Chapter 1: Material Cost

1. Material Cost & Its Allocation

A. QUESTION FROM STUDY MATERIAL

Study Material - ILLUSTRATION 1

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

	(₹)
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 COMPUTE the rate per kg. of each chemical, assuming a provision of 2% for further deterioration.

Hints: ₹12.04, ₹15.43

Study Material - ILLUSTRATION 2

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

Invoice	(₹)
200 units Part No. A 32 @ ₹ 5	1,000.00
Less: 20% discount	(200.00)
	800.00
Add: CGST @ 12%	96.00
	896.00
Add: Packing charges (5 non-returnable boxes)	50.00
	946.00

(i) A 2 per cent cash discount will be given if payment is made in 30 days.
(ii) Documents substantiating payment of CGST is enclosed for claiming Input credit.

Hints: ₹4.25

Study Material - ILLUSTRATION 3

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.

Hints: Cost per unit (₹ 60,000/800 units) = 75

B. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1 (RTP Nov 2019 Q1)

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

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

Particulars	Material –X	Material-Y
Purchase price per kg. (excluding GST)	₹140	₹640
Rate of GST	18%	18%
Freight per trip (fixed, irrespective of quantity)	-	₹28,000

Loss of materials in transit*	-	2%
Loss in process*	4%	5%

*On purchased quantity Other information:

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

Required:

(i) Calculate cost per kg. of material X and Y

(ii) Calculate the Economic Order quantity for both the materials.

Solution:

1. Working Notes:

(a) Annual purchase quantity for material X and Y:

Annual demand for product M- 20,000 units × 4 = 80,000 units

Particulars	**Mat-X**	**Mat-Y**
Quantity required for per unit of product M	3 kg.	4 kg.
Net quantity for materials required	2,40,000 kg.	3,20,000 kg.
Add: Loss in transit	-	6,881 kg.
Add: Loss in process	10,000 kg.	17,204 kg.
Purchase quantity	2,50,000 kg.	3,44,085 kg.

Note- Input credit on GST paid is available; hence, it will not be included in cost of material.

(i) Calculation of cost per kg. of material X and Y:

Particulars	**Mat-X**	**Mat-Y**
Purchase quantity	2,50,000 kg.	3,44,085 kg.
Rate per kg.	₹140	₹640
Purchase price	₹3,50,00,000	₹22,02,14,400
Add: Freight	0	₹9,80,000*
Total cost	₹3,50,00,000	₹22,11,94,400
Net Quantity	2,40,000 kg.	3,20,000 kg
Cost per kg.	₹145.83	₹691.23

(ii) *No. of trucks = $\frac{3,44,085 \text{ kg}}{10 \text{ ton} \times 1,000}$ = 34.40 trucks or 35 trucks

Therefore, total freight = 35 trucks × ₹28,000 = ₹9,80,000

(iii) Calculation of Economic Order Quantity (EOQ) for Mat.-X and Y:

$$EOQ = \sqrt{\frac{2 \times \text{Annual Requirement} \times \text{Order cost}}{\text{Carrying cost per unit p.a.}}}$$

Particulars	**Mat-X**	**Mat-Y**
Annual Requirement	2,50,000 kg.	3,44,085 kg.
Ordering cost	0	₹28,000
Cost per unit	₹145.83	₹691.23
Carrying cost	15%	15%
Carrying cost per unit p.a.	0*	₹103.68
EOQ	0	13,632.62 kg.

2. Inventory Level, EOQ & Valuation of offer

A. QUESTION FROM STUDY MATERIAL

Study Material - ILLUSTRATION 4

CALCULATE 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 kg.
Order placing cost per order	:	₹ 50
Cost per kg. of raw materials	:	₹ 2
Storage costs	:	8% on average inventory

Hints: 2,500 kg, 4 orders

Study Material - ILLUSTRATION 5

(i) COMPUTE E.O.Q. and the total variable 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

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

Hints:

(i) EOQ = 200 units, Variable Cost = ₹1,00,800

(ii) EOQ = 250 units, Variable Cost = ₹64,640

Study Material - ILLUSTRATION 6

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.

Hints:

	A	B
a	450	300
b	200	150
c	650	750
d	425	450

Study Material - ILLUSTRATION 7

From the details given below, CALCULATE:

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

Re-ordering quantity is to be calculated on the basis of following information: Cost of placing a purchase order is ₹ 20

Number of units to be purchased during the year is 5,000 Purchase price per unit inclusive of transportation cost is ₹ 50 Annual cost of storage per units is ₹ 5.

Details of lead time : Average- 10 days, Maximum- 15 days, Minimum- 5 days.
For emergency purchases- 4 days

Rate of consumption : Average: 15 units per day,
Maximum: 20 units per day.

Hints: (i) 300 units, (ii) 450 units, (iii) 150 units, (iv) 60 units

Study Material - ILLUSTRATION 8

M/s Tyrotubes trades in four wheeler tyres and tubes. It stocks sufficient quantity of tyres of almost every vehicle. In year-end 20X8-X9, the report of sales manager revealed that M/s Tyrotubes experienced stock-out of tyres.

The stock-out data is as follows:

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

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

DETERMINE optimum safest stock level.

Hints: Safety stock = 20 units, Total Cost = ₹2,140

TEST YOUR KNOWLEDGE

1. Anil & Company buys its annual requirement of 36,000 units in 6 instalments. 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?

Hints: EOQ = 3000 units, Cost saving = ₹150

2. A Company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 20X1:

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

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

Required:

(i) COMPUTE the economic order quantity

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

Hints:

(i) EOQ = 200 units

(ii)

	EOQ	Discount Accepted
Total Cost	₹32,16,000	₹32,26,000

3. 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
Relevant ordering cost per purchase order	₹ 1,200	₹ 1,400
Annual relevant carrying cost per bag	₹ 480	₹ 560

Required:

(i) COMPUTE EOQ for Super Grow and Nature's own.

(ii) 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?

(iii) For the EOQ, COMPUTE the number of deliveries per year for Super Grow and Nature's own.

Hints:

(i) EOQ = 100, 80

(ii) Total Cost = ₹48,000, ₹44,800

(iii) 20 orders, 16 orders

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

Raw Material	Usage per unit of Product (Kgs.)	Re-order quantity (Kgs.)	Price per Kg.	Delivery period (in weeks)			Re-order level (Kgs)	Minimum level (Kgs.)
				Minimum	Average	Maximum		
A	10	10,000	10	1	2	3	8,000	?
B	4	5,000	30	3	4	5	4,750	?
C	6	10,000	15	2	3	4	?	2,000

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

Hints: (i) 4,000 kg, (ii) 7,650 kg, (iii) 5,400 or 5,600 kg, (iv) 9,000 or 10,125 kg

5. (a) 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 1,000
1,160	1,000 and less than 2,000
1,140	2,000 and less than 3,000
1,120	3,000 and above.

The annual requirement for the material is 5,000 tons. The ordering cost per order is ₹ 1,200 and the stock holding cost is estimated at 20% of material cost per annum. You are required to COMPUTE the most economical purchase level.

(b) WHAT will be your answer to the above question if there are no discounts offered and the price per ton is ₹ 1,500?

Hints:

(a) 1,000 units, Cost = ₹59,22,000

(b) 200 units

6. Same as Illustration No. 6 of Study Material

Hints: (i) 300 units, (ii) 450 units, (iii) 150 units, (iv) 60 units

7. 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 the holding cost is 10% p.a. You are required to CALCULATE:

(i) Economic order quantity.

(ii) If the minimum lot size to be supplied is 4,000 units, what is the extra cost, the company has to incur?

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

Hints: (i) 2,400 units, (ii) ₹640, (iii) ₹2,400

B. PAST YEAR QUESTION

Nov.22 Q1(c)

MM Ltd. uses 7500 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 an order and a safety stock of 3200 valves is desired.
You are required to determine:
(i) The Economic Order Quantity (EOQ) and the frequency of orders.
(ii) The re-order point.
(iii) The Economic Order Quantity (EOQ) if the valve cost ₹ 4.50 each instead of 1.50 each.
(Assume a year consists of 360 days)

Solution:

(i) Calculation of Economic Order Quantity

Annual requirement (A) = 7500×12= 90,000 Valves Cost per order (O) = ₹ 15

Inventory carrying cost (i) = 20% Cost per unit of spare (c) = ₹ 1.5

Carrying cost per unit (i × c) = ₹ 1.5 × 20% = ₹ 0.30

Economic Order Quantity (EOQ) $= \sqrt{\frac{2 \times A \times O}{c \times i}}$

$= \sqrt{\frac{2 \times (90{,}000 \times 15)}{0.3}}$

= 3,000 Valves

Frequency of order or Number of Orders = 90,000/3,000 = 30 orders.
So Order can be placed in every 12 (360days/30) days

(ii) Re-order Quantity = {Maximum Consumption X Maximum lead time} + safety Stock
= {7500X1.5} + 3200 = 14,450 Valves

(iii) Calculation of Economic Order Quantity if valve costs ₹ 4.50

Carrying cost is 20% of ₹ 4.50 = ₹ 0.90

Economic Order Quantity (EOQ) $= \sqrt{\frac{2 \times A \times O}{c \times i}}$

$$= \sqrt{\frac{2 \times (90{,}000 \times 15)}{0.9}}$$

= 1732.0508 units or 1733 Valves

Nov.20 Q3(b)

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:

(i) How much the company's cost would be saved by opting EOQ model?

(ii) The Re-order point under EOQ model if lead time is 12 days.

(iii) How frequently should orders for procurement be placed under EOQ model?.

Solution:

Working Notes:

Annual requirement (A) = 27,000 units
Cost per order (O) = ₹ 240
Inventory carrying cost (i) = 12.5%
Cost per unit of spare (c) = ₹ 50
Carrying cost per unit (i × c) = ₹ 50 × 12.5% = ₹ 6.25

EOQ $= \sqrt{\frac{2 \times A \times O}{c \times i}}$

$= \sqrt{\frac{2 \times (27{,}000 \times 240)}{6.25}}$

= 1440 units

(i) Calculation of saving by opting EOQ:

	Existing Order policy	EOQ Model
No. of orders	9 27,000 3,000	**18.75 or 19** 27,000 1,440
A. Ordering Cost (₹)	**2,160** (₹ 240 × 9)	**4,500** ₹ 240 × 27,000 / 1,440

B. Carrying cost (₹)	**9,375** 3,000 × ₹ 6.25 2	**4,500** 1,440 × ₹ 6.25 2
Total cost (A+B) (₹)	**11,535**	**9,000**

Savings of Cost by opting EOQ Model = ₹ 11,535 – ₹ 9,000 = ₹ 2,535

(ii) **Re-order point under EOQ:**

Re-order point/ Re-order level = Maximum consumption × Maximum lead time

Consumption per day = 27,000 units / 360 days
= 75 units

Re-order point/ Re-order level = 75 units × 12 days = 900 units

(iii) Frequency of Orders (in days):

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

Nov.19 Q1(a)

Surekha Limited Produces 4000 liters of paints on a 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 EOQ and Total Annual Inventory Cost in respect of above raw material.

Solution:

a) EOQ $= \sqrt{\frac{2 \times A \times O}{c \times i}}$

$= \sqrt{\frac{2 \times (4{,}000 \times 4 \times 2) \times 40}{8\% \times 50}}$

= 800 units

b) Annual inventory cost

Purchase price (32000 × 50) = 16,00,000
Add: Ordering cost (32,000 / 800 × 40)= 1,600
Add: Carrying cost (800×1/2 × 4) = 1,600
= 16,03,200

Nov.18 Q1(a)

M/s. SJ Private Limited manufactures 20000 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:

(i) Re-order quantity
(ii) Re-order level
(iii) Maximum level
(iv) Minimum level
(v) Average stock level

Solution:

(a) Annual consumption 250 kg × 52 weeks = 13,000 kg.

(i) Re-order Quantity or EOQ $= \sqrt{\frac{2 \times A \times O}{c \times i}}$

A = Annual Consumption = 13,000 kg

O = Ordering Cost = ₹. 1,500

C = Cost per kg = ₹. 100

i = carrying cost rate = 9.75%

Carrying cost per kg per annum (c× i) = 100 × 9.75% = ₹. 9.75

$$EOQ = \sqrt{\frac{2 \times 13{,}000 \times 1{,}500}{9.75}}$$

$$= \sqrt{\frac{39000000}{9.75}} \quad = 2000 \text{ kg.}$$

(ii) Re-order level = Max. re-order period × Max, Consumption

= 7 weeks × 300 kg = 2,100 kg

(iii) Maximum level = Re-order level + Re-order Qty – (Min re-order Period × Min. Consumption)

= 2100 kg + 2000 kg – (5 × 200) kg = 3100 kg.

(iv) Minimum level = Re-order level – (Avg. re-order period × Avg. Consumption)

= 2,100 kg – (6 × 250) kg = 600 kg.

(v) Avg. stock level = 1/2 (Max. Level + Min. Level)

= ½ (3100+600) =1,850kg

OR

= Min. Level + ½ ROQ

= 600kg + ½ * 2000kg = 1600 kg

May.18 Q1(a)

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"	12000 Units
Cost of placing an order	₹ 1,800
Cost per unit of "SKY BLUE	₹ 640
Carrying cost per annum	18.75%

The company has been offered a quantity discount of 5 on the purchases of "SKY BLUE" provided the order size is 3000 components at a time.

You are required to:

1. Compute the Economic Order Quantity.
2. Advise whether the quantity discount offer can be accepted.

Solution:

(a) (i) Calculation of Economic Order Quantity

$$EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 12{,}000 \text{ units} \times ₹1{,}800}{₹\ 640 \times 18.75/100}} = 600 \text{ units}$$

(ii) Evaluation of Profitability of Different Options of Order Quantity

When EOQ is ordered

		(₹)
Purchase Cost	(12,000 units × ₹ 640)	76,80,000
Ordering Cost $\frac{A}{Q} \times O$ -	(12,000 units/ 600 units) ×₹ 1,800]	36,000
Carrying Cost ($\frac{Q}{2} \times C \times i$ -	600 units ×₹ 640 × ½ × 18.75/100)	36,000
Total Cost		77,52,000

(b) When Quantity Discount is accepted

		(₹)
Purchase Cost	(12,000 units × ₹ 608)	72,96,000
Ordering Cost [$\frac{A}{Q} \times O$	(12,000 units/3,000 units) × ₹ 1,800]	7,200
Carrying Cost [$\frac{Q}{2} \times C \times i$	(3,000 units × ₹ 608 ×½ × 18.75/100)]	1,71,000
Total Cost		74,74,200

Advise – The total cost of inventory is higher if EOQ is adopted. If M/s. X Private Limited gets a discount of 5% on the purchases of "SKY BLUE" (if order size is 3,000 components at a time), there will be financial benefit of ₹ 2,77,800 (77,52,000 - 74,74,200). However, order size of big quantity will increase volume of average inventory to 5 times. There may be risk of shrinkage, pilferage and obsolescence etc., of inventory due to increase in the average volume of inventory holding. This aspect also has to be taken into consideration before opting the discount offer and taking final decision.

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

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

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

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

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

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

Solution:

Comparative Statement of procuring material from two sources

	Material source I	Material source II
Defective (in %)	2	2.8
	(Future estimate)	(Past experience)
Units supplied (in one lot)	1,000	1,000
Total defective units in a lot	20	28
	(1,000 units × 2%)	(1,000 units ×2.8%)
Additional price paid per lot (₹) (A)	100	–
Rectification cost of defect (₹) (B)	100	140
	(20 units × ₹ 5)	(28 units × ₹ 5)
Total additional cost per lot (₹): [(A) + (B)]	200	140

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

Question-2

IPL Limited uses a small casting in one of its finished products. The castings are purchased from a foundry. IPL Limited purchases 54,000 castings per year at a cost of ₹ 800 per casting. The castings are used evenly throughout the year in the production process on a 360-days-per-year basis. The company estimates that it costs ₹9,000 to place a single purchase order and about ₹300 to carry one casting in inventory for a year. The high carrying costs result from the need to keep the castings in carefully controlled temperature and humidity conditions, and from the high cost of insurance.

