5 times of the normal wage rate.

Overheads: Overheads are applied @ ₹13 per labour hour.

Pricing policy: It is company's policy to price all orders based on achieving a profit margin of 25% on sales price.

You are required to:

(a) Calculate the total cost of the job.
(b) Calculate the price to be charged from the customer.

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 × 204 + 15 × 209) ÷ 21 units } × 15 units]	3,113.57
Valve [{(8 × 404 + 10 × 402 + 14 × 424) ÷ 32 units } × 6 units]	2,472.75
Direct wages	
Plumber [(180 hours × ₹50) + (12 hours × ₹25)]	9,300
Helper [(192 hours × ₹35) + (24 hours × ₹17.5)]	7,140
Overheads [₹13 × (180 + 192) hours]	4,836
Total Cost	***44,367.95***

(b) Price to be charged = Total Cost + 25% Profit on Job Price
= 44,367.95 ÷ 75% = ***₹59,157.27***

Working Notes:

1. Cost of 15mm GI Pipe:

Date	Calculation	Amount (₹)
17.08.20	8 units × ₹600	4,800
28.07.20	{(4 units × ₹600 + 35 units × ₹628) ÷ 39 units} × 10 units	6,251.28
		11,051.28

2. Cost of 20mm GI Pipe:

Date	Calculation	Amount (₹)
12.08.20	2 units × ₹660	1,320
28.08.20	{(8 units × ₹660 + 30 units × ₹610 + 20 units × ₹660) ÷ 58 units} × 2 units	1,268.28
		2,588.28

3. Cost of Other fitting materials:

Date	Calculation	Amount (₹)
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
		3,866.07

REVERSE CALCULATION OF OVERHEADS

BQ 7

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:

	Job 101	***Job 102***
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]

BATCH COSTING

BQ 8

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

Particulars	*Cost per Batch*	*Total Cost*
Direct material cost	500.00	6,000.00
Direct wages	50.00	600.00
Oven set-up cost	150.00	1,800.00
Prime cost	***700.00***	***8,400.00***
Add: Production overhead (20% on direct wages)	10.00	120.00
Total Production Cost	***710.00***	***8,520.00***
Add: S & D and Administration overhead (10% of Total Production Cost)	71.00	852.00
Total Cost	***781.00***	***9,372.00***
Add : Profit (⅓ of Total Cost)	260.33	3,124
Selling Price	***1,041.33***	***12,496.00***

No. of batch = 600 units ÷ 50 units = ***12 batches***

BQ 9

Rio Limited undertakes to supply 1,000 units of a component per month for the months of January, February, and 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.

Month	*Batch output*	*Material cost*	*Labour cost*
January	1,250	6,250	2,500
February	1,500	9,000	3,000
March	1,000	5,000	2,000

Labour is paid at the rate of ₹2 per hour the other details are:

Month	*Overheads*	*Labour hours*
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 10

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.

Month	Batch output	Material cost (₹)	Direct wages (₹)	Direct labour hours
January	210	650	120	240
February	200	640	140	280
March	220	680	150	280
April	180	630	140	270
May	200	700	150	300
June	220	720	160	320

The other details are:

Month	Chargeable expenses	Direct labour hours
January	12,000	4,800
February	10,560	4,400
March	12,000	5,000
April	10,580	4,600
May	13,000	5,000
June	12,000	4,800

Answer

Statement Showing Cost and Profit

Particulars	Jan.	Feb.	March	April	May	June	Total
Batch output (in units)	210	200	220	180	200	220	1,230
Sales value (₹)	*1,680*	*1,600*	*1,760*	*1,440*	*1,600*	*1,760*	*9,840*
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
Total cost	*1,370*	*1,452*	*1,502*	*1,391*	*1,630*	*1,680*	*9,025*
Profit per batch (₹)	*310*	*148*	*258*	*49*	*(30)*	*80*	*815*
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 11

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

EBQ/ Optimum Run size = $\sqrt{\frac{2\,DS}{C}}$ = $\sqrt{\frac{2\times 6{,}000\times 60}{10\%\ of\ 20}}$ = ***600 units***

BQ 12

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) EBQ/ Optimum Run size = $\sqrt{\frac{2DS}{C}}$ = $\sqrt{\frac{2\times 48{,}000\times 3{,}200}{12}}$

= ***5,060 bearings***

(ii) Interval between two consecutive optimum runs.

= 365 ÷ No. of runs = 365 ÷ 10 = ***36.5 days***

(iii) Minimum inventory holding cost:

= ½ × EBQ × C = ½ × 5,060 × 12 = ***₹30,360***

Working Notes:

Number of optimum runs = 48,000 ÷ 5,060 = ***9.49 or 10 runs***

BQ 13

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) Economic Run size = $\sqrt{\frac{2\,DS}{C}}$ = $\sqrt{\frac{2\times 90{,}000\times 1{,}500}{5\%\ of\ 2{,}200}}$ = ***1,567 bearings***

(ii) Calculation of Extra Cost at Run Size 6,000 bearings:

Particulars	At EBQ 1,567	At RBQ 18,000
Set up Cost ($^{D}/_{RBQ}$ × 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 × ½ × C)	½ × 1,567 × 110 = 86,185	½ × 18,000 × 110 = 9,90,000
Total Cost	**1,73,185**	**9,97,500**
Extra Cost	**-**	**8,24,315**

BQ 14

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) EBQ/ Optimum Run size $= \sqrt{\frac{2\,DS}{C}} = \sqrt{\frac{2 \times 24{,}000 \times 324}{1.2}}$

$=$ ***3,600 bearings***

D	=	Bearing to be manufactured/supplied p.a.	=	24,000 bearings
S	=	Set-up cost per run of bearing manufacture	=	₹324
C	=	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 ($^{D}/_{RBQ}$ × 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 × ½ × C)	½ × 3,600 × 1.2 = 2,160	½ × 6,000 × 1.2 = 3,600
Total Cost	**4,428**	**4,896**
Extra Cost	**-**	**468**

(c) Inventory holding cost at optimum level is ₹2,160

BQ 15

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

(i) 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.

(ii) 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 (₹) [(D/RBQ) × 100]*	*Holding Cost Per Annum (₹) [½ × 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):

$$EBQ = \sqrt{\frac{2DS}{C}} = \sqrt{\frac{2 \times 50{,}000 \times 100}{.20 \times 1}} = \textit{7,071 Litres}$$

PAST YEAR QUESTIONS

PYQ 1

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:

$$\textbf{Factory overhead rate} = \frac{\text{Factory overhead}}{\text{Direct labour cost}} \times 100 = \frac{3,80,000}{9,50,000} \times 100 = \textbf{40\%}$$

$$\textbf{Admin overhead rate} = \frac{\text{Admin overhead}}{\text{Factory cost}} \times 100 = \frac{2,50,400}{31,30,000} \times 100 = \textbf{8\%}$$

Working Note:

Factory cost = Opening stock of materials + Purchase of materials – Closing of materials + Labour + Factory overhead

= 1,50,000 + 18,50,000 – 2,00,000 + 9,50,000 + 3,80,000

= ***31,30,000***

2. Statement of Cost and Price

Particulars	***₹***
Direct materials	8,00,000
Direct wages	4,50,000
Prime cost	***12,50,000***
Factory overheads @ 40% of 4,50,000	1,80,000
Factory cost	***14,30,000***
Administration overheads @ 8% of 14,30,000	1,14,400
Cost of goods sold	***15,44,400***
Cost of delivery	45,000
Cost of sales	***15,89,400***
Profit @ 10% of sales	1,76,600
Sales (15,89,400/90%)	***17,66,000***

PYQ 2

XYZ Ltd. 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) Optimum Run size = $\sqrt{\frac{2\,DS}{C}}$ = $\sqrt{\frac{2\times 48{,}000\times 384}{12\times .20}}$

= **3,919 bearings**

Number of runs = Annual demand ÷ EBQ = 48,000 ÷ 3,919

= **12.24 or 13 runs**

(2) Interval between two runs = 365 ÷ Number of Runs = 365 ÷ 13

= **28 days appx.**

(3) Computation of Extra Cost:

Particulars	At EBQ 3,919	At RBQ 8,000
Set up Cost ($^{D}/_{RBQ}$ × S)	(48,000 ÷ 3,919) 12.24 or 13 set ups × 384	(48,000 ÷ 8,000) 6 set ups × 384
Carrying cost (RBQ × ½ × C)	= 4,992 ½ × 3,919 × 2.4 = 4,703	= 2,304 ½ × 8,000 × 2.4 = 9,600
Total Cost	**9,695**	**11,904**
Extra Cost	**-**	**2,209**

(4) Opinion: Company should go with the EBQ (i.e. 3,919 bearings) having lower cost than RBQ 8,000 units.

PYQ 3

The following data presented by the supervisor of a factory for a job.

	₹Per unit
Direct Material	120
Direct Wages @ ₹4 per hour (Departments A - 4 hrs., B - 7 hrs., C - 2 hrs & D - 2 hrs)	60
Chargeable Expenses	20
Total	**200**

Analysis of the profit and loss account for the year ended 31st March, 2019:

Particulars	₹	Particulars	₹
Material Direct Wages	2,00,000	Sales	4,30,000

Dept. A	12,000			
Dept. B	8,000			
Dept. C	10,000			
Dept. D	20,000	50,000		
Special store items		6,000		
Overheads				
Dept. A	12,000			
Dept. B	6,000			
Dept. C	9,000			
Dept. D	17,000	44,000		
Gross profit c/d		1,30,000		
		4,30,000		***4,30,000***
Selling expenses		90,000	Gross profit b/d	1,30,000
Net profit		40,000		
		1,30,000		***1,30,000***

It is also to be noted that average hourly rates for all the four departments are similar.

Required:

(a) Prepare a job cost sheet.

(b) Calculate the entire revised cost using the above figures as the base.