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

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

Required:

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

(ii) Assume the company is willing to assume a 15% risk of being out of stock. What would be the safety stock? The re-order pointAssume the company is willing to assume a 5% risk of being out of stock. What would be the safety stock? The re-order point?

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

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

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

Solution:

(i) Computation of economic order quantity (EOQ)

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

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

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

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

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

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

$$= 150 \text{ castings}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

(v) (a) Computation of new EOQ:

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

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

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

Question-3 (May'22)

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

Required

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

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

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

Solution:

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

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

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

= (₹ 0.5 × 12 months) + ₹ 9

= ₹ 15 per kg.

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

***(ii)* Frequency of orders for procurement:**

Annual consumption (A) = 40,000 kg.

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

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

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

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

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

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

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

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

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

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

Question-4

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

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

You are required to

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

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

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

Solution:

Working notes

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

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

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

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

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

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

(after considering the discount)

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

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

(Refer to working notes 3 and 4)

Question-5

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

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

Solution:

(i) Economic Order Quantity

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

(ii) Number of orders per year

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

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

(iii) Ordering and storage costs

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

(iv) Timing of next order

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

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

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

(b) Days requirement covered by inventory

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

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

(c) Time interval for placing next order

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

3 days – 3 days = 0 days

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

Question-6

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

Solution:

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

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

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

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

Question-7

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

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

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

Solution:

Working Notes

1. EOQ without discount

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

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

2. Prices with discount for different order size

5% Discount = 30 – 5% = ₹ 28.50

10% Discount = 30 – 10% = ₹ 27.00

12% Discount = 30 – 12%= ₹ 26.40

Statement of Computing Total cost at various order sizes

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

Optimal order quantity = 100 units

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

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

Question-8

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

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

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

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

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

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

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

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

To place an order company has to incur ₹ 720 on paper and documentation work. From the above information find out the followings in relation to raw material Dee:

(a) Re-order Quantity

(b) Maximum Stock level

(c) Minimum Stock level

(d) Calculate the impact on the profitability of the company by not ordering the EOQ. [Take 364 days for a year]

Solution:

Working Notes:

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

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

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

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

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

(iii) Re- Order level:

= (Maximum consumption per day × Maximum lead time)

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

Minimum consumption per day of raw material 'Dee':

Average Consumption per day = 50 Kg.

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

So Minimum consumption per day will be

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

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

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

(a) *Re-order Quantity :*

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

(b) *Maximum Stock level:*

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

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

(c) *Minimum Stock level:*

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

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

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

		When purchasing the ROQ	When purchasing the EOQ
I	Order quantity	1,000 kg.	1,200 kg.
II	No. of orders a year	$\frac{17,200kg.}{1,000kg.}$ =17.2 or 18 orders	$\frac{17,200kg.}{1,200kg.}$ =14.33 or15 orders
III	Ordering Cost	18 orders × ₹ 720 = ₹12,960	15 orders × ₹ 720 = ₹10,800
IV	Average Inventory	$\frac{1,000kg.}{2}$ = 500kg.	$\frac{1,200kg.}{2}$ = 600kg.
V	Carrying Cost	500 kg. × ₹ 17.2 = ₹ 8,600	600 kg. × ₹ 17.2 = ₹ 10,320
VI	Total Cost	₹ 21,560	₹ 21,120

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

Question-9

Following details are related to a manufacturing concern:

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

Calculate:

(i) Maximum consumption per day

(ii) Minimum consumption per day

Solution:

Difference between Minimum lead time Maximum lead time = 4 days

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

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

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

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

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

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

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

Or, 2 Min. lead time = 8 days

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

Putting this Minimum lead time value in (i), we get
Maximum lead time = 4 days + 4 days = 8 days

(i) Maximum consumption per day:

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

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

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

(ii) **Minimum Consumption per day:**

Maximum Stock Level =

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

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

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

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

Question-10 (Jan 2021 Old Course Q3(a)(i))

The following information is furnished by ABC Ltd.:

Re-order quantity	6,750 units
Minimum stock level to allow for emergencies	5 weeks
Average Delivery time from suppliers	4 weeks
Maximum stock level allowed by Management	20 weeks
Average rate of consumption per week	625 units
Minimum consumption in 4 weeks	1,250 units

Calculate:

(a) Re-order Level

(b) Maximum Stock Level

(c) Minimum Stock Level

Solution:

(a) Re-order level

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

= 1,250 units + [625 units × 4 weeks] = 3,750 units

(b) Maximum Stock Level

= Re-order level + Re-order quantity – (Min. consumption × Min. re order period)

= 3,750 units + 6,750 units – 1250 units

= 9,250 units

(c) Minimum Stock Level

= Re-order level – (Average consumption × Average delivery time)

= 3,750 units – (625 units × 4 weeks) = 1,250 units

(Note: It has been assumed that average delivery time and minimum delivery time is same i.e. 4 weeks)

Question-11 (May 2019 Old Course Q2(a))

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

(i)	Purchase price per kg	₹ 25
(ii)	Cost of placing order	₹ 240 per order
(iii)	Storage cost	2% per annum
(iv)	Interest rate	10% per annum
(v)	Average lead time	8 days
(vi)	Difference between minimum and maximum lead time	6 days
(vii)	Maximum usage	150 kg
(viii)	Minimum usage	90 kg

Opening stock of material 'REX' is 2,100 kg and closing stock will be 10% more than opening stock.

Required:

(i) Compute the EOQ and total cost as per EOQ.

(ii) Compute the reorder level and maximum level.

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

Solution:

Computation of Economic Order Quantity (EOQ):

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

$$= \sqrt{\frac{2 \times 37{,}210 \text{ kgs} \times ₹\ 240}{₹\ 25 \times (10+2)\%}}$$

= 2,440 kgs

No. Of orders = $\frac{37{,}210}{2{,}440}$ = 15.25 or 16 Orders

Total cost as per EOQ:

	Amount (₹)
Material purchase cost (₹ 25 × 37,210 kgs)	9,30,250
Add: Ordering costs (₹ 240 × 16 orders)	3,840
Add: Carrying cost $\frac{2{,}440}{2}$ x ₹3	3,660
Total Cost	**9,37,750**

OR

	Amount (₹)
Material purchase cost (₹ 25 × 37,210 kgs)	9,30,250
Add: Ordering costs (₹ 240 × 15.25 orders)	3,660
Add: Carrying cost $\frac{2{,}440}{2}$ x ₹ 3	3,660
Total Cost	9,37,570

(ii) Computation of Re-order level & Maximum level:

Re-order level = Maximum usage × Maximum lead time

= 150 kg × 11 days = 1,650 kg

Maximum level = Re-order level + Re-order Quantity (EOQ) – (Min. usage × Min. lead time)

= 1,650 kg + 2,440 kg – (90 kg × 5 days)

= 4,090 – 450 = 3,640 kg

(iii) Analysis of Offer at order level of 7,500 kgs:

If the company places 7,500 kg REX at a time, number of order and carrying cost per unit would be:

No. of orders = $\frac{37,210}{7,500}$ = 4.96 or 5 orders

Carrying cost per unit per annum = ₹ 25 × 98% × 12% = ₹ 2.94

Total cost at 7,500 order level:

	Amount (₹)
Material purchase cost {(₹ 25×98%) × 37,210 kgs)}	9,11,645
Add: Ordering costs (₹ 240× 5 orders)	1,200
Add: Carrying cost $\frac{7,500}{2}$ x ₹2.94	11,025
Total Cost	**9,23,870**

Since, ordering 7,500 kg at a time, the company saves ₹ 13,880 (₹ 9,37,750 - ₹ 9,23,870) [or, ₹ 13,700 (₹ 9,37,570 – ₹ 9,23,870)]. Hence, the company should accept the offer of 2% discount and 7,500 order size.

OR

	Amount (₹)
Material purchase cost {(₹ 25×98%) × 37,210 kgs)}	9,11,645
Add: Ordering costs (₹ 240× 4.96 orders)	1,191
Add: Carrying cost $\frac{7,500}{2}$ x₹ 2.94	11,025
Total Cost	9,23,861

Since, ordering 7,500 kg. at a time, the company saves ₹ 13,709 (₹ 9,37,570 - ₹ 9,23,861) [or, ₹ 13,889 (₹ 9,37,750 – ₹ 9,23,861)]. Hence, the company should accept the offer of 2% discount and 7,500 order size.

Working Notes:

1. No. of production units of product EMM:

= Forecasted sales + Closing stock – Opening stock

= 45,600 + $\frac{45,600}{12}$ - 3,150

= 45,600 + 3,800 – 3,150 = 46,250 units of EMM

2. Quantity of REX to be purchased:

	In Kgs.
No. of units of EMM to be produced	46,250
Quantity of REX required to produce one unit of EMM	0.8 kg
Quantity of REX for 46,250 units	37,000 kg
Less: Opening stock of REX	(2,100)
Add: Closing Stock of REX	2,310
Quantity of REX to be purchased	**37,210 kgs**

3. Computation of Lead times

Average Lead time = $\frac{\text{Max. lead time + Min. lead time}}{2}$ = 8 days

Or, Max. + Min. lead time = 16 days (i)

And Max – Min. lead time = 6 days (given) (ii)

Solving both the equations

Max. + Min. lead time	=	16
Max – Min. lead time	=	6
2 Min lead time	=	10

Thus,

Minimum lead time = 5 days and

Maximum lead time = 5 + 6 = 11 days

3. Inventory Ratio

A. QUESTIONS FROM STUDY MATERIAL

Study Material - ILLUSTRATION 9 (Dec 2021 Q1(a))

The following data are available in respect of material X for the year ended 31st March, 20X9.

	(₹)
Opening stock	90,000
Purchases during the year	2,70,000
Closing stock	1,10,000

CALCULATE:

(i) Inventory turnover ratio, and

(ii) The number of days for which the average inventory is held.

Hints: 2.5 times, 146 days

Study Material - ILLUSTRATION 10

From the following data for the year ended 31st December, 20X9, CALCULATE the inventory turnover ratio of the two items and put forward your comments on them.

Particulars	Material A (₹)	Material B (₹)
Opening stock 1.1.20X9	10,000	9,000
Purchase during the year	52,000	27,000
Closing stock 31.12.20X9	6,000	11,000

Hints:

A = 7 times, 52 days

B = 2.5 times, 146 days

B. PAST YEAR QUESTION

May.18 Q. 5(a)(1)

The following details are provided by M/s. SKU Enterprises for the year ended 31st March, 2018:

Particulars	Material-M (₹)	Material-N (₹)
Stock as on 01-04-2017	6,00,000	10,00,000
Stock as on 31-03-2018	4,50,000	7,25,000
Purchases during the year	9,50,000	18,40,000

You are required to:

1. Calculate Turnover Ratio of both the materials.
2. Advise which of the two materials is fast moving. (Assume 360 days in a year).

Solution:

Material M	Material N
Turnover ratio = Cost of stock of raw material consumed / Average stock of raw material = ₹6,00,000 + ₹9,50,000 -₹4,50,000 / (6,00,000+ 4,50,000) / 2 =2.09 Average number of days for which the average inventory is held = 360 / Inventory turnover ratio. = 360 days / 2.09 = 172.25 days	**Turnover ratio** = Cost of stock of raw material consumed Average stock of raw material = ₹10,00,000 + ₹18,40,000 -₹7,25,000. / (10,00,000+ 7,25,000) / 2 =2.45 Average number of days for which the average inventory is held = 360 / Inventory turnover ratio. = 360 days / 2.45 = 146.94 days

(ii) Advice

Comparatively Material M is slower than Material N since Inventory holding period of 'M' is 172.25 days in Comparison to 'N' i.e. 146.94 days. Infact, both materials have slow inventory turnover. Though, different business has their own expected rates for inventory turnover like food shops have fast inventory turnover, shop selling furniture etc. will have slower inventory turnover while manufacturers of large items of plant will have very long inventory turnover.

If it is not as per the Industry Standard, then a slow turnover may indicate that excessive inventory is held and risk of obsolete or spoiled inventory will increase. Large quantity of slow moving material means that capital is locked up in business and not earning revenue. It is advisable to make proper investigations into slow moving materials and take steps to minimize the loss arises therefrom as it may impact overall financial health of the organisation.

4. Material Pricing & Store Ledger

A. QUESTIONS FROM STUDY MATERIAL

Study Material - ILLUSTRATION 11

The following transactions in respect of material Y occurred during the six months ended 30th June, 20X8:

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

Required:

(a) 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.

(b) STATE when and why would you recommend the LIFO method of pricing material issues?

Hints: Chief Accountant is correct in his argument.

Study Material - ILLUSTRATION 12

The following information is provided by Sunrise Industries for the fortnight of April, 20X9:

Material Exe:
Stock on 1-4-20X9 100 units at ₹ 5 per unit.
Purchases
5-4-20X9, 300 units at ₹ 6
8-4-20X9, 500 units at ₹ 7
12-4-20X9, 600 units at ₹ 8
Issues
6-4-20X9, 250 units
10-4-20X9,400 units
14-4-20X9,500 units
Required:

(A) CALCULATE using FIFO and LIFO methods of pricing issues:

(a) the value of materials consumed during the period

(b) the value of stock of materials on 15-4-20X9.

EXPLAIN why the figures in (a) and (b) in part A of this question are different under the two methods of pricing of material issues used. You need not draw up the Stores Ledge

Hints: FIFO = ₹2,800, LIFO = ₹2,300

Study Material - ILLUSTRATION 13 (Old Course RTP May 2019)

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

Date	Particulars	Units	Rate per unit (₹)
15-12-19	Purchase Order- 008	10,000	9,930
30-12-19	Purchase Order- 009	10,000	9,780
01-01-20	Opening stock	3,500	9,810
05-01-20	GRN*-008 (against the Purchase Order- 008)	10,000	-
05-01-20	MRN**-003 (against the Purchase Order- 008)	500	-
06-01-20	Material Requisition-011	3,000	-
07-01-20	Purchase Order- 010	10,000	9,750
10-01-20	Material Requisition-012	4,500	-
12-01-20	GRN-009 (against the Purchase Order- 009)	10,000	-
13-01-20	MRN-004 (against the Purchase Order- 009)	400	-
15-01-20	Material Requisition-013	2,200	-
24-01-20	Material Requisition-014	1,500	-
25-01-20	GRN-010 (against the Purchase Order- 010)	10,000	-
28-01-20	Material Requisition-015	4,000	-
31-01-20	Material Requisition-016	3,200	-

*GRN- Goods Received Note; **MRN- Material Returned Note Based on the above data, you are required to CALCULATE:

(i) Re-order level
(ii) Maximum stock level
(iii) Minimum stock level
(iv) PREPARE Store Ledger for the period January 2020 and DETERMINE the value of stock as on 31-01-2020.
(v) Value of components used during the month of January, 2020.
(vi) Inventory turnover ratio.

Study Material - ILLUSTRATION 14

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 2021, 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, 2021:

Sep. 1	Opening stock of 6,000 units @ ₹ 285 per unit
Sep. 8	Issued 4875 units to mechanical division vide material requisition no. Mech 009/20
Sep. 9	Received 17,500 units @ ₹ 276 per unit vide purchase order no.159/2020
Sep. 10	Issued 12,000 units to technical division vide material requisition no. Tech 012/20
Sep. 12	Returned to stores 2375 units by technical division against material requisition no. Tech 012/20.
Sep. 15	Received 9,000 units @ ₹ 288 per units vide purchase order no. 160/ 2020
Sep. 17	Returned to supplier 700 units out of quantity received vide purchase order no. 160/2020.
Sep. 20	Issued 9,500 units to technical division vide material requisition no. Tech 165/20

On 25th September, 2021, 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, 2021, 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.

Hints: Balance of Stock = 19,46,112

TEST YOUR KNOWLEDGE

8. 'AT' Ltd. furnishes the following store transactions for September, 20X8:

1-9-X8	Opening balance	25 units value ₹ 162.50
4-9- X8	Issues Req. No. 85	8 units
6-9- X8	Receipts from B & Co. GRN No. 26	50 units @ ₹ 5.75 per unit
7-9- X8	Issues Req. No. 97	12 units
10-9- X8	Return to B & Co.	10units
12-9- X8	Issues Req.No. 108	15units
13-9- X8	Issues Req.No. 110	20units
15-9- X8	Receipts from M & Co. GRN. No. 33	25 units @ ₹ 6.10 per unit
17-9- X8	Issues Req.No. 121	10 units
19-9- X8	Received replacement from B & Co.	

GRN No. 38 10 Units

20-9- X8 Returned from department, material of M & Co. MRR No. 4 5 Units

22-9- X8 Transfer fromJob 182 to 187 in the Dept. MTR 6 5 Units

26-9-X8 Issues Req. No. 146 10 Units

29-9-X8 Transfer from Dept. "A" to Dept "B" MTR taking 5 Units

30-9-X8 Shortage in stock taking 2 Units

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

Hints: ₹167.30

9. The following information is extracted from the Stores Ledger:

Material X

Opening Stock Nil

Purchases:

Jan. 1 100 @ ₹ 1 per unit

Jan. 20 100 @ ₹ 2 per unit

Issues:

Jan. 22 60 for Job W 16

Jan. 23 60 for Job W 17

Complete 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 W 16, Job W 17 and the closing stock under the methods aforesaid and discuss from different points of view which method you would prefer.

Hints: FIFO = ₹160, LIFO = ₹80, Weighted Average = ₹120

B. PAST YEAR QUESTION

May'19 Q4 (b)

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

Date	Particulars	Quantity (kg)	Rate per kg
April 4	Purchase	3,000	₹ 16

April8	Issue	1,000	
April15	Purchase	1,500	₹ 18
April 20	Issue	1,200	
April 25	Return to supplier out of purchase made on April 15	300	
April 26	Issue	1,000	
April 28	Purchase	500	₹ 17

Opening stock as on 01-04-2019 is 1,000 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:

(i) Prepare a store ledger account under each of the following method of pricing the issue:

(a) Weighted Average Method

(b) LIFO

What would be the value of material consumed and value of closing stock as on 30-04-2019 as per these two methods?

Solution:

(i) (a) Stores Ledger Account for the month of April, 2019 (Weighted Average Method)

	Receipt			Issue			Balance		
Date	**Qty Units**	**Rate (₹)**	**Amount (₹)**	**Qty Units**	**Rate (₹)**	**Amount (₹)**	**Qty Units**	**Rate (₹)**	**Amount (₹)**
1-4-19	_	_	_	_	_	_	1,000	15.00	15,000
4-4-19	3,000	16.00	48,000	_	_	_	4,000	15.75	63,000
8-4-19	_	_	_	1,000	15.75	15,750	3,000	15.75	47,250
15-4-19	1,500	18.00	27,000	_	_	_	4,500	16.50	74,250
20-4-19	_	_	_	1,200	16.50	19,800	3,300	16.50	54,450
25-4-19	_	_	_	300	18.00	5,400	3,000	16.35	49,050
26-4-19	_	_	_	1,000	16.35	16,350	2,000	16.35	32,700
28-4-19	500	17.00	8,500	_	_	_	2,500	16.48	41,200
30-4-19	_	_	_	50	16.48	824	2,450	16.48	40,376

(b) Stores Ledger Account for the month of April, 2019 (LIFO)

	Receipt			Issue			Balance		
Date	**Qty Units**	**Rate (₹)**	**Amount (₹)**	**Qty Units**	**Rate (₹)**	**Amount (₹)**	**Qty Units**	**Rate (₹)**	**Amount (₹)**
1-4-19	_	_	_	_	_	_	1,000	15	15,000
4-4-19	3,000	16	48,000	_	_	_	1,000 3,000	15 16	15,000 48,000
8-4-19	_	_	_	1,000	16	16,000	1,000 2,000	15 16	15,000 32,000
15-4-19	1,500	18	27,000	_	_	_	1,000 2,000 1,500	15 16 18	15,000 32,000 27,000

20-4-19	_	_	_	1,200	18	21,600	1,000 2,000 300	15 16 18	15,000 32,000 5,400
25-4-19	_	_	_	300	18	5,400	1,000 2,000	15 16	15,000 32,000
26-4-19	_	_	_	1,000	16	16,000	1,000 1,000	15 16	15,000 16,000
28-4-19	500	17	8,500	_	_	_	1,000	15	15,000
							1,000 500	16 17	16,000 8,500
30-4-19	_	_	_	50	17	850	1,000	15	15,000
							1,000	16	16,000
							450	17	7,650

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

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

April, 2014

1 Opening balance 200 units @ ₹ 10 per unit.

5 Receipt 250 units costing ₹ 2,000

8 Receipt 150 units costing ₹ 1,275

10 Issue 100 units

15 Receipt 50 units costing ₹ 500

20 Shortage 10 units

21 Receipt 60 units costing ₹ 540

22 Issue 400 units

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

Shortage will be charged as overhead.

Solution:

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

Date	Receipts			Issues			Balance		
	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)
April 1							200	10	2,000
” 5	250	8	2,000				200	10	4,000
							250	8	
” 8	150	8.50	1,275				200	10	

							250	8	
							150	8.50	5,275
” 10				100	8.50	850	200	10	
							250	8	4,425
							50	8.50	
” 15	50	10	500				200	10	
							250	8	4,925
							50	8.50	
							50	10	
” 20				10 (shortage)	10	100	190	10	
							250	8	4,825
							50	8.50	
							50	10	
” 21	60	9	540				190	10	
							250	8	5,365
							50	8.50	
							50	10	
							60	9	
” 22				190	10	3,580	40	8	(Closing
				210	8		50	8.50	Stock)1,7
							50	10	85
							60	9	

Question-2 (Old Practice Manual Q20)

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

Receipts:

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

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

Issues:

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

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

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

You are required to prepare a Stores Ledger Account.

Solution:

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

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

Question-3 (Old Practice Manual Q23)

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

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

(a) What action should be taken to record the information shown.
(b) Suggest reasons for the shortage and discrepancies disclosed above and recommended a possible course of action by management to prevent future losses.

Solution:

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

Accounting treatment

1. If the shortage is normal:-

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

2. If the shortage is abnormal:-

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

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

   WIP Control A/c Dr. 2,400

   To Stores Ledger control A/c 2,400

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

   Production Overhead control A/c Dr. 2,400

   To Stores Ledger control A/c 2,400

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

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

   Accounting treatment

1.	If the excess is due to normal causes:			
	Stores Ledger control A/c	Dr.	200	
	To Production Overhead control A/c			200
2.	If the excess is due to abnormal causes:			
	Stores Ledger control A/c	Dr.	200	
	To Costing P&L A/c			200
3.	If the excess is due to wrong recording of direct material:			
	Stores Ledger control A/c	Dr.	200	
	To WIP Control A/c			200
4.	If the excess is due to wrong recording of indirect material:			
	Stores Ledger control A/c	Dr.	200	
	To Production Overhead control A/c			200

Item C:

	Units
Physical stock	720
Stock Card	750
Shortage	30

Value 30 units at ₹ 10 = ₹ 300.

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

Stock Card	750
Stores Ledger	780
Difference	30

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

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

(b) **Reasons for shortage and discrepancies:**

1. Wastage of material due to spoilage, breakages, evaporation etc. it may be normal or abnormal.
2. Theft or pilferage.
3. Issued but not entered in stock card.
4. Over issues.
5. Entering the issue in the wrong stock card.
6. Clerical errors in balancing or posting etc.
7. Incorrect entries in stock card.
8. Goods received and deposited in the wrong bins.

9. Small defective units - nails, screws etc.

10. Purchase in kg. but issues to production in numbers i.e. bolts, nuts etc.

Recommended course of action to prevent future losses

1. The entries should be correctly entered in stock cards.

2. Internal check system should be introduced by double checking on the entries.

3. Entry in the stores should be restricted to authorized persons only.

4. To avoid pilferage, the store room should be well guarded and protected. (Just like cash room).

5. Proper accounting should be done for all stock movements.

6. FIFO system should be followed while issuing materials (pricing of issue of materials may be a different method). This will avoid losses due to deterioration or obsolescence.

7. All issues of stock should be made on the basis of stores requisition duly signed by authorised person.

8. To minimise losses due to breakage in case of heavy and bulky materials, materials handling equipment like forklift trucks and cranes should be provided.

9. Wrong issues should be avoided by accurate measuring and weighing equipment should be inspected / checked periodically.

10. Proper storage conditions should be provided, particularly in the case of perishable items and items of lesser shelf life.

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

Question-4 (Nov. 2019 Old Course Q3(a))

M/s XYZ Traders is a distributor of an electronic calculator. A periodic inventory of electronic calculator on hand is taken when books are closed at the end of each quarter. The following summary of information is available for the quarter ended on 30th September, 2019:

Sales	₹ 1,46,20,000
Opening Stock	25,000 calculator @ ₹ 200 per calculator
Administrative Expenses	₹ 3,75,000
Purchases (including freight inward):	
- July 1, 2019	50,000 calculator @ ₹ 191 per calculator
- September 30, 2019	25,000 calculator @ ₹ 210 per calculator
Closing stock- September 30, 2019	32,000 calculator

You are required to compute the following by WAM (Weighted Average Method), FIFO method and LIFO method.

(i) Value of Inventory on 30th September, 2019.

(ii) Profit or loss for the quarter ended 30th September, 2019.

Solution:

(i) Computation of Value of Inventory as on 30th September 2019:

Date	Particulars	Units	WAM (₹)	FIFO (₹)	LIFO (₹)
01-07-19	OpeningStock	25,000	50,00,000 (₹200×25,000)	50,00,000 (₹200×25,000)	50,00,000 (₹200×25,000)
01-07-19	Purchases	50,000	95,50,000 (₹191×50,000)	95,50,000 (₹191×50,000)	95,50,000 (₹191×50,000)
30-09-19	Purchases	25,000	52,50,000 (₹210×25,000)	52,50,000 (₹210×25,000)	52,50,000 (₹210×25,000)
01-07-19 to 30-09-19	Issues/ Consumption (Balancing figure)	68,000	1,34,64,000*	1,32,13,000**	1,34,63,000***
30-09-19	Closing Stock	32,000	63,36,000	65,87,000	63,37,000

$$\text{Weighted average rate} = \frac{₹\,50,00,000 + ₹\,95,50,000 + ₹\,52,50,000}{(25,000 + 50,000 + 25,000)\ \text{units}} = ₹\,198$$

* ₹ 198 x 68,000

** ₹ 200×25,000 + ₹ 191×43,000 = ₹ 50,00,000 + ₹ 82,13,000

*** ₹ 210×25,000 + ₹ 191×43,000 = ₹ 52,50,000 + ₹ 82,13,000

(ii) Computation of Profit or Loss for the Quarter ended 30th September 2019

Particulars	WAM (₹)	FIFO (₹)	LIFO (₹)
Sales	1,46,20,000	1,46,20,000	1,46,20,000
Less: Consumption	1,34,64,000	1,32,13,000	1,34,63,000
Less: Administrative Exp.	3,75,000	3,75,000	3,75,000
Profit or Loss	**7,81,000**	**10,32,000**	**7,82,000**

[Assumption: Issue/ consumption pattern was even throughout the quarter]

5. ABC Analysis

A. QUESTIONS FROM STUDY MATERIAL

Study Material - ILLUSTRATION 15

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

Item	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

Hints: Refer ABC analysis concept in material cost control techniques.

Study Material - ILLUSTRATION 16

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

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

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

Hints: Refer ABC analysis concept in material cost control techniques.

B. PAST YEAR QUESTION

July'21 Q1 (a)

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

Item Code Number	Units	Unit Cost (₹)
101	25	50
102	300	01
103	50	80
104	75	08
105	225	02
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:

(i) Rank the items on the basis of % of Total Inventory Cost.

(ii) Classify the items into A, B and C categories as per ABC Analysis of Inventory Control adopted by MM Ltd.

Solution:

(i) Statement of Total Inventory Cost and Ranking of items

Item code no.	Units	% of Total units	Unit cost (₹)	Total Inventory cost(₹)	% of Total Inventory cost	Ranking
101	25	3.33	50	1,250	16.67	**2**
102	300	40.00	1	300	4.00	**6**
103	50	6.67	80	4,000	53.33	**1**
104	75	10.00	8	600	8.00	**4**
105	225	30.00	2	450	6.00	**5**
106	75	10.00	12	900	12.00	**3**
	750	100	153	7,500	100	

(ii) 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% & Less -- 'C' items

Ranking	Item code No.	% of Total units	Total Inventory cost (₹)	% of Total Inventory Cost	Category
1	103	6.67	4,000	53.33	
2	101	3.33	1,250	16.67	
Total	2	10.00	5,250	70.00	A

3	106	10.00	900	12.00	
4	104	10.00	600	8.00	
Total	2	20.00	1,500	20.00	B
5	105	30.00	450	6.00	
6	102	40.00	300	4.00	
Total	2	70.00	750	10.00	C
Grand Total	6	100	7,500	100	

Chapter 2 – Employees Cost and Direct Expenses

1. LABOUR COST AND ITS ALLOCATION

A. QUESTION FROM STUDY MATERIAL

Study Material - ILLUSTRATION 1

'X' an employee of ABC Co. gets the following emoluments and benefits:

(a)	Basic pay	₹ 10,000 p.m.
(b)	Dearness allowance	₹ 2,000 p.m.
(c)	Bonus	20% of salary and D.A.
(d)	Other allowances	₹ 2,500 p.m.
(e)	Employer's contribution to P.F.	10% of salary and D.A.

'X' works for 2,400 hours per annum, out of which 400 hours are non-productive and treated as normal idle time. You are required to COMPUTE the effective hourly cost of employee 'X'.

Hints: ₹108.06

Study Material - ILLUSTRATION 2

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 hours shift for meals-break and a 10 minutes recess for rest. During a week, his card showed that his time was chargeable to:

Job X	15 hrs.
Job Y	12 hrs.
Job Z	13 hrs.

The time not booked was wasted while waiting for a job. In Cost Accounting, STATE how would you allocate the wages of the workers for the week?

Hints: Effective hours = 44 hours, Abnormal hours = 4 hours, Cost = ₹120

Study Material - ILLUSTRATION 3

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

	A	B
(i) Basic Wages (₹)	10,000	16,000

(ii) Dearness Allowance	50%	50%
(iii) Contribution to provident Fund (on basic wages)	8%	8%
(iv) Contribution to Employee's State Insurance (on basic wages)	2%	2%
(v) Overtime (Hours)	10	--

The normal working hours for the month are 200. Overtime is paid at double the total of normal wages and dearness allowance. Employer's contribution to state Insurance and Provident Fund are at equal rates with employees' contributions. The two workers were employed on jobs X, Y and Z in the following proportions:

Jobs	**X**	**Y**	**Z**
Worker A	40%	30%	30%
Worker B	50%	20%	30%

Overtime was done on job Y.

Hints:

Earning = ₹15,500, ₹22,400

Wages Allocation : X = ₹19,200, Y = ₹11,420, Z = ₹12,480

Study Material - ILLUSTRATION 4

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

	Worker 'A' paid at ₹ 200 per day of 8 hours	**Worker 'B' paid at ₹ 100 per day of 8 hours**	**Worker 'C' paid at ₹ 300 per day of 8 hours**
Monday (hours)	10.5	8.0	10.5
Tuesday (hours)	8.0	8.0	8.0
Wednesday (hours)	10.5	8.0	10.5
Thursday (hours)	9.5	8.0	9.5
Friday (hours)	10.5	8.0	10.5
Saturday (hours)	--	8.0	8.0
Total (hours)	49.0	48.0	57.0

In terms of an award in an employee 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 irrespective of wages rate if they are present or are on leave with wages on all working days.

Sunday is a weekly holiday and each worker has to work for 8 hours on all week days and 4 hours on Saturdays; the workers are however paid full wages for Saturday (8 hours for 4 hours worked).