(c) Add 20% profit on selling price to determine the selling price.

[(5 Marks) Nov 2019]

Answer

Job Cost Sheet

Particulars		***Amount***
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
Prime Cost		***200.00***
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
Works Cost		***251.00***
Selling Expenses @ 30% on works cost		75.30
Total Cost		***326.30***
Profit @ 20% on selling price or 25% on cost		81.575
Sales		***407.875***

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 = $\frac{\text{Selling Expenses}}{\text{Works Cost}} \times 100$ = $\frac{90,000}{4,30,000 - 1,30,000} \times 100$

= ***30% of works cost***

PYQ 4

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:

(a) What would be the optimum run size for Stent manufacture?

(b) What is the minimum inventory holding cost?

(c) 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 = $\sqrt{\frac{2\,DS}{C}}$ = $\sqrt{\frac{2 \times 4,00,00,000 \times 2.5\% \times 225}{1.5 \times 12}}$ = ***5,000 Stents***

(b) Minimum Inventory Holding Cost:

Minimum Inventory Holding Cost = ½ × EBQ × C

= ½ × 5,000 × ₹18 = ***₹45,000***

(c) Calculation of Extra Cost:

Particulars	***At EBQ 5,000***	***At RBQ 4,000***
Set up Cost ($^{D}/_{RBQ} \times S$)	(10,00,000 ÷ 5,000) × 225 = 45,000	(10,00,000 ÷ 4,000) × 225 = 56,250
Carrying cost (½× RBQ × C)	½ × 5,000 × 18 = 45,000	½ × 4,000 × 18 = 36,000
Total Cost	***90,000***	***92,250***
Extra Cost	***-***	***2,250***

PYQ 5

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 ($^{D}/_{RBQ}$ × S)	1,44,000	19,200
Carrying cost (RBQ × ½ × C)	1,44,000	10,80,000
Total Cost	**2,88,000**	**10,99,200**
Extra Cost	**-**	**8,11,200**

PYQ 6

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
Prime cost	**1,92,000**	**1,35,000**
Factory overheads	84,000F	60,000F
Factory cost	**1,92,000+84,000F**	**1,35,000+60,000F**
Administration overheads	(1,92,000+84,000F)A	(1,35,000+60,000F)A
Total cost	(1,92,000+84,000F)+ (1,92,000+84,000F)A **= 2,97,600**	(1,35,000+60,000F)+ (1,35,000+60,000F)A **= 2,10,000**

**** Computation of total cost of jobs:***

Total cost of Job 1 when 12% is the profit on cost = $\frac{3,33,312}{112\%}$ = ***₹2,97,600***

Total cost of Job 2 when 20% is the profit on cost = $\frac{2,52,000}{120\%}$ = ***₹2,10,000***

Now, we have the following equations:

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)

Multiply equation (1) by 5 and equation (2) by 7

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)

By subtracting equation (4) from (3):

15,000 + 15,000 A	=	18,000
15,000A	=	3,000
A	=	***0.2 or 20%***

Now putting the value of A in equation (1) to find the value of F:

1,92,000 + 84,000F + 1,92,000 × 0.2 + (84,000F × .2	=	2,97,600
84,000 F + 16,800 F	=	67,200
F	=	***0.6667 or 66.67%***

(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
Prime cost	***1,92,000***	***1,35,000***
Factory overheads (66.67% of wages)	56,000	40,000
Factory cost	***2,48,000***	***1,75,000***
Administration overheads (20% of factory cost)	49,600	35,000
Total cost	***2,97,600***	***2,10,000***
Profit	35,712	42,000
Selling Price	***3,33,312***	***2,52,000***

(c) Selling Price of the Job 3

Particulars	***Amount***
Materials	68,750
Productive Wages	22,500
Prime Cost	***91,250***
Factory Overheads (66.67% of 22,500)	15,000
Factory Cost	***1,06,250***
Admin Overheads (20% of 1,06,250)	21,250
Total Cost	***1,27,500***
Profit	22,500
Sale Price (1,27,500 ÷ 85%)	***1,50,000***

PYQ 7

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
Prime cost		***1,23,000***
Add: Production overhead (20% on direct wages)		2,000
Total Production Cost		***1,25,000***
Add: S & D and Administration overhead (20% of production Cost)		25,000
Total Cost		***1,50,000***
Add : Profit		50,000
Selling Price (1,50,000 ÷ 75%)		***2,00,000***

No. of batch = 1,600 units ÷ 80 units = ***20 batches***

(b) Selling price per vaccine = 2,00,000 ÷ 1,600 = ***₹125***

PYQ 8

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:

Particulars	***At EBQ 13,500***	***At RBQ 7,500***
Set up Cost ($^{D}/_{RBQ}$ × S)	33,750	60,750
Carrying cost (RBQ × ½ × C)	33,750	18,750
Total Cost	***67,500***	***79,500***
Additional Cost	***-***	***12,000***

SUGGESTED REVISION FOR EXAM:

BQ: 2, 3, 4, 7, 8, 9, 10

PYQ: 2

CHAPTER 6 ACTIVITY BASED COSTING

BQ 1

ABC Ltd. is a multiproduct company, manufacturing three products A, B and C. The budgeted costs and production for the year ending 31st March, 2023 are as follows:

Particulars	A	B	C
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:

Particulars	(₹)
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:

Particulars	A	B	C
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

Particulars	A (₹)	B (₹)	C (₹)
Direct Material	8.00	12.00	6.00
Direct Labour	5.00	7.50	10.00
Production Overhead @ ₹17.00 per hour	8.50	12.75	17.00
	(17 × 30/60)	(17 × 45/60)	(17 × 60/60)

Total Unit Cost	***21.50***	***32.25***	***33.00***
Number of units	4,000	3,000	1,600
Total Cost (total unit cost × number of units)	***86,000***	***96,750***	***52,800***

Calculation of overhead rate per direct labour hour:

Overhead recovery rate = Budgeted overheads ÷ Budgeted labour hours
= ₹99,450 ÷ 5,850 hours = ₹17 per hour

Budgeted labour hours = 4,000 A × 30/60 + 3,000 B × 45/60 + 1,600 C × 60/60
= 5,850 hours

(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 (4 × 0.75)	4.50 (6 × 0.75)	2.25 (3 × 0.75)
Electricity @ ₹1.082 per operation	6.49 (6 × 1.082)	3.25 (3 × 1.082)	2.16 (2 × 1.082)
Storage @ ₹1,040 per batch	2.60 $\left(10 \times \frac{1,040}{4,000}\right)$	1.73 $\left(5 \times \frac{1,040}{3,000}\right)$	9.75 $\left(15 \times \frac{1,040}{1,600}\right)$
Total Unit Cost	***25.09***	***28.98***	***30.16***
Number of units	4,000	3,000	1,600
Total Cost (total unit cost × number of units)	***1,00,360***	***86,940***	***48,256***

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

Total weight = 4,000 × 4 kg + 3,000 × 6 kg + 1,600 × 3 kg = 38,800 kgs

Total machine operations = 4,000 × 6 + 3,000 × 3 + 1,600 × 2 = 36,200 oper.

Total batches = 10 + 5 + 15 = 30 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 2

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

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:

Particulars	P	Q	R
Batch size (units)	150	500	1,000
Number of purchase orders per batch	3	10	8
Number of inspections per batch	5	4	3

The total production overheads are 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"

Particulars	P (₹)	Q (₹)	R (₹)
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
Cost per unit	230	428	364

2. Statement Showing "Cost per unit as per ABC Method"

Particulars	P (₹)	Q (₹)	R (₹)
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
Total Costs	***12,81,000***	***21,25,000***	***67,04,000***
Cost per unit (Total Cost ÷ Units)	***427.00***	***425.00***	***335.20***

Working Notes:

(a) Total Machine Hours = 3,000 × 10 + 5,000 × 18 + 20,000 × 14 = ***4,00,000 hours***

(b) Total Production OH = 4,00,000 machine hours × ₹6 = ***₹24,00,000***

(c) Total no. of Batches = (3,000 ÷ 150) + (5,000 ÷ 500) + (20,000 ÷ 1,000)
= 20 batches + 10 batches + 20 batches = ***50 batches***

(d) Total no. of Inspections = 5 × 20 batches + 4 × 10 batches + 3 × 20 batches
= ***200 inspections***

(e) Total no. of Purchase Order = 3 × 20 batches + 10 × 10 batches + 8 × 20 batches
= ***320 orders***

(f) Statement Showing Cost Driver Rate:

Cost Pool	*%*	*Overheads*	*Cost Driver Basis*	*Volume*	*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 3

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:

	BABYSOFT- Gold		*BABYSOFT- Pearl*		*BABYSOFT- Diamond*	
Production (Units)	***4,000***		***3,000***		***2,000***	
Resources per Unit:	***Qty***	***Rate***	***Qty***	***Rate***	***Qty***	***Rate***
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:

Particulars	*(₹)*	*Cost drivers*
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"

Particulars	BABYSOFT-Gold	BABYSOFT-Pearl	BABYSOFT-Diamond
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
Cost per unit	***189.00***	***244.17***	***291.50***
Total cost (Cost per unit × number of units)	***7,56,000***	***7,32,510***	***5,83,000***

Working notes:

(a) Total Direct labour hours = 4,000 units × 30/60 + 3,000 × 40/60 + 2,000 × 1 hour
= 2,000 hours + 2,000 hours + 2,000 hours
= ***6,000 hours***

(b) Overhead rate = Budgeted overheads ÷ Budgeted labour hours
= ₹1,98,000 ÷ 6,000 hours
= ***₹33/direct labour hour***