Workers are paid overtime according to the Factories Act, 1948. Excluding holidays, the total number of hours works out to 176 in the relevant month. The company's contribution to Provident Fund and Employees State Insurance Premium are absorbed into overheads.
Calculate the wages payable to each worker.
Hints: Wages Payable: A = ₹1,647, B = ₹864, C = ₹2,838

Study Material - ILLUSTRATION 5 (Treatment of Overtime)

In a factory, the basic wage rate is ₹ 100 per hour and overtime rates are as follows:

Before and after normal working hours	175% of basic wage rate
Sundays and holidays	225% of basic wage rate
During the previous year, the following hours were worked	
- Normal time	1,00,000 hours
- Overtime before and after working hours	20,000 hours
Overtime on Sundays and holidays	5,000 hours
Total	1,25,000 hours

The following hours have been worked on job 'Z'

Normal	1,000 hours
Overtime before and after working hrs.	100 hours.
Sundays and holidays	25 hours.
Total	1,125 hours

You are required to CALCULATE the labour cost chargeable to job 'Z' and overhead in each of the following instances:

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

Hints: Inflated Wages Rate = ₹117

(a) Charge to Job Z = ₹1,31,625
(b) Charge to factory overhead= ₹10,625
(c) Charge to Job Z total cost = ₹1,23,125

Study Material - ILLUSTRATION 12

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.

Hints: Wage Rate = ₹83 (i.e. 189240/2280)

Study Material - ILLUSTRATION 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.

Hints: (i) 2240 hours, (ii) 1,68,000, (iii) ₹75

B. PAST YEAR QUESTION

Nov 20 Q4(b)

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

Particulars	R	S
(i) Basic Wages (₹)	15,000	30,000
(ii) Dearness Allowance	50%	50%
(iii) Contribution to EPF (on basic wages)	7%	7.5%
(iv) Contribution to ESI (on basic wages)	2%	2%
(v) Overtime (hours)	20	-

The normal working hours for the month are 200 hrs. Overtime is paid at double the total of normal wages and dearness allowance. Employer's contribution to State Insurance and Provident Fund are at equal rates with employees' contributions.

Both workers were employed on jobs A, B and C in the following proportions :

Jobs	A	B	C
R	75%	10%	15%
S	40%	20%	40%

Overtime was done on job 'A'. You are required to :

(i) Calculate ordinary wage rate per hour of 'R' and 'S'.

(ii) Allocate the worker's cost to each job 'A', 'B' and 'C'.

Solution:

(i) Calculation of Net Wages paid to Worker 'R' and 'S'

Particulars	R (₹)	S (₹)
Basic Wages	15,000.00	30,000.00
Dearness Allowance (DA) (50% of Basic Wages)	7,500.00	15,000.00
Overtime Wages (Refer to Working Note 1)	4,500.00	----
Gross Wages earned	27,000.00	45,000.00
Less: Provident Fund (7% × ₹ 15,000); (7.5% × ₹ 30,000)	(1,050.00)	(2,250.00)
Less: ESI (2% × ₹ 15,000); (2% × ₹ 30,000)	(300.00)	(600.00)
Net Wages paid	**25,650.00**	**42,150.00**

Calculation of ordinary wage rate per hour of Worker 'R' and 'S'

	R (₹)	S (₹)
Gross Wages (Basic Wages + DA) (excluding overtime)	22,500.00	45,000.00
Employer's contribution to P.F. and E.S.I.	1,350.00	2,850.00
	23,850.00	47,850.00
Ordinary wages Labour Rate per hour (₹ 23,850 ÷ 200 hours); (₹ 47,850 ÷ 200 hours)	**119.25**	**239.25**

(ii) Statement Showing Allocation of workers cost to each Job

	Total Wages	Jobs		
		A	B	C
Worker R				
Ordinary Wages (15:2:3)	23,850.00	17,887.50	2,385.00	3577.50
Overtime	4500.00	**4500.00**	-	--
Worker S				
Ordinary Wages (2:1:2)	47,850.00	19,140.00	9,570.00	19,140.00
	76,200.00	**41,527.50**	**11,955.00**	**22,717.50**

Working Note:

Normal Wages are considered as basic wages.

$$\text{Over time} = \frac{2 \times (\text{Basic wage} + \text{D.A.}) \times 20 \text{ hours}}{200 \text{ hours}}$$

$$= 2 \times \frac{₹22,500}{200} \times 20\text{hours}$$

$$= ₹ 4,500$$

Nov 18 Q5(b)(i)

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

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

You are required to calculate:

1. Annual cost of each employee
2. Employee cost per hour

Cost of abnormal idle time, per employee

Solution 1.

	Annual cost of each employee	**₹.**
1.	Salary (30,000×12)	3,60,000
2.	Bonus (25% of Salary)	90,000
3.	Employees Contribution to PF (15% of Salary)	54,000
4.	Employers welfare (661500/175)	3,780
	Total Annual Cost	5,07,780

2.

Effective Working hours (310 days × 8 hours)	2480 hours
Less: Leave days (30 days × 8 hours)	240 hours*
Available Working hours	2240 hours
Less: Normal Loss @	70 hours
	2170 hours

Employee cost per hour $\frac{507780}{2170}$ = ₹ 234

*It is assumed 310 working days are without taking leave permitted into consideration

3. Cost of abnormal idle time per employee = ₹ 234× 50 hours= ₹ 11700 Alternative solution for Part (2) and (3)

(2) Calculation of Employee cost per hour:

Working hours per annum	2,480 *
Less: Normal Idle time hours	70
Effective hours	2,410
Employee cost	5,07,780
Employee cost per hour	210.70

***It is assumed 310 working days are after adjusting leave permitted during the year.**

(3) Cost of Abnormal idle time per employee:

Abnormal Idle time hours	50
Employee cost per hour	210.70
Cost of Abnormal idle time (210.70 ×50)	10,534.85

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1 (Practice Manual Old Cource Q25)

An article passes through five hand operations as follows:

Operation No.	Time per article	Grade of worker	Wage rate per hour (₹)
1	15 minutes	A	0.65
2	25 minutes	B	0.50
3	10 minutes	C	0.40
4	30 minutes	D	0.35
5	20 minutes	E	0.30

The factory works 40 hours a week and the production target is 600 dozens per week. Prepare a statement showing for each operation and in total the number of operations required, the labour cost per dozen and the total labour cost per week to produce the total targeted output.

Solution:

Statement of number of operators required and labour cost per dozen and per week. Production target is 600 dozen or 7,200 article per week.

Particulars	Operation No.					Total
	1	2	3	4	5	
Time per article(minutes)	15	25	10	30	20	
Total time in hours for production. of 600 dozen $\frac{600doz. \times 12}{60 min.} = 120$	1,800 (120 × 15min.)	3,000 (120 × 25 min.)	1,200 (120 × 10 min.)	3,600 (120 × 30 min.)	2,400 (120 × 20 min.)	
No. of operators	45	75	30	90	60	300
$\frac{\text{Total time}}{40hours}$						
Labour cost per dozen (₹) $\frac{\text{Total time x Rate per hour}}{600dozen}$	1.95	2.50	0.80	2.10	1.20	8.55
Labour cost per week (₹) (Cost per doz. × 600 doz.)	1,170	1,500	480	1,260	720	5,130

Question-2 (Practice Manual Old Cource Q26)

Arnav Limited manufactures and sales plastic chairs. It pays wages under the differential piece rate system by following F.W. Taylor's System with a standard piece rate of ₹ 12.50 per unit of chair produced by the workers. Standard production per hour is 4 chairs. Each worker is supposed to work 8 hours a day from Monday to Friday and 5 hours on Saturday. Presently, there are 118 workers who are entitled for this plan.

The plant and machinery used to manufacture the chairs was purchased long back and does not match with the efficiency of the workers. Workers appraised their concerns to the management and demanded wages on the time rate basis i.e. ₹ 50 per hour and the incentive under the Halsey Premium plan.

The following production estimates has been made for the month of November, 2015 under the three scenarios:

Scenario	Worst case	Optimal case	Best case
Production (in units)	42,400	84,960	1,27,400

Required:

(a) Calculate total wages and average wages per worker per month, under the each scenario, when

(i) Current system of wages and incentive payment system is followed

(ii) Workers' demand for time rate wages and Halsey premium plan is accepted.

(b) Mr. K, during the month of October 2015, has produced 1,050 units. What will be impact on his earning if he will be able to produce the same number of units in next month also. Should he support the workers' demand?
(Take 4 working weeks in a month)

Solution:

(a) Calculation of Total wages and average wages per worker per month.

(i) When Current system of wages and incentive payment system is followed:

		Worst case	Optimal case	Best case
I	Standard Production (in units) (45 hours × 4 units × 4 weeks × 118 workers)	84,960	84,960	84,960
II	No. of units to be produced	42,400	84,960	1,27,400
III	Efficiency {(II ÷ I) × 100}	49.91%	100%	149.95%
IV	Differential piece rate*	₹10 (₹12.5× 0.8)	₹15 (₹12.5 × 1.2)	₹15 (₹12.5 × 1.2)
V	Total Wages (II × IV)	₹4,24,000	₹12,74,400	₹19,11,000
VI	Average wages per worker(V ÷ 118)	₹3,593.22	₹10,800	₹16,194.92

*For efficiency less than 100%, 83% of piece rate and for efficiency more than or equals to 100%, 125% of piece rate may also be taken.

(ii) When workers' demand for time rate wages and Halsey premium plan is accepted:

		Worst case	Optimal case	Best case
I	No. of units expected to be produced (units)	42,400	84,960	1,27,400
II	Standard no. units in an hour (units)	4	4	4
III	Standard Hours (I ÷ II)	10,600	21,240	31,850
IV	Expected working hours (45 hours × 4 weeks × 118 workers)	21,240	21,240	21,240
V	Hours to be saved (III – IV)	--	--	10,610
VI	Time wages (IV × ₹50)	₹10,62,000	₹10,62,000	₹10,62,000
VII	Incentive under Halsey Premium Plan 1/2 x Time saved x ₹ 50	--	--	₹2,65,250
VIII	Total Wages (VI +VII)	₹10,62,000	₹10,62,000	₹13,27,250
IX	Average wages per worker (VIII ÷ 118)	₹9,000	₹9,000	₹11,247.88

(b) Calculation of gain or loss in the current monthly income of Mr. K:

	Wages earned in October 2015:	
	Standard production unit (45 hours × 4 weeks × 4 units)	720 units
	No. of units produced	1,050 units
	Efficiency	145.83%
	Differential piece rate (refer the above part)	₹15
I	Total wages (1,050 units × ₹15)	₹15,750
	Expected wages under the new scheme	
	Standard hours (1,050 units ÷ 4 units)	262.50 hours
	Expected hours to be taken (45 hours × 4 weeks)	180 hours
	Time saved	82.50 hours
	Time wages (180 hours × ₹50)	₹9,000
	Incentive 1/2 x Time saved x ₹ 50	₹2,062.50
II	Total expected wages	₹11,062.50
	Loss from the proposed scheme (II – I)	₹4,687.50

Supporting the demand of colleague workers will cost ₹4,687.50 in the next month to Mr. K.

Question-3 (RTP Nov 20 Old Cource)

GZ Ld. pays the following to a skilled worker engaged in production works. The following are the employee benefits paid to the employee:

(a)	Basic salary per day	₹1,000
(b)	Dearness allowance (DA)	20% of basic salary
(c)	House rent allowance	16% of basic salary
(d)	Transport allowance	₹50 per day of actual work
(e)	Overtime	Twice the hourly rate (considers basic and DA), only if works more than 9 hours a day otherwise noovertime allowance. If works for more than 9 hours a day then overtime is considered after 8th hours.
(f)	Work of holiday and Sunday	Double of per day basic rate provided works atleast 4 hours. The holiday and Sunday basic is eligible for all allowances and statutory deductions.
(h)	Earned leave & Casual leave	These are paid leave.
(h)	Employer's contribution to Provident fund	12% of basic and DA
(i)	Employer's contribution to Pension fund	7% of basic and DA

The company normally works 8-hour a day and 26-day in a month. The company provides 30 minutes lunch break in between.

During the month of August 2020, Mr.Z works for 23 days including 15th August and a Sunday and applied for 3 days of casual leave. On 15th August and Sunday he worked for 5 and 6 hours respectively without lunch break.

On 5th and 13th August he worked for 10 and 9 hours respectively.

During the month Mr. Z worked for 100 hours on Job no.HT200.

You are required to CALCULATE:

(i) Earnings per day

(ii) Effective wages rate per hour of Mr.Z.

(iii) Wages to be charged to Job no.HT200.

Solution:

Workings:

1. Normal working hours in a month = (Daily working hours – lunch break) × no. of days
   = (8 hours – 0.5 hours) × 26 days = 195 hours

2. Hours worked by Mr.Z = No. of normal days worked + Overtime + holiday/ Sunday worked
   = (21 days × 7.5 hours) + (9.5 hours + 8.5 hours) + (5 hours + 6 hours)
   = 157.5 hours + 18 hours + 11 hours = 186.50 hours.

(i) Calculation of earnings per day

Particulars	**Amount (₹)**
Basic salary (₹1,000 × 26 days)	26,000
Dearness allowance (20% of basic salary)	5,200
	31,200
House rent allowance (16% of basic salary)	4,160
Employer's contribution to Provident fund (12% × ₹31,200)	3,744
Employer's contribution to Pension fund (7% × ₹31,200)	2,184
	41,288
No. of working days in a month (days)	26
Rate per day	1,588
Transport allowance per day	50
Earnings per day	**1,638**

(ii) Calculation of effective wage rate per hour of Mr. Z:

Particulars	**Amount (₹)**
Basic salary (₹1,000 × 26 days)	26,000
Additional basic salary for Sunday & holiday (₹1,000 × 2 days)	2,000
Dearness allowance (20% of basic salary)	5,600
	33,600
House rent allowance (16% of basic salary)	4,480
Transport allowance (₹50 × 23 days)	1,150
Overtime allowance (₹160 × 2 × 2 hours)*	640
Employer's contribution to Provident fund (12% × ₹33,600)	4,032
Employer's contribution to Pension fund (7% × ₹33,600)	2,352
Total monthly wages	46,254
Hours worked by Mr. Z (hours)	186.5
Effective wage rate per hour	248

*(Daily Basic + DA) ÷ 7.5 hours
= (1,000+200) ÷ 7.5 = ₹ 160 per hour

(iii) Calculation of wages to be charged to Job no. HT200
= ₹248 × 100 hours = ₹ 24,800

2. INCENTIVE SCHEME

A. QUESTION FROM STUDY MATERIAL

Study Material - ILLUSTRATION 7

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

Time rate (per Hour)	₹ 60
Time allowed	8 hours.
Time taken	6 hours.
Time saved	2 hours.

Hints: ₹420, ₹450

Study Material - ILLUSTRATION 8

Two workmen, 'A' and 'B', produce the same product using the same material. Their normal wage rate is also the same. 'A' is paid bonus according to the Rowan system, while 'B' is paid bonus according to the Halsey system. The time allowed to make the product is 50 hours. 'A' takes 30 hours while 'B' takes 40 hours to complete the product. The factory overhead rate is ₹ 5 per man-hour actually worked. The factory cost for the product for 'A' is ₹ 3,490 and for 'B' it is ₹ 3,600.

Required:

(a) Compute the normal rate of wages;

(b) Compute the cost of materials cost;

(c) Prepare a statement comparing the factory cost of the products as made by the two workmen.

Hints: Wage rate = ₹20, Factory cost: A = ₹3,490, B = ₹3,600

Study Material - ILLUSTRATION 9

(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 employee and
iii. Hourly earnings.

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

Hints: When Actual Hour is 50% of standard hours

Study Material - ILLUSTRATION 10

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

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

Hints: Effective hours rate = ₹35

Study Material - ILLUSTRATION 11

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

(i) The entire gains of improved production should not go to the workers.
(ii) In the name of speed, quality should not suffer.
(iii) The rate setting department being newly established 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.

TEST YOUR KNOWLEDGE

Question 1

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 Employee 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
Average time for producing 1 piece by one worker at the previous performance (This may be taken as time allowed)	2 hours
No. of working days in the month	25
No. of working hours per day for each worker	8
Actual production during the month	1,250 units

Required:

(i) Calculate effective rate of earnings per hour under Halsey Scheme and Rowan Scheme.

(ii) Calculate the savings to Mr. A in terms of direct labour cost per piece under the schemes.

Hints:

(i) Halsey = ₹45, Rowan = ₹48
(ii) Halsey = ₹80, Rowan = ₹8

Question 2

Wage negotiations are going on with the recognised employees' union, and the management wants you as an executive 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 and the employee cost per 100 pieces under (i) Day Wages, (ii) Piece rate, (iii) Halsey scheme, (iv) Rowan Scheme.

Also calculate under the above schemes the average cost of labour for the company to produce 100 pieces.

Hints:

Plan	Average Labour Cost (100 Pieces)
Day Wages	₹450
Piece Rate	₹750
Halsey	₹600
Rowan	₹613.25

B. PAST YEAR QUESTION

May 23 Q1(b)

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 earnings for one operator under-

(i) The existing Time Rate,

(ii) Rowan Premium Plan and,
(iii) Halsey Premium Plan (50%).

Solution:

Working Notes:

(1) Effective rate per hour:

Incentive for 60 hours = (₹ 150 × 48 hours + ₹ 300 × 12 hours)
= 7,200 + 3,600 = ₹ 10,800
= ₹ 10,800 ÷ 60 hours = ₹ 180 per hour

(2) Time taken/ Allowed to produce 100 toys:

= (60 hours ÷ 80 toys) × 100 toys = 75 hours

(3) Time saved = Time Allowed – Time Taken

= 75 hours – 48 hours = 27 hours

(i) Calculation of weekly earnings for one operator under the existing time rate:
= (48 hours x ₹ 150) + (12 hours x ₹ 300) = ₹ 10,800 Alternative solution
= Effective rate per hour (WN-1) × Time required for 100 toys (WN-2)
= ₹ 180 × 75 hours = ₹ 13,500

(ii) Calculation of weekly earnings for one operator under Rowan Premium plan:
(Time taken × Rate per hour) + (Time Saved/ Time Allowed × Time taken × Rate per hour)
= (48 hours × ₹ 150) + [(27 ÷ 75) × 48 × ₹ 150]
= 7,200 + 2,592 = ₹ 9,792

(iii) Calculation of weekly earnings for one operator under Halsey Premium plan:
(Time taken × Rate per hour) + (50% of Time Saved × Rate per hour)
= (48 hours × ₹ 150) + (50% of 27 hours × ₹ 150)
= ₹ 7,200 + ₹ 2,025 = ₹ 9,225

Nov 22 Q2(b)

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:
(i) Calculate wages of Mr. 'A' under each of the following methods:
(A) Time rate,
(B) Piece -rete with a guaranteed weekly wage,
(C) Halsey Premium Plan
(D) Rowan Premium Plan

(ii) Suggest which bonus plan i.e. Halsey Premium Plan or Rowan Premium Plan, the company should follow.

Solution:

(i) Calculation of wages of Mr. 'A' under different wage schemes:

A. Time rate

Wages = Time Worked × Rate for the time

= 48 hours x ₹ 15

= ₹ 720

B. Piece rate with a guaranteed weekly wage

Wages = Number of units produced × Rate per unit

= 200 units x ₹ 4.50*

= ₹ 900

*(₹ 15 / 60 minutes) x 18 minutes = ₹ 4.50

C. Halsey Premium Plan

Wages = Time taken × Time rate + 50% of time saved × Time rate

Wages = Time taken × Time rate + 50% (Standard time – Actual time) × Time rate

= (48 hours x ₹ 15) + 50% of (60 hours# – 48 hours) x ₹ 15

= ₹ 720 + ₹ 90

= ₹ 810

#(200 units x 18 minutes) / 60 minutes = 60 hours

D. Rowan Premium Plan

$$\text{Wages} = \text{Time taken} \times \text{Rate per hour} + \frac{\text{Time Saved}}{\text{Time Allowed}} \times \text{time taken} \times \text{Rate per hour}$$

$$= (48 \text{ hours} \times ₹ 15) + \left(\frac{60 - 48 \text{ hours}}{60 \text{ hours}} \times 48 \text{ hours} \times ₹15\right)$$

= ₹ 720 + ₹ 144

= ₹ 864

(ii) The company may follow Halsey Premium Plan over Rowan Premium Bonus Plan as the total wages paid is lower than that of Rowan Premium Bonus Plan.

Dec 21 Q1(c)

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 the wages under Rowan Incentive Plan.

You are required to:

(i) Calculate an effective hourly rate of earnings under Rowan Incentive Plan.

(ii) 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.

Solution:

(i) Calculation of Effective hourly rate of earnings under Rowan Incentive Plan:

Time taken = 8 hours; Time saved = 2 hours

Standard time allowed = 10 hours

	Particulars	Amount (₹)
A	Basic guaranteed wages (₹150×8 hours)	1,200
B	Add: Bonus for time saved ($\frac{2}{10} \times 8 \times$ ₹150)	240
C	Total earnings (A+B)	1,440
D	Hours worked	8 hours
E	Effective hourly rate (C÷D)	180

(ii) Let the time taken to complete the job is "T" and the time saved is 10-T

Effective hourly rate under the Halsey Incentive scheme

$$= \frac{(\text{Rate} \times \text{Hours Worked}) + (\text{Rate} \times 50\% \text{ of Time Saved})}{\text{Hours Worked}} = ₹180$$

$$= \frac{(₹150 \times T) + ₹150 \times 50\% (10 - T)}{T} = ₹ 180$$

$150T + 750 - 75T = 180T$

$180T - 75T = 750$

$T = \frac{750}{105} = 7.14$ hours

Jan 21 Q2(a)

Z Ltd is working by employing 50 skilled workers. It is considering the introduction of an incentive scheme - either Halsey Scheme (with 50% Bonus) or Rowan Scheme - of wage payment for increasing the labour productivity to adjust with the increasing demand for its products by 40%. The company 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 the company has accordingly given assurance to the workers.

Because of this assurance, an 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 a month	24
Number of working hours per day of each worker	8
Actual production during the month	6,120 units

Required:

(i) Calculate the effective increase in earnings of workers in percentage terms under Halsey and Rowan scheme.

(ii) Calculate the savings to Z Ltd in terms of direct labour cost per unit under both the schemes.

(iii) Advise Z Ltd about the selection of the scheme that would fulfil its assurance of incentivising

workers and also to adjust with the increase in demand.

Solution:

Working Notes:

1. Total time wages of 50 workers per month:

= No. of working days in the month × No. of working hours per day of each worker × Hourly rate of wages × No. of workers

= 24 days × 8 hrs. × ₹ 50 × 50 workers = ₹ 4,80,000

2. Time saved per month:

Time allowed per unit to a worker	1.975 hours
No. of units produced during the month by 50 workers	6,120 units
Total time allowed to produce 6,120 units (6,120 × 1.975 hrs)	12,087 hours
Actual time taken to produce 6,120 units (24 days × 8 hrs. × 50 workers)	9,600 hours
Time saved (12,087 hours – 9,600 hours)	2,487 hours

3. Bonus under Halsey scheme to be paid to 50 workers:

Bonus = (50% of time saved) × hourly rate of wages

= 50/100 × 2,487 hours × ₹ 50 = ₹ 62,175

Total wages to be paid to 50 workers are (₹ 4,80,000 + ₹ 62,175) ₹ 5,42,175, if Z Ltd. considers the introduction of Halsey Incentive Scheme to increase the worker productivity.

4. Bonus under Rowan Scheme to be paid to 50 workers:

$$\text{Bonus} = \frac{\text{Time Taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{hourly rate}$$

$$= \frac{9{,}600 \text{ hours}}{12{,}087 \text{ hours}} \times 2{,}487 \text{ hours} \times ₹ 50 = ₹ 98{,}764$$

Total wages to be paid to 50 workers are (₹ 4,80,000 + ₹ 98,764) ₹ 5,78,764, if Z Ltd. considers the introduction of Rowan Incentive Scheme to increase the worker productivity.

(i) (a) Effective hourly rate of earnings under Halsey scheme:

(Refer to Working Notes 1, 2 and 3)

$$= \frac{\text{Total time wages of 50 workers + Total bonus under Halsey scheme}}{\text{Total hours worked}}$$

$$= \frac{₹\ 4,80,000 + ₹\ 62,175}{9,600 \text{ hours}} = ₹\ \mathbf{56.48}$$

Effective increase in earnings of worker (in %) = $\frac{₹\ 56.48 - ₹\ 50}{₹\ 50} \times 100 = 2.96\%$

(b) Effective hourly rate of earnings under Rowan scheme:
(Refer to Working Notes 1, 2 and 4)

$$= \frac{\text{Total time wages of 50 workers + Total bonus under Rowan scheme}}{\text{Total hours worked}}$$

$$= \frac{₹\ 4,80,000 + ₹\ 96,875}{9,600 \text{ hours}} = ₹\ \mathbf{60.29}$$

Effective increase in earnings of worker (in %) = $\frac{₹\ 60.29 - ₹\ 50}{₹\ 50} \times 100 = 20.58\%$

(ii) (a) Saving in terms of direct labour cost per unit under Halsey scheme:
(Refer to Working Note 3)

Labour cost per unit (under time wage scheme)

= 1.975 hours × ₹ 50 = ₹ 98.75

Labour cost per unit (under Halsey scheme)

$\frac{\text{Total wages paid under the scheme}}{\text{Total number of units produced}} = \frac{₹\ 5,42,175}{6,120} = ₹88.60$

(b) Saving in terms of direct worker cost per unit under Rowan Scheme:
(Refer to Working Note 4)

Labour cost per unit under Rowan scheme = ₹ 5,78,764/6,120 units = ₹ 94.57
Saving per unit = ₹ 98.75 – ₹ 94.57 = ₹ 4.18

(iii) Calculation of Productivity:

Normal Production Hours worked/Unit per Hour (9,600/1.975)	4,861
Actual Production Units	6,120
Increase in labour productivity	1,259
% Productivity i.e. increase in production/Normal production	**25.9%**

Advice: Rowan plan fulfils the company's assurance of 20% increase over the present earnings of workers. This would increase productivity by 25.9% only. It will not adjust with the increase in demand by 40%.

Nov 19 Q4(a)

Zico Ltd. Has its factory at two location viz Nasik and Satara. Rowan plan is used at Nasik factory and Hasley Plan is used 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 hours per day for 5 day week. Job in Nasik factory is completed in 32 hours while at Satara factory it has taken 30 hours. Conversion costs at Nasik and Satara are ₹ 5408 and ₹ 4950. Overheads account for ₹ 25 per hours

Required :

(i) To find out normal wage rate; and

(ii) To compare the respective conversion cost

Solution:

(i) Let, normal wage rate be ₹x/hr

	Nasik	Satara
S.H.	40	40
A.H.	32	30
	8	10

Total wages :

1. At Nasik = (32.x + 8.x.32/40)
   = 38.4x

   Labour + overhead = conversion cost

   38.4x + 800 = 5408 …….(1)

2. At Satara = (30.x + 10.x . 50%)
   = 35x

   35x + 750 = 4950 …….(2)

Solving Equation (1) and (2)

We get,

X = ₹120

(ii) Comparision of conversion cost

	Nasik	Satara
Wages	38.4 x 120	35 x 120
	₹4608	₹4200
Overheads	₹800	₹750
	₹5408	₹4950

May 19 Q1(b)

M/s Zeba Private Limited allotted a standard time of 40 hours for a job and the rate per hour is ₹ 75. The actual time taken by a worker is 30 hours.

You are required to calculate the total earnings under the following plans:

(i) Halsey Premium Plan (Rate 50%)

(ii) Rowan Plan

(iii) Time Wage System

(iv) Piece Rate System

(v) Emerson Plan

Solution

1. **Halsey Premium plan**

= (time taken × Rate per hour) + (½ × Time saved × Rate per hour)

= (30 hours × ₹75) + (½ × 10 hours × ₹ 75) = ₹2,250 + ₹375 = ₹2,625

2. **Rowan Premium plan:**

= (time taken × Rate per hour) + ($\frac{\text{Time saved}}{\text{Time allowed}}$ × Time taken × Rate per hour)

= (30 hours × ₹75) +($\frac{10}{40}$ ×30×₹75)

= ₹2,250 + ₹562.5 = ₹2,812.5 or ₹2,813

3. **Time wage system:**

= Time taken × Rate per hour

= 30 × ₹ 75 = ₹ **2,250**

4. **Piece Rate System:**

= Std. Time × Rate per hour

= 40 × ₹ 75 = ₹ **3,000**

5. **Emerson plan:**

Efficiency level = 40/30 = 133.33%

Time taken × (120% + 33.33%) of Rate

= 30 hours × 153.33% of ₹ 75

= ₹ **3,450**

May 18 Q1(b)

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 payments:

(i) Rowan Plan

(ii) Halsey Plan

Solution

		₹
(i)	Rowan Plan : Normal time wage = 15 hours @ ₹ 5=	75

Bonus = Time saved /Time allowed × (Time taken × Time rate)

$= \frac{5}{20} \times (15 \times 5) =$ 18.75

93.75

(ii) Halsey Plan: Normal time wage = 15 hours @ ₹ 5 = 75

Bonus = 50% of (Time saved x Time rate) = 50% of (5x5) = 12.5

87.5

Statement of Comparative Factory cost of work

	Rowan Plan	Halsey Plan
	₹	₹
Materials	50	50
Direct Wages	93.75	87.5
Prime Cost	143.75	137.5
Factory Overhead (100% of Direct wages)	93.75	87.5
Factory Cost	237.5	225

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

A Company is undecided as to what kind of wage scheme should be introduced. The following particulars have been compiled in respect of three systems, which are under consideration of the management.

Workers

	A	B	C
Actual hours worked in a week	38	40	34
Hourly rate of wages	₹ 6	₹ 5	₹ 7.20
Production in units			
Product- P	21	-	60
Product- Q	36	-	135
Product -R	46	25	-
Standard time allowed per unit of each product is:			
Minutes	P 12	Q 18	R 30

For the purpose of piece rate, each minute is valued at ₹ 0.10 You are required to calculate the wages of each worker under:

1) Guaranteed hourly rates basis
2) Piece work earnings basis, but guaranteed at 75% of basic pay (guaranteed hourly rate) if his earnings are less than 50% of basic pay.

3) Premium bonus basis where the worker receives bonus based on Rowan scheme.

Solution:

(1) Computation of wages of each worker under guaranteed hourly rate basis:

Workers	Actual hours worked in a week	Hourly rate of wages (₹)	Wages (₹)
(a)	(b)	(c)	(d) = (b) × (c)
A	38	6.00	228.00
B	40	5.00	200.00
C	34	7.20	244.80

(2) Computation of wages of each worker under piece work earnings basis:

		Worker A		Worker B		Worker C	
Product	Rate per unit	Units	Wages (₹)	Units	Wages (₹)	Units	Wages (₹)
(a)	(b)	(c)	(d= b*c)	(e)	(f = b*e)	(g)	(h=b*g)
P	1.20	21	25.20	-	-	60	72
Q	1.80	36	64.80	-	-	135	243
R	3.00	46	138.00	25	75	-	-
			228.00		75.00		315.00

Since each worker has been guaranteed at 75% of basic pay, if his earnings are less than 50% of basic pay (guaranteed hourly rate), therefore, earning of the workers will be as follows Workers A and C will be paid the wages as computed viz., ₹ 228 and ₹ 315 respectively. The computed earnings under piece rate basis for worker B is ₹ 75 which is less than 50% of basic pay i.e., ₹ 100 (₹ 200 × 50) therefore he would be paid ₹ 150 i.e. 75% × ₹ 200 .