(c) Calculation of Direct material cost

	BABYSOFT- Gold (₹)	BABYSOFT- Pearl (₹)	BABYSOFT- Diamond (₹)
Essential oils	$120.00 \left(\frac{200 \times 60}{100}\right)$	$165.00 \left(\frac{300 \times 55}{100}\right)$	$195.00 \left(\frac{300 \times 65}{100}\right)$
Cocoa Butter	$40.00 \left(\frac{200 \times 20}{100}\right)$	$40.00 \left(\frac{200 \times 20}{100}\right)$	$40.00 \left(\frac{200 \times 20}{100}\right)$
Filtered water	$4.50 \left(\frac{30 \times 15}{100}\right)$	$4.50 \left(\frac{30 \times 15}{100}\right)$	$4.50 \left(\frac{30 \times 15}{100}\right)$
Chemicals	$3.00 \left(\frac{30 \times 10}{100}\right)$	$6.00 \left(\frac{50 \times 12}{100}\right)$	$9.00 \left(\frac{60 \times 15}{100}\right)$
Total cost	***167.50***	***215.50***	***248.50***

2. Statement Showing "Unit Cost and Total Cost as per ABC Costing"

Particulars	BABYSOFT- Gold	BABYSOFT- Pearl	BABYSOFT-Diamond
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 (0.06 × 108)	6.36 (0.06 × 106)	7.02 (0.06 × 117)
Supervising cost	5.00 (10 × 30/60)	6.67 (10 × 40/60)	10.00 (10 × 60/60)
Utilities	8.50 (1.70 × 5)	8.50 (1.70 × 5)	10.20 (1.70 × 6)
Cost per unit	***192.48***	***243.70***	***285.72***
Total cost	***7,69,920***	***7,31,100***	***5,71,440***

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/machine operations***

(d) Calculation of Total Weight and Total Operations:

	BABYSOFT- Gold	***BABYSOFT- Pearl***	***BABYSOFT- Diamond***	***Total***
Quantity (units)	4,000	3,000	2,000	-
Weight per unit (grams)	108 {(60×0.8)+20+30+10}	106 {(55×0.8)+20+30+12}	117 {(65×0.8)+20+30+15}	-
Total weight (grams)	4,32,000 (4,000 × 108)	3,18,000 (3,000 × 106)	2,34,000 (2,000 × 117)	9,84,000
Total operations	20,000 (4,000 × 5)	15,000 (3,000 × 5)	12,000 (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 4

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:

Particulars	***General Supermarket Chains (₹)***	***Drugstore Chains (₹)***	***Chemist Shops (₹)***
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:

Activity Area	***Cost Driver***
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:

Activity Area	Total costs in April, 2023 (₹)	Total Units of Cost Allocation Base used in April, 2023
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:

Particulars	Supermarket Chains	Drugstore Chains	Chemist Shops
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

Particulars	Supermarket	Drugstore	Chemist Shops	Total
Number of deliveries	330	825	2,750	-
Average revenue per delivery (₹)	84,975	28,875	5,445	-
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 purch. 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	Supermarket	Drugstore	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 ÷ 2,80,41,750) × 100	0.58%
Drug store chains	(1,90,410 ÷ 2,38,21,875) × 100	0.80%
Chemist shops	(4,74,650 ÷ 1,49,73,750) × 100	3.17%

Working note:

Computation of operating cost of each distribution channel:

Activities	Supermarket Chains	Drugstore Chains	Chemist Shops
Customer purchase order process	15,400 (385 × ₹40)	39,600 (990 × ₹40)	1,65,000 (4,125 × ₹40)
Line item ordering	16,170 (385 × 14 × ₹3)	35,640 (990 × 12 × ₹3)	1,23,750 (4,125 × 10 × ₹3)
Store delivery	16,500 (330 × ₹50)	41,250 (825 × ₹50)	1,37,500 (2,750 × ₹50)
Cartons dispatched	99,000 (330 × 300 × ₹1)	66,000 (825 × 80 × ₹1)	44,000 (2,750 × 16 × ₹1)
Shelf-stocking	15,840 (330 × 3 × ₹16)	7,920 (825 × 0.6 × ₹16)	4,400 (2,750 × 0.1 × ₹16)
Operating cost	***1,62,910***	***1,90,410***	***4,74,650***

(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 5

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:

	Soft drinks	Fresh produce	Packaged food
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:

Activity	Description of activity	Total Cost	Cost-allocation base
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)

	Soft Drinks (₹)	Fresh Produce (₹)	Packaged Foods (₹)	Total (₹)
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
% of Operating income to Sales	*1.70%*	*7.17%*	*3.30%*	*4.97%*

Working notes:

(a) Calculation of Cost Driver Rate

Activity (1)	Total cost (₹) (2)	Cost allocation base (3)	Cost driver rate (4) = [(2)÷(3)]
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

(b) Total support cost = 60,000 + 7,80,000 + 12,60,000 + 8,64,000 + 15,36,000
= ***45,00,000***

(c) Percentage of support cost to COGS = $\frac{45,00,000}{1,50,00,000} \times 100$ = ***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)

	Soft Drinks (₹)	Fresh Produce (₹)	Packaged Foods (₹)	Total (₹)
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
% of Operating income to Sales	***10.78%***	***0.60%***	***8.75%***	***4.97%***

BQ 6

MST Limited has collected the following data for its two activities. It calculates activity cost rates based on cost driver capacity.

Activity	*Cost Driver*	*Capacity*	*Cost*
Power	Kilowatt hours	50,000 kilowatt hours	₹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 (10,000 × ₹4)	80,000 (20,000 × ₹4)	60,000 (15,000 × ₹4)	1,80,000
Quality inspection @ ₹30 per inspection	1,05,000 (3,500 × ₹30)	75,000 (2,500 × ₹30)	90,000 (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 7

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:

Particulars	*Equipment Y*	*Equipment Z*
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:

Equipments	*Orders processed*	*Machine hours worked*	*Inspection hours*
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

Particulars	*Equipment Y*	*Equipment Z*
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
Manufacturing cost per unit	***₹936.38***	***₹1,298.50***

Predetermined overhead rate = Budgeted overheads ÷ Budgeted labour hours
= ₹12,42,500 ÷ 20,000 hours = ₹62.125/hour

Total labour hours = 2,500 units of Y × 3 hours + 3,125 units of Y × 4 hours
= 20,000 hours

(2) Statement Showing Unit Manufacturing Cost Using ABC Method

Particulars	Equipment Y	Equipment Z
Direct material cost	₹300	₹450
Direct labour cost	₹450	₹600
Overheads per unit (W.N.)	₹226.80	₹216.16
Manufacturing cost per unit	**₹976.80**	**₹1,266.16**

(3) Statement Showing Cost Distortion

Particulars	Equipment Y	Equipment Z
Unit manufacturing cost:		
Using direct labour hours as an application base	936.38	1298.50
Using activity based costing	976.80	1,266.16
Cost distortion	**(-) 40.42**	**+ 32.34**

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
Overhead per unit				**₹226.80**	**₹216.16**

BQ 8

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	1,23,12000	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	***53,090***	***2,23,531***	***6,90,375***	***7,39,757***	***274***

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 (₹) (No. of purchase × ₹750)	11,250	18,750	22,500	18,750	22,500
Customer visits costs (₹) (No. of customer visits × ₹600)	1,200	1,800	3,600	1,200	1,800
Delivery vehicles travel costs (₹) (Kms travelled × ₹5.75 per km.)	1,150	1,035	1,725	2,300	3,450
Product handling costs (₹) (units × ₹3.75)	17,550	73,830	5,13,000	2,68,313	32,906
Cost of expediting deliveries (₹) (No. of expedited deliveries × ₹2,250)	-				2,250
Total cost of customer level operating activities (₹)	***31,150***	***95,415***	***5,40,825***	***2,90,563***	***62,906***

(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 9

'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 (b) Rents (c) Currency Replenishment Cost	 4,00,000 2,00,000 1,00,000	 All fixed, no change. Fully fixed, no change. Expected to double during budget period.
Total	7,00,000	(This activity is driven by no. of ATM transactions)
Computer Processing	5,00,000	Half this amount is fixed and no change is expected. The variable portion is expected to increase to three times the current level. (This activity is driven by the number of computer transactions)
Issuing Statements	18,00,000	Presently, 3 lakh statements are made. In the budget period, 5 lakh statements are expected. For every increase of one lakh statement, one lakh rupees is the budgeted increase. (This activity is driven by the number of statements)
Computer Inquiries	2,00,000	Estimated to increase by 80% during the budget period. (This activity is driven by telephone minutes)

The activity drivers and their budgeted quantifies are given below:

Activity Drivers	Deposits	Loans	Credit Cards
No. of ATM Transactions	1,50,000	-	50,000
No. of Computer Processing Transactions	15,00,000	2,00,000	3,00,000
No. of Statements to be issued	3,50,000	50,000	1,00,000
Telephone Minutes	3,60,000	1,80,000	1,80,000

The bank budgets a volume of 58,600 deposit accounts, 13,000 loan accounts, and 14,000 Credit Card Accounts.

Required:

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"

Activity	Budgeted Activity Cost (₹)	Activity Driver	Budgeted Activity Driver units	Activity Rate (₹)	Deposits	Loans	Credit Cards
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:

Activity	Budgeted Cost (₹)	Remark
ATM Services: (a) Machine Maintenance (b) Rents (c) Currency Replenishment Cost	 4,00,000 2,00,000 2,00,000	 All fixed, no change. Fully fixed, no change. Doubled during budget period.
Total	8,00,000	
Computer Processing	2,50,000 7,50,000	₹2,50,000 (half of ₹5,00,000) is fixed and no change is expected. ₹2,50,000 (variable portion) is expected to increase to three times the current level.
Total	10,00,000	
Issuing Statements	18,00,000 2,00,000	Existing. 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. (₹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 (24,000 × 20)	₹10,80,000 (54,000 × 20)
Number of units	5,500	24,000
Overheads Cost Per Unit	***₹87.27***	***₹45.00***

Overheads Recovery Rate = Annual Overheads ÷ Annual Machine Hours
= (4,75,020 + 5,79,988 + 5,04,992) ÷ (24,000 + 54,000)
= ₹15,60,000 ÷ 78,000 = ***₹20 per machine hour***

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
Overheads Cost Per Unit				***₹95.39***	***₹43.14***

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
Difference in overheads cost per unit	***- ₹8.12***	***+ ₹1.86***

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
Prime Cost	***30,13,900***
Production Overhead @ 17.1847% of Prime Cost	5,17,930
Total Cost	***35,31,830***
÷ Number of units	÷ 15,000
Cost Per Unit	***₹235.46***

Calculation of overhead rate:

Overheads Recovery Rate = (Total Overheads ÷ Total Prime Cost) × 100

= [(22,50,000 + 17,30,000 + 6,84,500 + 5,14,800) ÷ 3,01,39,000] × 100
= ***17.1847 % of Prime Cost***

(2) Statement Showing Unit Cost and Total Cost Using ABC Method

Particulars		***(₹)***
Direct Material		26,38,700
Direct Labour		3,75,200
Prime Cost		***30,13,900***
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
Total Cost		***32,57,147***
Number of units		15,000
Cost Per Unit		***₹217.14***

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
Manufacturing cost per unit	**₹890**	**₹1,120**

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
Manufacturing cost per unit	**₹928.75**	**₹1,087.79**

(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
Cost distortion	**(-) 38.75**	**+ 32.21**

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
Overhead per unit	**₹218.75**	**₹207.79**

PYQ 4

PQR Ltd has decided to analyse the profitability of it's 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
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:

Activity	Cost Driver
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

Particulars	Customers				
	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)
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
Customer Level Operating Income	***55,120***	***76,200***	***1,03,600***	***1,04,000***	***(7,920)***

Working note:

Computation of customer level operating activities costs:

Particulars	Customers				
	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)
Order taking costs (₹) (No. of purchase orders × ₹200)	6,000	10,000	12,000	10,000	12,000

Customer visits costs (₹) (No. of customer visits × ₹300)	1,200	1,800	3,600	1,200	1,800
Delivery costs (₹) (*Kms travelled × ₹4.00 per km.)	3,200	2,880	4,800	6,400	9,600
Product handling costs (₹) (Number of case sold × ₹2.00)	18,720	28,400	1,24,000	76,000	19,600
Cost of expediting deliveries (₹) (No. of expedited deliveries × ₹100)	-	-	-	-	200
Total cost of customer level operating activities	***29,120***	***43,080***	***1,44,400***	***93,600***	***43,200***

* 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 (34 × 800)	25,600 (32 × 800)	11,200 (14 × 800)
Delivery costs @ ₹700 per delivery	77,000 (110 × 700)	44,800 (64 × 700)	36,400 (52 × 700)
Shelf Stocking costs @ ₹199 per hours	21,890 (110 × 199)	31,840 (160 × 199)	33,830 (170 × 199)
Total Cost	**2,56,090**	**2,52,240**	**2,41,430**

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 31st March, 2020:

Particulars	X	Y	Z
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.

	Budgeted Overheads (₹)	Cost Driver	Remarks
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

Particulars	X (₹)	Y (₹)	Z (₹)
Direct Material	90	84	176
Direct Labour	18	20	30
Production Overhead @ ₹9 per hour	40.50 (9 × 18/4)	45 (9 × 20/4)	67.50 (9 × 30/4)
Total Unit Cost	**148.50**	**149**	**273.50**

Working Note:
Calculation of overhead rate per direct labour hour:

Overhead recovery rate = Budgeted overheads ÷ Budgeted labour hours
= (50,000 + 40,000 + 28,240 + 1,28,000)÷ 27,360 hours = ₹9/hour

Budgeted labour hours = 1,200 X × 18/4 + 1,440 Y × 20/4 + 1,968 C × 30/4 = 27,360 hours

(2) Statement Showing Total Cost Per Unit of Each Product Using ABC Method

Particulars	X (₹)	Y (₹)	Z (₹)
Direct Material	90	84	176
Direct Labour	18	20	30
Production OH:			
Mat. Procurement	10.81 [(48×270.27)/1,200]	10.89 [(58×270.27)/1,440]	10.85 [(79×270.27)/1,968]
Set-up	8.68 [(25×416.67)/1,200]	8.68 [(30×416.67)/1,440]	8.68 [(41×416.67)/1,968]
Quality Control	6.13 [(25×294.17)/1,200]	6.13 [(30×294.17)/1,440]	6.13 [(41×294.17)/1,968]
Maintenance	26.67 [(20×6,400×1/4)/1,200]	22.22 [(20×6,400×1/4)/1,440]	32.52 [(20×6,400×1/2)/1,968]
Total Unit Cost	**160.29**	**151.92**	**264.18**

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 (10,000 × ₹10)	80,000 (8,000 × ₹10)	60,000 (6,000 × ₹10)	2,40,000
Production runs	60,000 (200 × ₹300)	54,000 (180 × ₹300)	48,000 (160 × ₹300)	1,62,000
Quality Inspections	90,000 (3,000 × ₹30)	75,000 (2,500 × ₹30)	45,000 (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 (₹)
(A)	Direct Cost:		18,000
	Direct Material		3,750
	Direct expenses: Initial design cost	(30,000 × 1,500/12,000)	21,750
	Total (A)		
(B)	Indirect cost:		15,000
	Direct Labour hours	(1,500 × ₹10)	4,500
	Production runs	(15 × ₹300)	7,500
	Quality Inspections	(250 × ₹30)	27,000
	Total (B)		48,750
	Total cost (A + B)		9,750
	Add: Profit @ 20% on cost		58,500
	Sales value		
Sale Price per unit of S (58,500 ÷ 1,500)			39

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:

1. Calculate the operating income and operating income as a percentage (%) of revenue of each product line if:

   (a) All support cost (other than cost of goods sold) are allocated in the ratio of cost of goods sold.
   (b) All support cost (other than cost of goods sold) are allocated using an activity-based costing system.

2. 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

1. (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
% of Operating income to Sales	*22.12%*	*14.60%*	*9.32%*	*13.46%*

1. (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 (50,000 × 2)	1,50,000 (50,000 × 3)	2,50,000 (50,000 × 5)	5,00,000
Ordering cost @ ₹415/purchase order	2,32,400 (415 × 560)	3,36,150 (415 × 810)	2,61,450 (415 × 630)	8,30,000
Delivery cost @ ₹650/delivery	6,17,500 (650 × 950)	6,50,000 (650 × 1,000)	5,52,500 (650 × 850)	18,20,000
Shelf stocking cost @ ₹720/hour	6,48,000 (720 × 900)	9,00,000 (720 × 1,250)	16,92,000 (720 × 2,350)	32,40,000
Customer Support cost @ ₹6/unit	10,51,200 (6 × 1,75,200)	9,01,800 (6 × 1,50,300)	8,67,000 (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
% of Operating income to Sales	*8.81%*	*12.71%*	*15.78%*	*13.46%*

2. 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 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 (1)	*Total cost (₹) (2)*	*Cost allocation base (3)*	*Cost driver rate (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 (750 × 350)	3,37,500 (750 × 450)	5,55,000 (750 × 740)
Machine Related Costs @ ₹3 per hour	45,000	56,250	1,87,500

Material Handling Cost @ ₹750 per movement	(3 × 15,000) 1,50,000 (750 × 200)	(3 × 18,750) 2,10,000 (750 × 280)	(3 × 62,500) 5,06,250 (750 × 675)
Inspection Costs @ ₹385 per inspection	77,000 (385 × 200)	1,54,000 (385 × 400)	3,46,500 (385 × 900)
Total Costs	***9,47,000***	***12,95,250***	***34,70,250***
Cost per unit (Total Cost ÷ Units)	***126.267***	***103.62***	***138.81***

Working Notes:

(a) Total Machine Hours = 7,500 × 2 + 12,500 × 1.5 + 25,000 × 2.5 = ***96,250 hours***

(b) Total Production OH = 96,250 machine hours × ₹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:

(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
Total Cost				***₹5,40,000***	***₹16,08,000***

(b) Overhead cost per unit:

Express coffee	=	5,40,000 ÷ 5,000	=	***₹108***
Instant coffee	=	16,08,000 ÷ 60,000	=	***₹26.80***

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
	₹33,75,000

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
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
Overheads Cost Per Unit				***₹22.12***	***₹22.35***	***₹20.38***

SUGGESTED REVISION FOR EXAM:

BQ: 1, 2, 3, 4, 6, 8, 9

PYQ: 2, 7, 8

CHAPTER 7 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

Particulars	***Job A (₹)***	***Job B (₹)***	***Job C (₹)***
Product blueprint cost	1,40,000	-	-
Hire charges paid for machinery	-	40,000	-
License fee paid for software	-	-	50,000
Total Direct Expenses	***1,40,000***	***40,000***	***50,000***

BQ 2

The following expenditures were incurred in Aditya Ltd. For the month of March 2024:

Particulars	₹
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
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

Particulars	₹
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
Total	***15,50,600***

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

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	₹16,000
Depreciation	₹26,000
Insurance	₹20,000
Total	***₹1,44,000***

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***
(A) Standing Charges:	
Salary of Drivers, Cleaners and Conductors	24,000
Salary to Supervisor	10,000
Taxation and Insurance	16,000
Depreciation	26,000
Insurance	20,000
Total (A)	***96,000***
(B) Running Expenses:	
Diesel and other Oil	40,000
Total (B)	***40,000***
(C) Maintenance Charges:	
Repairs and Maintenance	8,000
Total (C)	***8,000***
Total operating cost (A + B + C)	***1,44,000***
÷ Total passenger - kms	÷ 3,60,000
Cost per passenger-km	***₹0.40***

Working:

Passenger-kms = 5 buses × 40 kms × 40 passengers × 75% × 30 days × 2 = ***3,60,000***