Working Notes:

1. Piece rate / per unit

Product	Standard time per unit in minutes	Piece rate each minute (₹)	Piece rate per unit (₹)
(a)	(b)	(c)	(d) = (b) × (c)
P	12	0.10	1.20
Q	18	0.10	1.80
R	30	0.10	3.00

2. Time allowed to each worker

Worker A = (21 units × 12 minutes) + (36 units × 18 minutes) + (46 units × 30 minutes)
= 2,280 minutes or 38 hours

Worker B = 25 units × 30 minutes
= 750 minutes or 12.5 hours

Worker C = (60 units × 12 minutes) + (135 units × 18 minutes)
= 3,150 minutes or 52.5 hours

3. Computation of wages of each worker under Premium bonus basis (where each

worker receives bonus based on Rowan Scheme)

Workers	Time allowed hours	Time taken hours	Time saved hours	Wage rate/hour (₹)	Earnings (₹)	Bonus (₹)	Total of earning & bonus (₹)
A	38.00	38.00	-	6.00	228.00	-	228.00
B	12.50	40.00	-	5.00	200.00	-	200.00
C	52.50	34.00	18.50	7.20	244.80	86.26*	331.06

*Bonus under Rowan scheme = $\frac{\text{Time saved}}{\text{Time Allowed}}$ × Time taken × Rate per hour

= $\frac{18.5 \text{ hours}}{52.5 \text{ hours}}$ × 34 hours × ₹ 7.20

= ₹ 86.26

Question-2

The standard hours of job X is 100 hours. The job has been completed by Amar in 60 hours, Akbar in 70 hours and Anthony in 95 hours.

The bonus system applicable to the job is as follows:-

Percentage of time saved to time allowed (Slab rate)

	Bonus Saving
Upto 10%	10% of time saved
From 11% to 20%	15% of time saved
From 21% to 40%	20% of time saved
From 41% to 100%	25% of time saved

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

Solution:

Statement of total earnings and rate of earning per hour

	Workers		
	Amar	Akbar	Anthony
Standard hours of Job	100 hours	100 hours	100 hours
Time taken on the Jobs (i)	60 hours	70 hours	95 hours
Time saved	40 hours	30 hours	5 hours
Percentage of time saved to time allowed	40 %	30 %	5%
Bonus hours (ii) (See Working Note 1)	6.5 hours	4.5 hours	0.5 hours

Total hours to be paid [(i) + (ii)]	66.5 hours	74.5 hours	95.5 hours
Total earning @ ₹ 1 per hour	₹ 66.5	₹ 74.5	₹ 95.5
Rate of earning per hour (See Working Note 2)	₹ 1.1083	₹ 1.0642	₹ 1.005

Note:

1. Bonus hours as percentage of time saved:

Amar : (10 hours × 10%) + (10 hours × 15%) + (20 hours × 20%) = 6.5 hours
Akbar : (10 hours × 10%) + (10 hours × 15%) + (10 hours × 20%) = 4.5 hours
Anthony : 5 hours × 10% = 0.5 hours

2. Rate of Earning per hour = $\frac{\text{Total earning}}{\text{Total time taken on job}}$

Amar = $\frac{₹ 65.5}{60 \text{ hours}}$ = ₹1.1083
Akbar = $\frac{₹ 74.5}{70 \text{ hours}}$ = ₹1.0642
Anthony = $\frac{₹95.50}{95 \text{ hours}}$ = ₹1.005

Question-3

The existing Incentive system of Alpha Limited is as under:
Normal working week 5 days of 8 hours each plus 3 late shifts of 3 hours each
Rate of Payment Day work: ₹ 160 per hour Late shift: ₹ 225 per hour
Average output per operator for 49 hours week i.e. including 3 late shifts – 120 articles

In order to increase output and eliminate overtime, it was decided to switch on to a system of payment by results. The following information is obtained:

Time-rate (as usual)	:	₹ 160 per hour
Basic time allowed for 15 articles	:	5 hours
Piece-work rate	:	Add 20% to basic piece-rate
Premium Bonus	:	Add 50% to time.

Required:

(i) Prepare a Statement showing hours worked, weekly earnings, number of articles produced and labour cost per article for one operator under the following systems:

(a) Existing time-rate

(b) Straight piece-work

(c) Rowan system

(d) Halsey premium system

(ii) Assume that 135 articles are produced in a 40-hour week under straight piece work, Rowan Premium system, and Halsey premium system above and worker earns half the time saved under Halsey premium system.

Solution:

Table showing Labour Cost per Article

Method of Payment	Hours worked	Weekly earnings (₹)	Number of articles produced	Labour cost per article (₹)
Existing time rate (WN-1)	49	8,425.00	120	70.21
Straight piece rate system (WN-2)	40	8,640.00	135	64.00
Rowan Premium System (WN-3)	40	9,007.41	135	66.72
Halsey Premium System (WN-4)	40	8,600.00	135	63.70

Working Notes:

1. Existing time rate

Weekly wages:

Normal shift	(40 hours × ₹ 160)	₹ 6,400
Late shift	(9 hours × ₹ 225)	₹ 2,025
		₹ 8,425

2. Piece Rate System

15 articles are produced in 5 hours

Therefore, to produce 135 articles, hours required is $\frac{5 \text{ hours}}{15 \text{ articles}} \times 135 \text{ articles} = 45 \text{ hours}$

Cost of producing 135 articles:

At basic time rate (45 hours × ₹160) = ₹7,200

Add: Bonus @ 20% on basic Piece rate

$\left[\frac{₹\ 7,200}{135 \text{ articles}} \times 20\% \times 135 \text{ articles}\right]$ = ₹1,440

Earning for the week = ₹8,640

3. Rowan Premium system

(i) Time allowed for producing 135 articles $\left[\frac{5 \text{ hours}}{15 \text{ articles}} \times 135 \text{ articles} \times 150\%\right]$ = 67.5 hours

(ii) Time taken to produce 135 articles = 40.0 hours

(iii) Time saved = 27.5 hours

Earnings under Rowan Premium system:

= (time taken × Rate per hour) + $\left[\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour}\right]$

= (40 × ₹160) + $\left[\frac{27.5 \text{ hours}}{67.5 \text{ hours}} \times 40 \text{ hours} \times ₹160\right]$ = ₹ 9,007.41

4. Halsey Premium System

= (time taken × Rate per hour) + (½ × Time saved × Rate per hour)

= (40 hours × ₹160) + (½ × 27.5 hours × ₹160) = ₹6,400 + ₹2,200 = ₹8,600

Question-4

Two workmen, Andrew and Baker, produce the same product using the same material. Andrew is paid bonus according to Halsey plan, while Baker is paid bonus according to Rowan plan. The time allowed to manufacture the product is 100 hours. Andrew has taken 60 hours and Baker has taken 80 hours to complete the product. The normal hourly rate of wages of workman Andrew is ₹ 24 per hour. The total earnings of both the workers are same. Calculate normal hourly rate of wages of workman Baker.

Solution:

	Andrew	**Baker**
Time allowed (Hours)	100	100
Time taken (Hours)	60	80
Time saved (Hours)	40	20
Let the rate of wages of the worker Baker is 'L' per hour		
Normal Wages	₹ 1,440 (60 hours× ₹24)	₹ 80 L (80 hours× L)
Bonus	₹ 480*	₹ 16 L**
Total earnings	₹ 1,920	₹ 96 L

* Bonus under Halsey system = ½ x Time saved x Rate per Hour
= ½ x 40 hours x ₹24 = ₹480

**Bonus under Rowan system = $\frac{\text{Time Saved}}{\text{Time allowed}}$ x Time worked x Rate per hour

= $\frac{20 \text{ hours}}{100 \text{ hours}}$ x 80 hours x L = 16L

According to the problem,

Total earnings of Andrew = Total earnings of Baker

₹ 1,920 = ₹ 96 L

L = ₹ 20

Therefore, Hourly rate of wages of Baker is ₹ 20 per hour.

Question-5

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

Solution:

Increase in hourly rate of wages under Rowan Plan is ₹ 10 i.e.(₹ 60 – ₹ 50)

This is equal to $\frac{\text{Time Saved}}{\text{Time Allowed}}$ x Rate per hour (Please refer Working Notes)

Or, $\frac{\text{Time Saved}}{\text{Time Allowed}}$ x ₹50 = ₹10

Or, $\frac{\text{Time Saved}}{90 \text{ hours}}$ x ₹50 = ₹10

Therefore, Time Saved = 18 hours and Time Taken is 72 hours i.e. (90 hours – 18 hours)

Effective Hourly Rate under Halsey System:
Time saved = 18 hours
Bonus @ 40% = 18 hours × 40% × ₹ 50 = ₹ 360
Total Wages = (₹50 × 72 hours + ₹360) = ₹ 3,960
Effective Hourly Rate = ₹ 3,960 ÷ 72 hours = ₹ 55

Working Note:

$$\text{Effective hourly rate} = \frac{(\text{Time Taken} \times \text{Rate per hour}) + \frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Rate per hour}}{\text{Time Taken}}$$

$$\text{Or,} \quad ₹\ 60 = \frac{\text{Time Taken} \times \text{Rate per hour}}{\text{Time Taken}} + \frac{\frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Rate per hour}}{\text{Time Taken}}$$

$$\text{Or,} \quad ₹\ 60 - \frac{\text{Time Taken} \times \text{Rate per hour}}{\text{Time Taken}} = \frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Rate per hour} \times \frac{1}{\text{Time Taken}}$$

$$\text{Or,} \quad ₹\ 60 - ₹\ 50 = \frac{\text{Time Saved}}{\text{Time Allowed}} \times ₹\ 50$$

Question-6

You are given the following information of a worker:
(i) Name of worker : Mr. Roger
(ii) Ticket No. : 002
(iii) Work started : 1-4-14 at 8 a.m.
(iv) Work finished : 5-4-14 at 12 noon
(v) Work allotted : Production of 2,160 units
(vi) Work done and approved : 2,000 units
(vii) Time and units allowed : 40 units per hour
(viii) Wage rate : ₹ 25 per hour
(ix) Mr. Roger worked 9 hours a day.
You are required to calculate the remuneration of Mr. Roger on the following basis:
(i) Halsey plan and
(ii) Rowan plan

Solution:
No. of units produced and approved = 2,000 units
Standard time = 40 units per hour
Hourly Wage Rate = ₹ 25
Time Allowed = $\frac{2000 \text{ units}}{40 \text{ units}}$ = 50 hours

Time Taken = (4 days × 9 hours) + 4 hours = 40 hours
Calculation of Remuneration under Halsey Plan:
Standard time allowed for 2,000 units : 50 hours
Actual time taken for 2,000 units: 40 hours
Time saved 10 hours
Basic wages for time taken 40 hours @ ₹ 25 ₹ 1,000
Bonus: 50% of time saved ($\frac{50}{}$ x 10 hours x ₹25) ₹125

100

Total remuneration ₹1125

(ii) Calculation of Remuneration under Rowan Plan:

Wages for time taken 40 hours @ ₹ 25 ₹ 1,000

Bonus = Time saved / Time allowed x Time taken x hourly rate

= 10 hours / 50 hours x 40 hours x ₹25 = ₹200

Total remuneration = ₹1,200

Question-7

Mr. Michael executes a piece of work in 120 hours as against 150 hours allowed to him. His hourly rate is ₹ 10 and he gets a dearness allowance @ ₹ 30 per day of 8 hours worked in addition to his wages. You are required to calculate total wages received by Mr. Michael under the following incentive schemes:

1. Rowan Premium Plan, and
2. Emerson's Efficiency Plan

Solution:

Time Allowed = 150 hours
Time Taken = 120 hours
Time Saved = 30 hours

(i) Rowan Premium Plan

	(₹)
Normal wages (₹ 10 x 120 hours)	1,200
D.A. for 15 days i.e. 120 hours / 8 hours (₹30 x 15 days)	450
Bonus = Time saved / Time Allowed x Time taken x Hourly rate = 30 hours / 150 hours x 120 hours x ₹10	240
Total Wages	1,890

(ii) Emersion₹s Efficiency Plan

Normal wages (120 hours × ₹ 10)	1,200
D.A. (15 days x ₹ 30)	450
Bonus * = 45% × ₹1,200	540
Total Wages	2,190

*Efficiency = Time Allowed / Time Taken x 100 = 150 / 120 x 100 = 125%

Rate of Bonus up to 100%	=	20%
From 101% to 125%	=	25%
		45%

Question-8

The management of a company wants to formulate an incentive plan for the workers with a view to increase productivity. The following particulars have been extracted from the books of company:

Piece Wage rate ₹ 10
Weekly working hours 40
Hourly wages rate ₹ 40 (guaranteed)
Standard/normal time per unit 15 minutes. Actual output for a week:
Worker A: 176 pieces
Worker B: 140 pieces
Differential piece rate: 80% of piece rate when output below normal and 120% of piece rate when output above normal.
Under Halsey scheme, worker gets a bonus equal to 50% of Wages of time saved.

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

Solution:

Calculation of earnings for workers under different incentive plans:

Halsey's Premium Plan	**Worker A**	**Worker B**
Actual time taken	40 hours	40 hours
Standard time for actual Production	44 hours (176 pcs x 15 min.) 60 min	35 hours (140 pcs x 15 min.) 60 min
Minimum Wages	₹1,600 (40 hours x ₹40)	₹1,600 (40 hours x ₹40)
Bonus	₹80 {50% (44-40) x ₹40}	No Bonus
Earning	₹1,680	₹1,600
Rowan's Premium Plan:		
Minimum Wages (as above)	₹1,600	₹1,600
Bonus 145:45	₹145.45 (4 hours x 40 hours x ₹40) 44 hours	No Bonus
Earning	₹1,745.45	₹1,600

Question-9

A skilled worker is paid a guaranteed wage rate of ₹ 120 per hour. The standard time allowed for a job is 6 hour. He took 5 hours to complete the job. He is paid wages under Rowan Incentive Plan.

(i) Calculate his effective hourly rate of earnings under Rowan Incentive Plan.

(ii) If the worker is placed under Halsey Incentive Scheme (50%) and he wants to maintain the same effective hourly rate of earnings, calculate the time in which he should complete the job.

Solution:

(i) Effective hourly rate of earnings under Rowan Incentive Plan Earnings under Rowan Incentive plan =

(Actual time taken × wage rate) + $\frac{\text{Time Saved}}{\text{Time Allowed}}$ x Time taken × Wage rate

= (5 hours × ₹120) + ($\frac{\text{1 hour}}{\text{6 hours}}$ x 5 hours x ₹120)

= ₹ 600 + ₹100 = ₹700

Effective hourly rate = ₹700/5 hours = ₹ 140 /hour

(ii) Let time taken = X

Effective hourly rate = $\frac{\text{Earnings under Halsay Scheme}}{\text{Time Taken}}$

Or, Effective hourly rate under Rowan Incentive plan =

$\frac{\text{(Time taken x Rate) + 50\% Rate x (Time allowed - Time taken)}}{\text{Time Taken}}$

Or, ₹140 $\frac{\text{(X x ₹120) + 50\% ₹120 x (6 - X)}}{\text{X}}$

Or, 140X = 120X + 360 – 60X

Or, 80X = 360

Or, X = 360/80 = 4.5 hours

Therefore, to earn effective hourly rate of ₹140 under Halsey Incentive Scheme worker has to complete the work in 4.5 hours.

Question-10 (Practice Manual Old Cource Q8)

The finishing shop of a company employs 60 direct workers. Each worker is paid ₹ 400 as wages per week of 40 hours. When necessary, overtime is worked up to a maximum of 15 hours per week per worker at time rate plus one-half as premium. The current output on an average is 6 units per man hour which may be regarded as standard output. If bonus scheme is introduced, it is expected that the output will increase to 8 units per man hour. The workers will, if necessary, continue to work overtime up to the specified limit although no premium on incentives will be paid.

The company is considering introduction of either Halsey Scheme or Rowan Scheme of wages incentive system. The budgeted weekly output is 19,200 units. The selling price is ₹ 11 per unit and the direct material cost is ₹ 8 per unit. The variable overheads amount to ₹ 0.50 per direct labour hour and the fixed overhead is ₹ 9,000 per week.

Prepare a statement to show the effect on the company's weekly profit of the proposal to introduce (a) Halsey Scheme, and (b) Rowan Scheme.