BQ 2

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 buy 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
(A) Standing Charges:		
Depreciation per month	(10,00,000 ÷ 2.5 Years × $^{1}/_{12}$)	33,333
Insurance per month	[(10,00,000 × 3%) × $^{1}/_{12}$]	2,500
Annual Tax for one month	(20,000 × $^{1}/_{12}$)	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
Total (A)		***1,30,500***
(B) Running Charges:		
Petrol and oil	($^{500}/_{100}$ × 6,000 kms)	30,000
Commission @ 10% of collections		23,667
Total (B)		***53,667***
(C) Maintenance Charges:		
Repairs and maintenance	(2,04,000 × $^{1}/_{12}$)	17,000
Total (C)		***17,000***
Total operating cost (A + B + C)		***2,01,167***
Add: Profit @ 15% of collections		35,500
Collections (WN 3)		***2,36,667***
÷ Total Passenger-kms		÷ 2,40,000
Fare for per passenger-km		***₹0.9861***

WN 1: Calculation of total travelling of bus in one month:

= 2 × No of round trips daily × Distance one way × No of days

= 2 × 3 × 40 × 25 = ***6,000 kms***

WN 2: Calculation of passenger-kms per month:

= No of kms travelled per month × No of passengers

= 6,000 × 40 = ***2,40,000 passenger-kms***

WN 3: Calculation of collections:

Total collections = Operating cost (excluding commission on collections) + 10% for commission + 15% for profit

= 1,30,500 + 30,000 + 17,000 + 25% of collections

Collections = ***₹2,36,667***

BQ 3

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

Particulars	***Amount***
(A) Standing Charges:	
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
Total (A)	***2,283.33***
(B) Running Charges:	
Petrol and Oil (1.00 × 4,000)	4,000
Commission @ 10% on taking (10% of 8,822.21)	882.22
Total (B)	***4,882.22***
(C) Maintenance Charges:	
Annual Repairs (4,000 ÷ 12)	333.33
Total (C)	***333.33***
Total operating cost (A + B + C)	***7,498.88***
Add: Profit @ 15% on taking (15% of 8,822.21)	1,323.33
Taking (WN 2)	***8,822.21***
÷ Total round trips per month (25 days × 4 round trips)	100
Taking per round trip	***₹88.22***

WN 1: Calculation of total travelling of a car in one month:

= 20 Kms. × 2 sides × 4 times × 25 days = ***4,000 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

Collections = ***₹8,822.21***

BQ 4

Saitravels 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 33-⅓% of net takings of the firm.

[Newcity to Restvillage: 250kms × 0.161 = ₹40.25; Newcity to Shivapur: 200kms × 0.161 = ₹32.20]

BQ 5

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***
(A) Standing Charges:	
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
Total (A)	***72,041.25***
(B) Running Costs:	
Diesel (11,440 km ÷ 4 km) × ₹56	1,60,160
Lubricant oil (11,440 km. ÷ 100) × ₹10	1,144
Total (B)	***1,61,304***
(C) Maintenance Costs:	
Repairs and Maintenance	1,000
Total (C)	***1,000***
Total Operating Cost (A + B + C)	***2,34,345.25***
Add: Profit @ 30% on Taking	1,40,604.15
Net Taking	***3,74,952.40***
Add: Passenger tax @ 20 % on Taking	93,738.10
Taking per month	***4,68,690.50***
÷ Total passenger kms	÷ 5,20,500
Fare per passenger per km	***0.90***
Fare Delhi to Chandigarh (250 × 0.90)	***₹225***
Fare Delhi to Agra (210 × 0.90)	***₹189***
Fare Delhi to Jaipur (270 × 0.90)	***₹243***

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
Taking	=	***4,68,690.50***

2. Calculation of total km runs per month:

Bus route	***Kms per trip***	***Trips per day***	***Days per month***	***Kms per month***
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
				11,440 kms

3. Calculation of total passenger kms:

= (4,000 kms × 50 persons × 90%) + (4,200 kms × 50 persons × 85%) + (3,240 kms × 50 persons × 100%) = ***5,20,500***

BQ 6

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 7

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 it's 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
(A) Standing Charges:			
Insurance	1,200	1,200	-
Taxes	800	-	800
Depreciation (6,00,000 – 80,000) × 1/5	1,04,000	-	-
Hire Charges	-	-	1,80,000
Total (A)	**1,06,000**	**1,200**	**1,80,800**
(B) Running Charges:			
Petrol (20,000 × 6)	1,20,000	-	1,20,000
Reimbursement (20,000 × 10)	-	2,00,000	-
Total (B)	**1,20,000**	**2,00,000**	**1,20,000**
(C) Maintenance Charges:			
Repairs and maintenance (20,000 × 0.20)	4,000	-	-
Tyres (20,000 × .12)	2,400	-	2,400
Total (C)	**6,400**	**-**	**2,400**
Total Cost (A + B + C)	**2,32,400**	**2,01,200**	**3,03,200**
Rank	**II**	**I**	**III**

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 8

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
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:

Particulars	
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

Particulars	CNG Car (₹)	EV Car (₹)
(A) Running Charges:		
Fuel cost/ Power consumption cost	4,500	1,425
Total (A)	***4,500***	***1,425***
(B) Standing Charges		
Depreciation	4,583.33	10,000
Monthly insurance cost (7,600 ÷ 12)/ (14,600 ÷ 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
Total (B)	***31,216.66***	***37,216.67***
(C) Maintenance Charges:		
Monthly maintenance cost (8,000 ÷ 12)/ (5,200 ÷ 12)	666.67	433.33
Amortised cost of tyre replacement [(16,000 ÷ 5 years) ÷ 12]	177.78	133.33
Amortised cost of battery replacement	66.67	4,500
Total (C)	***911.12***	***5,066.66***
Total Cost (A + B + C)	***36,627.78***	***43,708.33***

Working notes:

(a) Fuel cost per month = (₹60 ÷ 20 kms) × 1,500 kms = ***₹4,500***

Power cost per month = (₹7.6 × 30 KWH ÷ 240 kms) × 1,500 kms = ***₹1,425***

(b) Depreciation CNG Car = (₹9,20,000 – ₹95,000) ÷ 15 Years × 1/12 = ***₹4,583.33***

Depreciation EV Car = (₹15,20,000 – ₹1,50,000 – ₹1,70,000) ÷ 10 Years × 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 × 2) ÷ 15 Years] × 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
(no replacement at the end of useful life, sold as scrap)
Amortised cost = (₹16,000 ÷ 10 Years) × 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 ÷ 15 Years) × 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 ÷ 10 Years) × 1/12	=	***₹4,500***

BQ 9

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***
(A) Fixed Costs:	
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
Total (A)	***6,000***
(B) Running Costs:	
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) ÷ 80,000 Kms} × 3,200 Kms]	16,000
Total (B)	***22,800***
Total operating cost (A + B)	***28,800***

(b) Vehicle cost per kilometer = Total cost ÷ Total Km
= 28,800 ÷ 3,200 km = ***₹9.00***

Cost per ton-km = Total cost ÷ Total ton-km
= 28,800 ÷ 16,000 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. Total ton-km = 1,600 kms × 10 + 1,600 kms × Nil = ***16,000***

3. Tyres cost = (6,250 ÷ 25,000 kms) × 3,200 kms = ***₹800***

BQ 10

A transport company has 20 vehicles, which capacities are as follows:

No of vehicles	*Capacity per vehicle*
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 vihicles)	₹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:

(i) Calculate per ton-km operating cost.
(ii) 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

Particulars			***Amount***
(A) Standing Charges:			
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
Total (A)			***17,86,000***
(B) Running Charges:			
Loading and unloading charges			7,65,000
Consumable Stores			1,35,000
Cost of diesel		[(90,000 kms ÷ 5 kms) × ₹78]	14,04,000
Lubricants, Oil etc.			1,15,000
Total (B)			***24,19,000***
(C) Maintenance Charges:			
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
Total (C)			***8,13,000***
Total operating cost (A + B + C)			***50,18,000***
÷ Total ton-kms.			9,43,200
Cost per ton-km			***₹5.32***

(ii) Calculation of Chargeable Freight:

Freight per ton-km = Cost per ton-km + 25% profit on freight
= ₹5.32 ÷ 75% = ***₹7.093***

Working notes:

1. Calculation of kms ran in Oct, 2023 = 100 kms × 2 × 25 days × 20 vehicles × 90%
= 90,000 kms.

2. Loading and unloading charges = [(20 vehicles × 90%) × 25 days × 2 trips × ₹850]
= ***₹7,65,000***

3. Calculation of ton-kms = {100 kms × 25 days × 90% × [(5 × 9 tons) + (6 × 12 tons) + (7 × 15 tons) + (2 × 20 tons)] + 100 kms × 25 days × 70% [(5 × 9 tons) + (6 × 12 tons) + (7 × 15 tons) + (2 × 20 tons)]} - 10%
= ***9,43,200 ton-km***

BQ 11

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 × 70/60) 7.00	(6.00 × 90/60) 9.00
Fuel oil, tyres, repairs similar charges @ ₹0.60 per Km	(0.60 × 10 kms) 6.00	(0.60 × 20 kms) 12.00
Operating Cost	***13.00***	***21.00***
÷ Effective tonne-kms	÷ 25	÷ 50
Cost per tonne-km	***₹0.52***	***₹0.42***

Decision: Purchase should be made from colliery X having lower operating cost per trip.

Working Notes:

(1) Total operating time in 1 trip:	***Colliery X***	***Colliery Y***
Running time (mine to plot)	60/20 × 5 Kms 15 minutes	60/20 × 10 Kms 30 minutes
Loading time	30 minutes	20 minutes
Running time (plot to mine)	15 minutes	30 minutes
Unloading time	10 minutes	10 minutes
Total operating time in one trip	***70 minutes***	***90 minutes***
(2) Effective tonnes km per trip:	5 tonnes × 5 kms + Nil tonnes × 5 kms ***= 25 tonne kms***	5 tonnes × 10 kms + Nil tonnes × 10 kms ***= 50 tonne kms***

BQ 12

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 MT × 80 kms + 12 MT × 120 kms + 16 MT × 160 kms

= ***5,600 MT km.***

Simple Average or Commercial basis MT kms:

= Average load × Total kms travelled

= $\frac{20+12+16}{3}$ MT × 360 kms = ***5,760 MT km.***

BQ 13

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:

Outward journey	*No. of journeys*	*Load (in ton)*
'A' to 'B'	10	6
'A' to 'C'	2	6
'C' to 'B'	2	4
Return journey	***No. of journeys***	***Load (in ton)***
'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:

Cost per commercial ton-km = $\frac{3,42,000}{44,862}$ = ***₹7.62***

1. (b) Calculation of cost per absolute ton-kms:

Cost per absolute ton-km = $\frac{3,42,000}{44,720}$ = ***₹7.65***

2. Statement of Profit
(For the month of January, 2023)

Particulars	*Amount*
Receipts:	
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
Total Receipts	***3,53,200***
Less: Total operating cost	(3,42,000)
Operating Profit	***11,200***
Less: Fine paid for overloading	(12,400)
Net Loss for the month	***(₹1,200)***

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
Total Operating Cost	***3,42,000***

(ii) Calculation of commercial ton-kms:

Total distance = 12 journeys × 300 kms × 2 (two way) = ***7,200***

Total weight = 12 journeys × 6 ton + 2 journeys × 4 ton + 5 journeys × 8 ton + 6 Journeys × 6 ton + 1 journey × 6 ton = ***162 ton***

Commercial ton-km = Total distance × Average weight
= 7,200 kms × (162 tons ÷ 26 journeys) = ***44,862***

(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)]} = ***20,960***

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)]}
= ***23,760***

Absolute ton-km = 20,960 + 23,760 = ***44,720***

HOTEL AND LODGES

BQ 14

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
Total Cost	***28,17,067***
Add: Profit @ 20% on taking	7,04,266
****Total Taking***	***35,21,333***
÷ Equivalent single room days	÷ 1,04,400
Rent for single room day	***₹33.73***
Rent for double room day (33.73 × 2.5)	***₹84.32***
Rent for triple room day (33.73 × 2.5 × 2)	***₹168.65***

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

Total Taking = ₹35,21,333

2. Calculation of equivalent single room suites:

Type of suites	Room days	Equivalent single room suites
Single room suite	100 × 360 ×100% = 36,000	36,000 × 1= 36,000
Double room suite	50 × 360 × 80% = 14,400	14,400 × 2.5 = 36,000
Triple room suite	30 × 360 × 60% = 6,480	6,480 × 5 = 32,400
Total equivalent single room days		***1,04,400***

BQ 15

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 31st 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	5,5,0000
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
Total Cost	***29,44,800***
Add: Profit @ 20% on Room rent or 25% on Cost	7,36,200
Total Rent to be Charged	***36,81,000***
÷ Equivalent Off-Season room days	÷ 36,000
Rent for one room per day in Off-Season	***₹102.25***
Rent for one room per day in Season (₹102.25 × 2)	***₹204.50***

Working Notes:

Equivalent Off –Season room days = 100 × 80% × 30 days × 6 months × 2 (double of Off-Season) + 100 × 40% × 30 days × 6 months × 1

= 14,400 × 2 + 7,200 × 1

= ***36,000 Room days***

HOSPITAL

BQ 16

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

(a) Calculate profit per Patient day, if the hospital recovers on an average ₹2,000 per day from each patient
(b) Find out Breakeven point for the hospital.

Answer

(a) Statement Showing Profit Per Patient Day

Particulars	Amount
(A) Variable Costs:	
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
Total (A)	***56,05,000***
(B) Fixed Costs:	
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
Total (B)	***48,61,000***

Total cost (A + B)	***1,04,66,000***
Collection from patients (2,000 × 8,000 patient days)	***1,60,00,000***
Profit (Collection – Total cost)	***55,34,000***
Profit per patient day (Profit ÷ Patient days)	***691.75***

(b) Calculation of BEP for the hospital:

BEP = Fixed cost ÷ Contribution per patient day
= 48,61,000 ÷ 1,299.375 = ***3,741 patient days***

Working Notes:

1. Calculation of number of Patient days:

= (35 beds × 150 days) + (25 beds × 80 days) + 750 beds
= ***8,000***

2. Calculation Contribution per patient day:

Contribution = Sales – Variable cost
= 1,60,00,000 – 56,05,000 = 1,03,95,000

Contribution per patient day = 1,03,95,000 ÷ 8,000 = ***1,299.375***

INFORMATION TECHNOLOGY (IT) AND IT ENABLED SERVICES (ITES)

BQ 17

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

Particulars	***Amount***
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
Total Salary	***7,75,000***
Overheads (50 % of Salary)	3,87,500
Travel expenses	1,87,500
Depreciation on Laptops [(1,00,000 ÷ 2 years) × 6/12]	25,000
Total Project Cost	***13,75,000***

Working Notes:

1. Total Overheads per annum = Repairs & Maintenance + Administration Overheads
= 3,00,000 + 12,00,000 = ***15,00,000***

2. Calculation of total salary per annum and salary per month:

Particulars	*Total Per Annum*	*Per Person Per Annum*	*Per Person Per Month*
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
Total	***₹30,00,000***	***₹13,50,000***	***₹1,12,500***

3. Calculation of Overhead absorption rate:

Overhead absorption rate = Total overheads per annum ÷ Total salary per annum
= 15,00,000 ÷ 30,00,000 = ***50% of salary***

TOLL PLAZA/ TOLL ROADS

BQ 18

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)

Particulars	*Amount (₹)*
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
Total Cost for April 2020	***1,94,80,000***
÷ Total kilometers	÷ 60 kms
Cost per Kilometer for April	***₹3,24,667***

2. Calculation of toll rate per vehicle:

Total Toll Collection in April = Total Cost for April + 25%
= ₹1,94,80,000 + 25 % = ***₹2,43,50,000***

Toll Rate per vehicle = Total collection for April ÷ Total vehicles in April
= ₹2,43,50,000 ÷ 10,00,000 = ***₹24.35***

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 = ***10,00,000***

BQ 19

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:

Sl. No.	*Type of vehicle*	*Daily traffic volume*
1	Two wheelers	44,500
2	Car and SUVs	3,450
3	Bus and LCV	1,800
4	Heavy commercial vehicles	816

The following is the estimated cost of the project:

Activities	*Amount (₹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
Total Project Cost	***1,14,495.25***

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 (₹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
Total Project Cost	***1,15,615.25***
÷ Concession period in days (25 years × 365 days)	÷ 9,125
Cost per day of concession period (₹in Lakh)	***₹12.67***

(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		***₹19.06***
Toll per Cars and SUVs	(₹19.06 × 4)	***₹76.24***
Toll per Bus and LCV	(₹19.06 × 6)	***₹114.36***
Toll per Heavy commercial vehicles	(₹19.06 × 9)	***₹171.54***

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 = ***₹14,57,050***

(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
Total Equivalent Two wheeler per day					***76,444***

EDUCATIONAL INSTITUTIONS

BQ 20

AD Higher Secondary School (AHSS) offers courses for 11th & 12th standard in three streams i.e. Arts, Commerce and Science. AHSS runs higher secondary classes along with primary and secondary classes, but for accounting purpose it treats higher secondary as a separate responsibility centre. The Managing committee of the school wants to revise its fee structure for higher secondary students. The accountant of the school has provided the following details for a year:

	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 (35,000×12×4)	21,00,000 (35,000×12×5)	25,20,000 (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
Total Cost per annum	***20,87,636***	***34,32,000***	***34,62,764***	***89,82,400***
÷ Number of Students	÷ 120	÷ 360	÷ 180	÷ 660
Cost per student per annum	***17,397***	***9,533***	***19,238***	***13,610***

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)
Total Profit/ (Loss) per annum	(6,47,636)	8,88,000	(13,02,764)	(10,62,400)

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 ÷ 1,040) × 208		(₹4,20,000 ÷ 1,100) × 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 × 10,000 × 12 months)	1,20,000
Add: 15% of other peons' salary {15% of 3 peons × 10,000 × 12 months) }	54,000
Total	**1,74,000**

(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 21

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:

1. 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.
2. Calculate cost per policy.
3. Calculate cost per rupee of insured value.