Solution:

Working notes:

1. Total available hours per week 2,400
(60 workers × 40 hours)

2. Total standard hours required to produce 19,200 units (19,200 units ÷ 6 units per hour) — 3,200

3. Total labour hours required after the introduction of bonus scheme to produce 19,200 units (19,200 units ÷ 8 units per man hour) — 2,400

4. Time saved in hours (3,200 hours – 2,400 hours) — 800

5. Wage rate per hour (₹) (₹ 400 ÷ 40 hours) — 10

6. Bonus:

(i) Halsey Scheme = $\frac{1}{2}$ x Time saved x Wage rate per hour

= $\frac{1}{2}$ x 800 hours × ₹ 10 = ₹ 4,000

(ii) Rowan Scheme = $\frac{\text{Time saved}}{\text{Time allowed}}$ x Time taken × Wage rate per hour

= $\frac{800 \text{ hours}}{3{,}200 \text{ hours}}$ × 2,400 hours × ₹ 10 = ₹ 6,000

Statement showing the effect on the company's weekly present profit by the introduction of Halsey & Rowan schemes

	Present (₹)	Halsey (₹)	Rowan (₹)
Sales revenue: (A) (19,200 units × ₹11)	2,11,200	2,11,200	2,11,200
Direct material cost (19,200 units × ₹ 8)	1,53,600	1,53,600	1,53,600
Direct wages (Refer to working notes 2 & 3)	32,000 (3,200 hrs. × ₹10)	24,000 (2,400 hrs. × ₹10)	24,000 (2,400 hrs. × ₹10)
Overtime premium	4,000 (800 hrs.× ₹ 5)	-	-
Bonus (Refer to working notes 6 (i) & (ii))	-	4,000	6,000
Variable overheads	1,600 (3,200 hr.×₹0.50)	1,200 (2,400 hr.×₹0.50)	1,200 (2,400 hr.×₹0.50)
Fixed overheads	9,000	9,000	9,000
Total cost : (B)	2,00,200	1,91,800	1,93,800
Profit: {(A)- (B)}	11,000	19,400	17,400

Question-11 (Practice Manual Old Cource Q11)

'Under the Rowan Premium Bonus system, a less efficient worker can obtain same bonus as a highly efficient worker.' Discuss with suitable examples.

Solution:

Bonus under Rowan system = $\frac{\text{Time taken}}{\text{Time allowed}}$ x Time saved × Rate per hour

The statement that under Rowan Premium bonus system, a less efficient worker and a highly efficient worker can obtain same amount of bonus, can be proved with the help of an example. Let time allowed for a job is 4 hours and Labour rate per hour is ₹ 5.

Case I : Less efficient worker, If time taken = 3 hours.

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

Case II : Highly efficient worker, If time taken = 1 hour

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

So, it can be concluded that under Rowan System, the less efficient worker and highly efficient worker can get the same bonus.

Question-12 (Practice Manual Old Cource Q22)

Jigyasa Boutiques LLP. (JBL) takes contract on job works basis. It works for various fashion houses and retail stores. It has employed 26 workers and pays them on time rate basis. On an average an employee is allowed 2 hours for boutique work on a piece of garment. In the month of March 2014, two workers Margaret and Jennifer were given 30 pieces and 42 pieces of garments respectively for boutique work. The following are the details of their work:

	Margaret	Jennifer
Work assigned	30 pcs.	42 pcs.
Time taken	28 hours	40 hours

Workers are paid bonus as per Halsey System. The existing rate of wages is ₹ 50 per hour. As per the new wages agreement the workers will be paid ₹ 55 per hour w.e.f. 1st April 2014. At the end of the month March 2014, the accountant of the company has calculated wages to these two workers taking ₹ 55 per hour.

(i) From the above information calculate the amount of loss that the company has incurred due to incorrect rate selection.

(ii) What would be the loss incurred by the JBL due to incorrect rate selection if it had followed Rowan scheme of bonus payment.

(iii) Amount that could have been saved if Rowan scheme of bonus payment was followed.

(iv) Do you think Rowan scheme of bonus payment is suitable for JBL?

Solution:

	Margaret	Jennifer
No. of garments assigned (Pieces.)	30	42
Hour allowed per piece (Hours)	2	2
Total hours allowed (Hours)	60	84
Hours Taken (Hours)	28	40
Hours Saved (Hours)	32	44

i. Calculation of loss incurred due to incorrect rate selection.
(While calculating loss only excess rate per hour has been taken)

	Margaret (₹)	Jennifer (₹)	Total (₹)
Basic Wages	140 (28 Hrs. × ₹ 5)	200 (40 Hrs. × ₹ 5)	340
Bonus (as per Halsey Scheme) (50% of Time Saved × Excess Rate)	80 (50% of 32 Hrs. × ₹ 5)	110 (50% of 44 Hrs. × ₹ 5)	190
Excess Wages Paid	220	310	530

ii. Amount of loss if Rowan scheme of bonus payment were followed

	Margaret (₹)	Jennifer (₹)	Total (₹)
Basic Wages	140.00 (28 Hrs. × ₹ 5)	200.00 (40 Hrs. × ₹ 5)	340.00
Bonus (as per Rowan Scheme) $\frac{\text{Time taken}}{\text{Time allowed}}$ x Time saved × Excess Rate	74.67 $\left(\frac{28}{60} \times 32 \times ₹5\right)$	104.76 $\left(\frac{40}{84} \times 44 \times ₹5\right)$	179.43
Excess Wages Paid	214.67	304.76	519.43

iii. Calculation of amount that could have been saved if Rowan Scheme were followed

	Margaret (₹)	Jennifer (₹)	Total (₹)
Wages paid under Halsey Scheme	220.00	310.00	530.00
Wages paid under Rowan Scheme	214.67	304.76	519.43
Difference (Savings)	5.33	5.24	10.57

iv. Rowan Scheme of incentive payment has the following benefits, which is suitable with the nature of business in which Jigyasa Boutique LLP operates:

a. Under Rowan Scheme of bonus payment, workers cannot increase their earnings or bonus by merely increasing its work speed. Bonus under Rowan Scheme is maximum when the time taken by a worker on a job is half of the time allowed. As this fact is known to the workers, therefore, they work at such a speed which helps them to maintain the quality of output too.

b. If the rate setting department commits any mistake in setting standards for time to be taken to complete the works, the loss incurred will be relatively low.

Question-13 (Jan 21 Old Course Q6 (a))

The standard time allowed for a certain piece of work is 300 hours. Normal wages is ₹ 60 per hour.

The bonus system applicable to the work is as follows:

Percentage of time saved to time allowed (slab rate)	Bonus

(i) Up to the first 20% of time allowed	25% of the corresponding saving in time.
(ii) For and within the next 30% of time allowed	40% of the corresponding saving in time.
(iii) For and within the next 30% of time allowed	30% of the corresponding saving in time.
(iv) For and within the next 20% of time allowed	10% of the corresponding saving in time.

Calculate the total earnings of a worker over the piece of work and his earnings per hour when he takes.
(a) 320 hours,
(b) 150 hours, and
(c) 30 hours respectively.

Solution:

Calculation of total earnings and earnings per hour:

	Particulars	**(a) Time taken is 320 hours**	**(b) Time taken is 150 hours**	**(c) Time taken is 30 hours**
A.	Time Allowed	300 hours	300 hours	300 hours
B.	Time taken	320 hours	150 hours	30 hours
C.	Time Saved (A-B)	Nil	150 hours	270 hours
D.	Bonus hours (Refer the workings)	Nil	51 hours	81 hours
E.	Hours to be paid (B+D)	320 hours	201 hours	111 hours
F.	Wages rate per hour	₹ 60	₹ 60	₹ 60
G.	Total earnings (E×F)	₹ 19,200	₹ 12,060	₹ 6,660
H.	Earnings per hour (G÷B)	₹ 60	₹ 80.40	₹ 222

Workings:

Calculation of bonus hours:

	Time saved 150 hours	**Time saved 270 hours**
For first 20% of time allowed i.e. 60 hours	15 (25% of 60 hours)	15 (25% of 60 hours)
For next 30% of time allowed i..e. 90 hours	36 (40% of 90 hours)	36 (40% of 90 hours)
For next 30% of time allowed i..e. 90 hours	-	27 (30% of 90 hours)
For next 20% of time allowed i..e. 60 hours	-	3 (10% of 30 hours)
Bonus hours	**51**	**81**

Question-14 (May 21 Old Course RTP)

JBL Sisters operates a boutique which works for various fashion houses and retail stores. It has employed 26 workers and pays them on time rate basis. On an average an employee is allowed 8 hours for boutique work on a piece of garment. In the month of December 2020, two workers M and J were given 15 pieces and 21 pieces of garments respectively for boutique work. The following are the details of their work:

	M	J
Work assigned	15 pcs.	21 pcs.
Time taken	100 hours	140 hours

Workers are paid bonus as per Halsey System. The existing rate of wages is ₹ 60 per hour. As per the new wages agreement, the workers will be paid ₹ 72 per hour w.e.f. 1st January 2021. At the end of the month December 2020, the accountant of the company has wrongly calculated wages of these two workers taking ₹ 72 per hour.

Required:

(i) Calculate the loss incurred due to incorrect rate selection.

(ii) Calculate the loss incurred due to incorrect rate selection, had Rowan scheme of bonus payment followed.

(iii) Calculate the loss/ savings if Rowan scheme of bonus payment had followed.

(iv) Discuss the suitability of Rowan scheme of bonus payment for JBL Sisters?

Solution:

Workings Notes:

Calculation of Total hours saved:

	M	J
No. of garments assigned (Pieces.)	15	21
Hour allowed per piece (Hours)	8	8
Total hours allowed (Hours)	120	168
Hours Taken (Hours)	100	140
Hours Saved (Hours)	20	28

1. Calculation of loss incurred due to incorrect rate selection:
   (While calculating loss, only excess rate per hour has been taken)

	M (₹)	J (₹)	Total (₹)
Basic Wages	1,200 (100 Hrs. × ₹12)	1,680 (140 Hrs. × ₹12)	2,880
Bonus (as per Halsey Scheme) (50% of Time Saved × Excess Rate)	120 (50% of 20 Hrs. × ₹12)	168 (50% of 28 Hrs. × ₹12)	288

Excess Wages Paid	1,320	1,848	3,168

2. Calculation of loss incurred due to incorrect rate selection had Rowan scheme of bonus payment followed:

	M (₹)	J (₹)	Total (₹)
Basic Wages	1,200 (100 Hrs. × ₹12)	1,680 (140 Hrs. × ₹12)	2,880
Bonus (as per Rowan Scheme) Time taken x Time saved ×Excess Rate / Time allowed	200 (100 x 20 x ₹12) / 120	280 (140 x 28 x ₹12) / 168	480
Excess Wages Paid	1,400	1,960	3,360

3. Calculation of amount that could have been saved if Rowan Scheme were followed:

	M (₹)	J (₹)	Total (₹)
Wages paid under Halsey Scheme	1,320	1,848	3,168
Wages paid under Rowan Scheme	1,400	1,960	3,360
Difference (loss)	(80)	(112)	(192)

(iv) Rowan Scheme of incentive payment has the following benefits, which is suitable with the nature of business in which JBL Sisters operates:

(a) Under Rowan Scheme of bonus payment, workers cannot increase their earnings or bonus by merely increasing its work speed. Bonus under Rowan Scheme is maximum when the time taken by a worker on a job is half of the time allowed. As this fact is known to the workers, therefore, they work at such a speed which helps them to maintain the quality of output too.

(b) If the rate setting department commits any mistake in setting standards for time to be taken to complete the works, the loss incurred will be relatively low.

Question-15 (Nov 19 Old Course RTP)

ADV Pvt. Ltd. manufactures a product which requires skill and precision in work to get quality products. The company has been experiencing high labour cost due to slow speed of work. The management of the company wants to reduce the labour cost but without compromising with the quality of work. It wants to introduce a bonus scheme but is indifferent between the Halsey and Rowan scheme of bonus.

For the month of November 2019, the company budgeted for 24,960 hours of work. The workers are paid ₹80 per hour.

Required:

Calculate and suggest the bonus scheme where the time taken (in %) to time allowed to complete the works is (a) 100% (b) 75% (c) 50% & (d) 25% of budgeted hours.

Solution:

The Cost of labour under the bonus schemes are tabulated as below:

Time Allowed	Time taken	Wages (₹)	Bonus (₹)		Total Wages (₹)		Earning per hour (₹)	
			Halsey*	Rowan**	Halsey	Rowan	Halsey	Rowan
(1)	(2)	(3) = (2) ×₹80	(4)	(5)	(6) = (3) + (4)	(7) = (3) + (5)	(8) = (6)/(2)	(9) = (7)/(2)
24,960	24,960	19,96,800	-	-	19,96,800	19,96,800	80.00	80.00
24,960	18,720	14,97,600	2,49,600	3,74,400	17,47,200	18,72,000	93.33	100.00
24,960	12,480	9,98,400	4,99,200	4,99,200	14,97,600	14,97,600	120.00	120.00
24,960	6,240	4,99,200	7,48,800	3,74,400	12,48,000	8,73,600	200.00	140.00

* Bonus under Halsey Plan = 50% of (Time Allowed – Time Taken) × Rate per hour

** Bonus under Rowan Plan = $\frac{\text{Time taken}}{\text{Time allowed}}$ x Time saved x Rate per hour

Rowan scheme of bonus keeps checks on speed of work as the rate of incentive increases only upto 50% of time taken to time allowed but the rate decreases as the time taken to time allowed comes below 50%. It provides incentives for efficient workers for saving in time but also puts check on careless speed. On implementation of Rowan scheme, the management of ADV Pvt. Ltd. would resolve issue of the slow speed work while maintaining the skill and precision required maintaining the quality of product.

3. LABOUR TURNOVER

A. QUESTION FROM STUDY MATERIAL

Study Material - ILLUSTRATION 14

The Accountant of Y Ltd. has computed employee turnover rates for the quarter ended 31st March, 20X1 as 10%, 5% and 3% respectively under 'Flux method', 'Replacement method' and 'Separation method' respectively. If the number of workers replaced during that quarter is 30, FIND OUT the number of workers for the quarter

(i) recruited and joined and
(ii) left and discharged and
(iii) Equivalent employee turnover rates for the year.

Hints: (i) 42, (ii) 18, (iii) 40%, 20%, 12%

Study Material - ILLUSTRATION 15

The management of B.R Ltd. is worried about their increasing employee turnover in the factory and before analyzing the causes and taking remedial steps, it wants to have an idea of the profit foregone as a result of employee 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 employee force was 4.45 lakhs. As a result of the delays by the Personnel Department in filling vacancies due to employee turnover, 1,00,000 potentially productive hours were lost. The actual direct employee hours included 30,000 hours attributable to training new recruits, out of which half of the hours were unproductive.

The costs incurred consequent on employee turnover revealed, on analysis, the following:

Settlement cost due to leaving	₹43,820
Recruitment costs	₹26,740
Selection costs	₹12,750
Training costs	₹30,490

Assuming that the potential production lost as a consequence of employee turnover could have been sold at prevailing prices, FIND the profit foregone last year on account of employee turnover.

Hints: Profit Foregone: ₹5,00,000

B. PAST YEAR QUESTION

May 19 Q-3(a)

The information regarding number of employees on roll in a shopping mall for the month of December 2017 are given below:

Number of employees as on 01-12-2017 900

Number of employees as on 31-12-2017 1100

During December, 2017, 40 employees resigned and 60 employees were discharged. 300 employees were recruited during the month. Out of these 300 employees, 225 employees were recruited for an expansion project of the mall and rest were recruited due to exit of employees.