Answer

1. Statement Showing Total Cost for 'Professionals Protection Plus' Policy

Particulars	Amount
(a) Product development, Marketing and Sales support:	
Policy development cost	11,25,000
Cost of marketing of the policy	45,20,000
Sales support expenses	11,45,000
Total (a)	***67,90,000***
(b) Operations:	
Policy issuance cost	10,05,900
Policy servicing cost	35,20,700
Claims management cost	1,25,600
Total (b)	***46,52,200***

(c) IT Cost:	
IT cost	74,32,000
Total (c)	***74,32,000***
(d) Support functions:	
Postage and logistics	10,25,000
Facilities cost	15,24,000
Employees cost	5,60,000
Office administration cost	16,20,400
Total (d)	***47,29,400***
Total Cost (a + b + c + d)	***2,36,03,600***

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 22

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 (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
Total overhead costs	***₹1,81,000***

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

Particulars	***Amount***
Direct professional labour cost (4 employees × 60,000)	2,40,000
Service overhead cost (25% of 1,81,000)	45,250
Total processing cost per month	***2,85,250***
÷ Number of applications processed per month	÷ 500
Cost of Processing One Home Loan Application	***₹570.50***

POWER HOUSES

BQ 23

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

Particulars	Amount
(A) Fixed Costs:	
Plant supervision	6,00,000
Administration overheads	40,00,000
Depreciation (₹5,00,00,000 × 5%)	25,00,000
Total (A)	**71,00,000**
(B) Variable Costs:	
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
Total (B)	**65,00,000**
Total Operating Cost (A + B)	**1,36,00,000**
÷ Total kwh generated	÷ 20,00,000
Cost of electricity generated per kwh	**₹6.80**

BQ 24

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

Particulars	Amount

(A) Fixed Costs:	
Plant supervision	3,00,000
Administration overheads	20,00,000
Depreciation (₹2,00,00,000 × 5%)	10,00,000
Total (A)	***33,00,000***
(B) Variable Costs:	
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 kwh ÷ 5 kwh) × ₹4.25 per kg	8,50,000
Total (B)	***32,50,000***
Total Operating Cost (A + B)	***65,50,000***
÷ Total kwh generated	÷ 10,00,000
Cost of electricity generated per kwh	***₹6.55***

BQ 25

Solar Power Ltd. has a power generation capacity of 1000 Megawatt per day. On an average it operates at 85% of its installed capacity. The cost structure of the plant is as under:

Cost Particulars	*Amount (₹in lakhs)*
Employee cost per year	2,500
Solar panel maintenance cost per year	250
Site maintenance cost per year	150
Depreciation per year	5,940

Calculate cost of generating 1kW of power. [1 Megawatt = 1,000 kW]

Answer

Calculation of 1 kW Power Generation Cost

Particulars	*Amount (₹in Lakhs)*
Employee cost per year	2,500
Solar panel maintenance cost per year	250
Site maintenance cost per year	150
Depreciation per year	5,940
Total Cost	***8,840***
÷ Estimated Power generated in megawatt	÷ 3,10,250
Cost of generating 1 megawatt in ₹	***2,849.31***
Cost of generating 1 kW (2,849.31 ÷ 1,000)	***2.849***

Working:

1. Estimated power generated in a year = 1000 Megawatt × 85% × 365 days
= 3,10,250 Megawatt

PAST YEAR QUESTIONS

PYQ 1

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***
(A) Standing Charges:	
Depreciation per month [(18,00,000 - 1,20,000) × $^{1}/_{15}$ × $^{1}/_{12}$]	9,333
Insurance per month [(18,00,000 × 3%) × $^{1}/_{12}$]	4,500
Manager-cum accountant's salary	8,000
Annual Tax for one month (50,000 × $^{1}/_{12}$)	4,167
Garage Rent	2,500
Driver's salary	15,000
Conductor's salary	12,000
Stationery	500
Total (A)	***56,000***
(B) Running Charges:	
Diesel and oil ($^{52}/_{10}$ × 3,000 kms)	15,600
Engine oil, lubricants ($^{2,500}/_{1,200}$ × 3,000 kms)	6,250
Commission @ 10% of collections 'WN'	12,047
Total (B)	***33,897***
(C) Maintenance Charges:	
Repairs and maintenance (1,50,000 × $^{1}/_{12}$)	12,500
Total (C)	***12,500***
Total operating cost (A + B + C)	***1,02,397***
Add: Profit @ 15% of collections	18,070
Collections (WN 3)	***1,20,467***
÷ Total Passenger-kms	÷ 1,20,000
Fare for per passenger-km	***₹1.004***

WN 1: Calculation of total travelling of bus in one month:

= 2 × No of round trips daily × Distance one way × No of days
= 2 × 3 × 20 × 25 = ***3,000 kms***

WN 2: Calculation of passenger-kms per month:

= No of kms travelled per month × No of passengers
= 3,000 × 40 = ***1,20,000 passenger-kms***

WN 3: Calculation of collections:

Total collections = Operating cost (excluding commission on collections) + 10% for commission + 15% for profit = 90,350 + 25% of collections

Collections = ***₹1,20,467***

PYQ 2

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

Particulars	***Amount***
(A) Fixed Charges:	
Insurance	15,600
Garage Rent (2,400 × 4 quarters)	9,600
Road Tax	5,000
Salary of Operating Staff (7,200 × 12 months)	86,400
Depreciation	68,000
Total (A)	***1,84,600***
(B) Variable Charges:	
Diesel [(1,80,000 km ÷ 5 km) × 13]	4,68,000
Oil and Sundries [(1,80,000 km ÷ 100 km) × 22]	39,600
Total (B)	***5,07,600***

(C) Maintenance Charges:	
Repairs (4,800 × 4 quarters)	19,200
Tyres and Tubes (3,600 × 4 quarters)	14,400
Total (C)	***33,600***
Total Operating Cost (A + B + C)	***7,25,800***
Add: Profit @ 25% of Taking	3,42,359
Add: Passenger Tax @ 22% Taking	3,01,275
Total Taking	***13,69,434***

Calculation of cost per passenger km and one way fare per passenger:

$$\textbf{Cost per passenger km} = \frac{\text{Total Operating Cost}}{\text{Total Passenger Km}} = \frac{7,25,800}{40,32,000} = ₹0.18$$

$$\textbf{One way fare per passenger} = \frac{\text{Total Taking}}{\text{Total Passenger Km}} \times 30 \text{ km} = \frac{13,69,434}{40,32,000} \times 30 \text{ km}$$

$$= ₹10.19$$

WN 1: Calculation of total travelling of bus in one year:

30 km × 2 sides × 10 trips × 25 days × 12 months = ***1,80,000 kms***

WN 2: Calculation of passenger-kms per year:

1,80,000 km × 32 passengers × 70% = ***40,32,000 passenger-kms***

WN 3: Calculation of Taking:

Total taking = Operating cost + 25% for profit + 22% for passenger tax
= 7,25,800 + 47% of Total taking

Total Taking = ***₹13,69,434***

PYQ 3

'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:

Type of Rooms	*Number of Rooms*	*Occupancy*
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:

Particulars	*₹in Lakhs*
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

Particulars	*₹ in Lakhs*
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
Total Cost	***1,666.98***
Add: Profit @ 25% on taking	555.66
Total Taking	***2,222.64***
÷ Equivalent single room days	÷ 90,720
Tariff for Deluxe Room	***₹2,450***
Tariff for Super Deluxe Room (2,450 × 2)	***₹4,900***
Tariff for Luxury Suite (2,450 × 3)	***₹7,350***

Working Notes:

1. Calculation of Attendant wages:

Wages = No of rooms occupied in a year × ₹500 per room per day

= 57,240 × ₹500 = ***₹286.20 lakhs***

2. Calculation of equivalent single room suites:

Name of Room	*Room Days*	*Equivalent Deluxe Room p.a.*
Deluxe Room	100 × 360 × 90% = 32,400	32,400 × 1= 32,400
Super Deluxe Room	60 × 360 × 75% = 16,200	16,200 × 2 = 32,400
Luxury Suite	40 × 360 × 60% = 8,640	8,640 × 3 = 25,920
Total	***57,240***	***90,720***

PYQ 4

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 33-⅓% on taking (total receipts from passengers).

[(8 Marks) Nov 2016]

Answer

Operating Cost Sheet

Particulars	***Amount***
(A) Fixed Expenses:	
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
Total (A)	***18,01,200***
(B) Variable Expenses:	
Diesel (5,40,000 × 66 ÷ 6)	59,40,000
Engine oils & lubricants (2,000 ÷ 1,000) × 5,40,000	10,80,000
Total (B)	***70,20,000***
(C) Maintenance Expenses:	
Repairs and maintenance (24,000 × 6)	1,44,000
Total (C)	***1,44,000***
Total operating cost (A + B + C)	***89,65,200***
Add: Profit @ 33-⅓% of taking	44,82,600
Taking	***1,34,47,800***
÷ Total passenger kms	÷ 1,94,40,000
Fare per passenger km	***₹0.6918***

WN 1: Calculation of total traveling of 5 buses per annum:

= No of round trips daily × Distance two way × No of days × No of buses × 12

= 3 × 100 × 25 × 6 × 12 = ***5,40,000 kms***

WN 2: Calculation of passenger kms per annum:

= No of kms travelled per annum × Capacity occupied × No of passengers

= 5,40,000 × 48 × 75% = ***1,94,40,000 kms***

PYQ 5

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% p.a. 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

Particulars		***Amount***
(A) Variable Cost:		
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
Total (A)		***1,30,65,500***
(B) Fixed Expenses:		
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
Total (B)		***1,63,51,000***
Total cost (A + B)		***2,94,16,500***
Collection from patients (2,500 × 14,600 patient days)		***3,65,00,000***
Profit (Collection – Total cost)		***70,83,500***
Profit per patient day (Profit ÷ Patient days)		***485.17***

(b) Calculation of BEP for the hospital:

BEP = Fixed cost ÷ Contribution per patient day

= 1,63,51,000 ÷ 1,605.10 = ***10,186.90 patient days***

Working Notes:

1. Calculation of number of Patient days:

= (50 beds × 200 days) + (30 beds × 105 days) + (20 beds × 60 days) + 250 beds = **14,600**

2. Calculation Contribution per patient day:

Contribution	=	Sales – Variable cost		
	=	3,65,00,000 – 1,30,65,500	=	2,34,34,500
Contribution per patient day	=	2,34,34,500 ÷ 14,600	=	**1,605.10**

PYQ 6

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)

Particulars		Amount
(A) Standing Charges:		
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
Total (A)		**1,02,833**
(B) Running Charges:		
Diesel and oil	($^{1,500}/_{100}$ × 5,000 kms)	75,000
Commission @ 10% of collections 'WN'		28,000
Total (B)		**1,03,000**
(C) Maintenance Charges:		
Repairs	(50,000 × $^{1}/_{12}$)	4,167
Total (C)		**4,167**
Total operating cost (A + B + C)		**2,10,000**
Add: Profit @ 25% of collections		70,000
Total Takings (WN 3)		**2,80,000**

(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	=	**₹1.40**

WN 1: Calculation of total travelling of bus in one month:

= 2 × No of round trips daily × Distance one way × No of days
= 2 × 4 × 25 × 25 = ***5,000 kms***

WN 2: Calculation of passenger-kms per month:

= No of kms travelled per month × No of passengers
= 5,000 × 40 = ***2,00,000 passenger-kms***

WN 3: Calculation of Takings:

Total takings = Operating cost (excluding commission on takings) + 10% for commission + 25% for profit
= 1,82,000 + 35% of takings
Total Takings = ***₹2,80,000***

PYQ 7

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)

Particulars		***Amount***
(A) Fixed Costs:		
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
Total (A)		***18,400***

(B) Running Costs:		
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) ÷ 1,60,000 Kms} × 3,200 Kms]		16,000
Total (B)		***49,920***
Total operating cost (A + B)		***68,320***

(2) Vehicle cost per kilometer = Total cost ÷ Total Kms
= 68,320 ÷ 3,200 kms = ***₹21.35***

Cost per tonne kilometer = Total cost ÷ Total tonne kms
= 68,320 ÷ 16,000 kms = ***₹4.27***

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. Total tonne kilometers = 1,600 kms × 10 + 1,600 kms × Nil = ***16,000***

3. Tyres cost = (52,500 ÷ 25,000 kms) × 3,200 kms = ***₹6,720***

PYQ 8

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 31st 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 lakhs × 80% × 5%)	12,00,000
On Furniture	(₹300 lakhs × 20% × 15%)	9,00,000
Room attendant's wages:		
In Season	(200 rooms × 80% × 30 days × 6 months × ₹15)	
In Off-Season	(200 rooms × 40% × 30 days × 6 months × ₹15)	4,32,000
Lighting charges:		2,16,000
Season	(200 rooms × 80% × 6 months × ₹110)	
Off-Season & Non Winter	(200 rooms × 40% × 2 months × ₹110)	1,05,600
Off-Season & Winter	(200 rooms × 40% × 4 months × ₹30)	17,600
Total Cost		9,600
Add: Profit @ 20% on Room rent or 25% on Cost		***45,71,000***
Total Rent to be Charged		11,42,750
÷ Equivalent Off-Season room days		***57,13,750***
		÷ 72,000
Rent for one room per day in Off-Season		***₹79.356***
Rent for one room per day in Season (₹79.36 × 2)		***₹158.72***

Working Notes:

Equivalent Off –Season room days = 200 × 80% × 30 days × 6 months × 2 (double of Off-Season) + 200 × 40% × 30 days × 6 months × 1

= 28,800 × 2 + 14,400 × 1 = ***72,000 Room days***

PYQ 9

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

(ii) Electricity ₹1,50,000

(iii) Telephone ₹1,00,000

(iv) Maintenance cost ₹50 Lakhs

(v) 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
Total Cost	***8,04,72,000***
÷ Total kilometers	÷ 120 kms
Cost per Kilometer	***₹6,70,600***

2. Calculation of toll rate per vehicle:

Total Toll Collection in June 2020 = Total Cost + 30%
= ₹8,04,72,000 + 30 % = ***₹10,46,13,600***

Toll Rate per vehicle = Total collection for June ÷ Total vehicles in June
= ₹10,46,13,600 ÷ 1,00,00,000 = ***₹10.46***

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 = ***1,00,00,000***

PYQ 10

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:

Particulars	Amount
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
Other Expenses for the year were as under:	
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

Particulars		***Amount***
(A) Variable Cost:		
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
Total (A)		***13,65,000***
(B) Fixed Expenses:		
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
Total (B)		***10,74,000***
Total cost (A + B)		***24,39,000***
Collection from patients (200 × 15,600 patient days)		***31,20,000***
Profit (Collection – Total cost)		***6,81,000***
Profit per patient day (Profit ÷ Patient days)		***43.65***

(2) Calculation of BEP for the hospital:

BEP = Fixed cost ÷ Contribution per patient day
= 10,74,000 ÷ 112.50 = ***9,547 patient days***

Working Notes:

1. Calculation of number of Patient days:

= (100 beds × 120 days) + (40 beds × 80 days) + (20,000 ÷ 50)
= ***15,600***

2. Calculation Contribution per patient day:

Contribution = Sales – Variable cost
= 31,20,000 – 13,65,000 = 17,55,000

Contribution per patient day = 17,55,000 ÷ 15,600 = ***112.50***

PYQ 11

MRSL 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:

1. 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.
2. Calculate cost per policy.

[(5 Marks) July 2021]

Answer

1. Statement Showing Total Cost for "Covid-19" Insurance Policy

Particulars	Amount
(a) Product development, Marketing and Sales support:	
Policy development cost	35,00,000
Cost of marketing of the policy	1,38,90,000
Sales support expenses	32,00,000
Total (a)	***2,05,90,000***
(b) Operations:	
Policy issuance cost	29,50,000
Policy servicing cost	96,45,000
Claims management cost	3,80,000
Total (b)	***1,29,75,000***
(c) IT Cost:	
IT cost	2,21,00,000
Total (c)	***2,21,00,000***
(d) Support functions:	
Postage and logistics	32,40,000
Facilities cost	46,75,000
Employees cost	16,20,000
Office administration cost	48,00,000
Total (d)	***1,43,35,000***
Total Cost (a + b + c + d)	***7,00,00,000***

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 12

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	***₹***
(A) Standing Charges:	
Driver's salary (₹20,000 × 12 months)	2,40,000
Lady attendant's salary (₹10,000 × 12 months)	1,20,000
Cleaner's salary (₹15,000 × 12 months × 1/2)	90,000
Insurance charges (2% of ₹15,00,000)	30,000
Licence fees and taxes (₹5,080 × 12 months)	60,960
Garage rent (₹24,000 × 12 months × 1/8)	36,000
Depreciation {(₹15,00,000 - ₹3,00,000) × 1/8}	1,50,000

Total (A)	***7,26,960***
(B) Maintenance Charges:	
Repairs and maintenance {(₹2,856 ÷ 5,760) × 57,600}	28,560
Total (B)	***28,560***
(C) Running Charges:	
Diesel {(₹80 ÷ 8) × 57,600}	5,76,000
Total (C)	***5,76,000***
Total operating cost (A + B + C)	***13,31,520***

2. Calculation of average cost per employee per month:

Operating cost of Mini Bus per month = ₹13,31,520 ÷ 12 = ₹1,10,960

No. of employees per bus in two trips = 30 persons × 2 trips × 80%
= 48

Let the fare charged from employee within 15 km be = X

∴ Fare for employee beyond 15 km = 2X

Total Cost or fare (₹1,10,960) = (48 × 50% × X) + (48 × 50% × 2X) = 72X
X = ₹1,10,960 ÷ 72 = ₹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
= ₹1,541.11 × 2
= ***₹3,082.22***

Working notes:

Calculation of kms. run by a mini bus in a year:

= One way distance × 2 (both ways) × No of trips × No of days in a month × 12 months in a year
= 30 kms. × 2 × 4 (two shifts and two trips in each shift) × 20 days × 12 months
= ***57,600 kms.***

PYQ 13

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

Particulars	Mine X	Mine Y
Drivers wages, license, insurance, depreciation, garage rent and taxes @ ₹12 per hour	(12.00 × 90/60) 18.00	(12.00 × 100/60) 20.00
Fuel, oil, tyres, repairs and maintenance @ ₹1.60 per Km	(1.60 × 30 kms) 48.00	(1.60 × 40 kms) 64.00
Operating Cost	**66.00**	**84.00**
÷ Effective tonne-kms	÷ 60	÷ 80
Cost per tonne-km	**₹1.10**	**₹1.05**

Working Notes:

(1) Total operating time in 1 trip:	Mine X	Mine Y
Running time (to & fro)	60/40 × 30 Kms 45 minutes	60/40 × 40 Kms 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 + Nil tonnes × 15 kms	4 tonnes × 20 kms + Nil tonnes × 20 kms
	= 60 tonne kms	**= 80 tonne kms**

PYQ 14

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:

(a) Compute the cost of processing a Vehicle Loan Application on the assumption that 496 Vehicle Loan applications are processes each month.

(b) Find out the number of Education Loan Applications processes, 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
Total processing cost per month	**2,48,000**
÷ Number of applications processed per month	÷ 496
Cost of Processing One Vehicle Loan Application	**₹500**

(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	**1,88,000**
÷ Total processing cost per Education Loan Application	÷ 500
Number of Education Loan Application	**376**

Working Notes:

Overheads costs of the branch = 90,000 + 30,000 + 12,000 + 18,000 + 10,000 = **₹1,60,000**

PYQ 15

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:

(a) Calculate the toll rate for each type of vehicles if concession facilities are not available on the return journey.

(b) 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:

Total collection from toll = Cost + 10% = ₹59,09,090 + 10%
= ₹64,99,999

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,

Total Toll collection	=	(45,000 × 2 × T) + (12,000 × 2 × 2.5T) + (10,000 × 2 × 5T)
₹64,99,999	=	2,50,000T
T	=	₹26

Toll rate for light vehicles	=	***₹26***				
Toll rate for light vehicles	=	2.5T	=	₹26 × 2.5	=	***₹65***
Toll rate for light vehicles	=	5T	=	₹26 × 5	=	***₹130***

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:

Revenue earned from Light weight vehicles under (a) = 45,000 × 2 × ₹26 = ₹23,40,000

Let, toll rate for Light weight vehicle be 'T' then toll rate for return Light weight vehicle be '0.75T'

Revenue from Light weight vehicles	=	(45,000×T) + (45,000×70%×T + 45,000×30%×0.75T)
₹23,40,000	=	86,625T
T	=	***₹27.013***

SUGGESTED REVISION FOR EXAM:

BQ: 2, 5, 6, 9, 11, 12, 13, 14, 15, 16, 17, 19, 21, 25

PYQ: 15