Assuming 365 days in a year, calculate Employee Turnover Rate and Equivalent Annual' Employee Turnover Rate by applying the following:

(i) Replacement Method

(ii) Separation Method

(iii) Flux Method

Solution:

(a) Labour turnover rate:

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

Replacement Method

$$\text{Labour turnover rate} = \frac{\text{No. of workers replaced}}{\text{Average number of workers}} \times 100$$

$$= \frac{75}{1{,}000} \times 100 = 7.5\%$$

$$\text{Equivalent Annual Turnover Rate} = \frac{7.5 \times 365}{31} = 88.31\%$$

(b) Separation Method

$$\text{Labour turnover rate} = \frac{\text{No. of workers left + No. of workers discharged}}{\text{Average no. of worker}} \times 100$$

$$= \frac{(40+60)}{(900+1{,}100)/2} \times 100 = \frac{100}{1{,}000} \times 100$$

$$= 10\%$$

$$\text{Equivalent Annual Turnover Rate} = \frac{10 \times 365}{31} = 117.74\%$$

(c) Flux Method:

$$\text{Labour turnover rate} = \frac{\text{No. of Separation + No. of accessions}}{\text{Average number of workers}} \times 100$$

$$= \frac{(100+300)}{(900+1{,}100)/2} \times 100 = \frac{400}{1{,}000} \times 100 = 40\%$$

$$\text{Equivalent Annual Turnover Rate} = \frac{40 \times 365}{31} = 470.97\%$$

OR

$$\text{Labour turnover rate} = \frac{\text{No. of Separation + No. of replaced}}{\text{Average number of workers}} \times 100$$

$$= \frac{(100+75)}{1000} \times 100 = 17.5\%$$

$$\text{Equivalent Annual Turnover Rate} = \frac{17.5 \times 365}{31} = 206.05\%$$

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question 1

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

No. of workers as on 01.01.2013 = 7,600

No. of workers as on 31.12.2013 = 8,400

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

Solution:

Labour turnover rate:

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

(i) Separation Method:

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

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

(ii) Replacement Method

$$= \frac{\text{No. of workers replaced}}{\text{Average no. of workers}} \times 100$$

$$= \frac{300 \times 100}{8,000} = 3.75\%$$

(iii) New Recruitment

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

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

$$= \frac{1500-300}{8,000} \times 100 = \frac{1200 \times 100}{8,000} = 15\%$$

(iv) Flux Method:

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

$= \frac{(400 + 1,500)}{(7,600 + 8,400)} \times 100 = \frac{1,900}{8,000} \times 100 = 23.75\%$

Question-2

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

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

Solution:

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

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

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

(i) Labour Turnover by Separation Method

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

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

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

(ii) Labour Turnover by Flux Method

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

$$= \frac{50 + 30 + 40}{(990 + 1,010)/2} \times 100 = \frac{120 \text{ wokrers}}{1,000 \text{ worker}} \times 100 = 12\%$$

Chapter. 3: Overhead- Absorption Costing Method

Part-I: Primary and Secondary Distribution

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 1: (Direct Re-distribution Method)

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

PREPARE a statement apportioning the costs of service departments over the production departments.

Hints: ₹34,20,000, ₹29,00,000, ₹26,40,000

ILLUSTRATION: 2 (Step Method)

Suppose the expenses of two production departments A and B and two service departments X and Y are as under:

	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			

Hints: ₹ 46,000, ₹ 5,10,000

ILLUSTRATION: 3 (Reciprocal- Simultaneous Equation)

Service departments' expenses

	(₹)
Boiler House	3,00,000
Pump Room	60,000
	3,60,000

The allocation is :

	Production Departments		Boiler House	Pump Room
	A	B		
Boiler House	60%	35%	–	5%
Pump Room	10%	40%	50%	–

Hints: A = ₹2,10,769, B = ₹1,49,231

ILLUSTRATION: 4 (Reciprocal- Trial and Error Method / Repeated Distribution Method)

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 20X3:

	Total (₹)	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:						
Area (Sq. ft.)		500	250	500	250	500
Capital value of assets (₹ 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:

	A	B	C	X	Y
Service Dept. 'X' (%)	45	15	30	–	10
Service Dept. 'Y' (%)	60	35	–	5	–

Required:

(i) PREPARE a statement showing distribution of overheads to various departments.

(ii) PREPARE a statement showing re-distribution of service departments expenses to production departments using Trial and error method.

Hints:

	A	B	C
Trial & Error	₹8,48,200	₹6,50,500	₹7,51,300
Repeated Distribution	₹8,48,177	₹6,50,541	₹7,51,282

ILLUSTRATION: 5

A Ltd., manufactures two products A and B. The manufacturing division consists of two production departments P_1 and P_2 and two service departments S_1 and S_2.

Budgeted overhead rates are used in the production departments to absorb factory overheads to the products. The rate of Department P_1 is based on direct machine hours, while the rate of Department P_2 is based on direct labour hours. In applying overheads, the pre-determined rates are multiplied by actual hours.

For allocating the service department costs to production departments, the basis adopted is as follows:

(i) Cost of Department S_1 to Department P_1 and P_2 equally, and

(ii) Cost of Department S_2 to Department P_1 and P_2 in the ratio of 2 : 1 respectively.

The following budgeted and actual data are available:
Annual profit plan data:
Factory overheads budgeted for the year:

Departments	P_1	25,50,000	S_1	6,00,000
	P_2	21,75,000	S_2	4,50,000

Budgeted output in units:
Product A 50,000; B 30,000.

Budgeted raw-material cost per unit:
Product A ₹ 120; Product B ₹ 150.

Budgeted time required for production per unit:

Department P_1 : Product A : 1.5 machine hours
Product B : 1.0 machine hour
Department P_2 : Product A : 2 Direct labour hours
Product B : 2.5 Direct labour hours

Average wage rates budgeted in Department P_2 are:
Product A - ₹ 72 per hour and Product B – ₹ 75 per hour.

All materials are used in Department P_1 only.

Actual data: (for the month of July, 20X8)
Units actually produced: Product A : 4,000 units
Product B : 3,000 units

Actual direct machine hours worked in Department P1:
On product A 6,100 hours, Product B 4,150 hours.

Actual direct labour hours worked in Department P_2:
on 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		5,91,900		5,52,000
		₹		₹
Overheads: Department	P_1	2,31,000	S_1	60,000
	P_2	2,04,000	S_2	48,000

You are required to :

(i) COMPUTE the pre-determined overhead rate for each production department.

(ii) PREPARE a performance report for July, 20X8 that will reflect the budgeted costs and actual costs.

Hints:

(i) P1 = ₹30, P2 = ₹15

(ii) Budgeted Cost = ₹25,71,000, Actual Cost = ₹26,31,861

ILLUSTRATION: 6 (Overhead & Cost Sheet)

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 percentage on Total Cost	10%	20%

Required:

(i) COMPUTATION of percentage recovery rates of factory overheads and administrative overheads.

(ii) CALCULATION of the amount of factory overheads, administrative overheads and profit for each of the two jobs.

(iii) Using the above recovery rates FIX the selling price of job 103. The additional data being:

Direct materials	₹ 24,000
Direct wages	₹ 20,000
Profit percentage on selling price	12-½%

Hints:

(i) Factory overhead = 60%, Administrative overhead = 25%

(ii)

	Job 101 (₹)	Job 102 (₹)
SP	₹1,66,650	₹1,28,250
Profit	₹15,150	₹21,375

(iii) SP for Job 103 = ₹80,000

ILLUSTRATION: 7 (Overhead & Cost Sheet)

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, 20X9.

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

	(₹)	Basis of allocation to products
Fixed Costs		
Rent & Insurance	3,00,000	Square feet
Depreciation	1,00,000	Parcel
Salesmen's salaries & expenses	6,00,000	Sales Volume
Administrative wages and salaries	5,00,000	No. of invoices
Variable Costs:		
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.

Hints:

Product	A	B	C	D
% of Profit	9.5	(12.10)	(8.80)	26.4

TEST YOUR KNOWLEDGE

Question-1

The ABC Company has the following account balances and distribution of direct Charges on 31st March, 20X1.

	Total	Production Depts.		Service Depts.	
		Machine shop	Packing	Gen. Plant	Store & Maintenance
	(₹)	(₹)	(₹)	(₹)	(₹)
Allocated Overheads :					
Indirect labour	14,650	4,000	3,000	2,000	5,650
Maintenance material	5,020	1,800	700	1,020	1,500
Misc. supplies	1,750	400	1,000	150	200
Superintendent's salary	4,000	–	–	4,000	–
Cost & payroll salary	10,000	–	–	10,000	–
Overheads to be apportioned:					
Power	8,000				
Rent	12,000				
Fuel and heat	6,000				
Insurance	1,000				
Taxes	2,000				
Depreciation	1,00,000				
	1,64,420	6,200	4,700	17,170	7,350

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

	Floor Space	Radiator Sections	No. of Employees	Investment ₹	H.P hours
MachineShop	2,000 Sq.ft.	45	20	640,000	3,500
Packing	800 ””	90	10	200,000	500
GeneralPlant	400 ””	30	3	10,000	–
Store&Maint.	1,600 ””	60	5	150,000	1,000
	4,800 ””	225	38	1,000,000	5,000

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

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

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

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

Hints:

	Machine	Packing	General	Stock
Primary Distribution	83,920	30,500	20,000	30,000
Secondary Distribution	1,18,396	46,024	-	-

Question-2

Modern Manufactures Ltd. has three Production Departments P1, P2, P3 and two Service Departments S1and S2 details pertaining to which are as under:

	P_1	P_2	P_3	S_1	S_2
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:

	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 the depts. 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.

Hints:

	P1	P2	P3	S1	S2
Primary Distribution	7,700	7,300	9,800	4,700	929
Secondary Distribution	9,233.52	9,035.02	12,160.46	-	-

Question-3

Deccan manufacturing Ltd. Have three dept. which are regarded as production dept. Service departments' cost are distribution to these production departments using the "Step Ladder Method" of distribution. Estimates of factory overheads costs to be incurred by each department on the forthcoming year are as follow.

Data required for the distribution is also shown against each department.

Department	Factory overhead (₹)	Direct labour hours	No. of employees	Area in sq.m.
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:

1. Prepare a schedule showing the distribution of overhead costs of the four service departments to the three production departments; and
2. Calculate the overhead recovery rate per direct labour hour for each of the three production departments.

Hints:

X = 3,00,000, 75

Y = 1,35,000, 45

Z = 1,60,000, 40

Question-4

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

	Total	Production Depts.		Service Depts.	
		Machine shop	Packing	Gen. Plant	Store & Maintenance
	(₹)	(₹)	(₹)	(₹)	(₹)
Allocated Overheads:					
Indirect labour	14,650	4,000	3,000	2,000	5,650
Maintenance material	5,020	1,800	700	1,020	1,500
Misc. supplies	1,750	400	1,000	150	200
Superintendent's salary	4,000	–	–	4,000	–
Cost & payroll salary	10,000	–	–	10,000	–
Overheads to be apportioned:					
Power	8,000				
Rent	12,000				
Fuel and heat	6,000				
Insurance	1,000				
Trade License fees	2,000				
Depreciation	1,00,000				
	1,64,420	6,200	4,700	17,170	7,350

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

	Floor Space (Sqft)	Radiator Sections	No. of Employees	Investment (₹)	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	1,600	60	5	1,50,000	1,000

& Maintenance					
	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:

(a) PREPARE an overhead distribution statement with supporting schedules to show computations and basis of distribution including distribution of the service departments' expense to production departments.

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

Hints:

(a) Overhead Distribution Statement

Particulars	**Production Department**		**Service Department**	
	Machine	**Packing**	**General Plant**	**Stores & Maint.**
Total overheads	**83,920**	**30,500**	**20,000**	**30,000**

Schedule of Apportioned Expenses

Item	**Basis**	**Total Amount**	**Production Depts.**		**Service Depts.**	
			Machine shop	**Packing**	**Gen. Plant**	**Store & Maint.**
		(₹)	**(₹)**	**(₹)**	**(₹)**	**(₹)**
Total		1,29,000	77,720	25,800	2,830	22,650

(b) Distribution of Service Department Expenses

	Production Depts.		Service Depts.	
	Machineshop	Packing	Gen. Plant	Store & Maint.
	(₹)	(₹)	(₹)	(₹)
Total	1,18,397	46,023		

Question-5

A Ltd., manufactures two products A and B. The manufacturing division consists of two production departments P1 and P2 and two service departments S1 and S2. Budgeted overhead rates are used in the production departments to absorb factory overheads to the products. The rate of Department P1 is based on direct machine hours, while the rate of Department P2 is based on direct labour hours.

For allocating the service department costs to production departments, the basis adopted is as follows:

(i) Cost of Department S1 to Department P1 and P2 equally, and

(ii) Cost of Department S2 to Department P1 and P2 in the ratio of 2 : 1 respectively.

The following data relating to factory overheads budgeted for the year is available:

Production Departments		Service Departments	
P_1	P_2	S_1	S_2
₹ 25,50,000	₹ 21,75,000	₹ 6,00,000	₹ 4,50,000

Budgeted output in units:

Product A 50,000; B 30,000.

Budgeted time required for production per unit:

Department P1 : Product A : 1.5 machine hours
Product B : 1.0 machine hour

Department P2 : Product A : 2 Direct labour hours
Product B : 2.5 Direct labour hours

You are required to COMPUTE the pre-determined overhead rate for both the production departments.

Hints:

	P1	P2
Budgeted machine/ labour hour rate (₹)	30.00	15.00

B. PAST YEAR EXAM QUESTIONS

Nov.-20 Q2(b) 10 Marks

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 machine (₹)	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 Service Departments are allocated as under :

	P	Q	R	X	Y
X	45%	15%	30%	-	10%
Y	35%	25%	30%	10%	-

Product 'A' is processed for manufacture in Departments P, Q and 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 departments costs.

(iii) Find out the Total Cost of a 'Product A'.

Solution:

(i) Statement showing distribution of Overheads

Primary Distribution Summary

Item of cost	Basis of apportionment	Total (₹)	P (₹)	Q (₹)	R (₹)	X (₹)	Y (₹)
Direct wages	Actual	2,800	--	--	--	2,000	800
Rent and Rates	Floor area (4:5:7:2:2)	10,000	2,000	2,500	3,500	1,000	1,000
General lighting	Light points (4:2:3:1:2)	600	200	100	150	50	100
Indirect wages	Direct wages (50:15:45:20:8)	3,450	1,250	375	1,125	500	200
Power	Horse Power ofmachines used(10:8:10:2:5)	3,500	1,000	800	1,000	200	500
Depreciation of machinery	Value of machinery (10:8:10:2:5)	70,000	20,000	16,000	20,000	4,000	10,000
Sundries	Direct wages (50:15:45:20:8)	13,800	5,000	1,500	4,500	2,000	800
Total		**1,04,150**	**29,450**	**21,275**	**30,275**	**9,750**	**13,400**

Secondary Distribution using simultaneous equation method:

Overheads of service cost centres

Let, X be the overhead of service cost centre X

Y be the overhead of service cost centre Y

X = 9,750 + 0.10 Y

Y = 13,400 + 0.10 X

Substituting the value of Y in X we get X = 9,750 + 0.10 (13,400 + 0.10 X)

X = 9,750 + 1,340 + 0.01 X

0.99 X = 11,090

∴ X = ₹ 11,202

∴ Y = 13,400 + 0.10 x 11,202

= ₹ 14,520.20

Secondary Distribution Summary

Particulars	Total (₹)	P (₹)	Q (₹)	R (₹)
Allocated and Apportioned over-heads as per primary distribution		29,450.00	21,275.00	30,275.00
X	11,202.00	5,040.90	1,680.30	3,360.60
Y	14,520.20	5,082.07	3,630.05	4,356.06
Total		39,572.97	26,585.35	37,991.66

(ii) Calculation of Overhead recovery rate per hour

	P (₹)	Q (₹)	R (₹)
Total overheads cost	**39,572.97**	**26,585.35**	**37,991.66**
Working hours	13,191	7,598	14,995
Rate per hour (₹)	**3**	**3.50**	**2.53**

(iii) Cost of Product A

	(₹)
Direct material	65.00
Direct labour	40.00
Prime cost	105.00
Production on overheads	
P 6 hours x ₹ 3 = ₹ 18	
Q 5 hours x ₹ 3.50 = ₹ 17.50	
R 2 hours x ₹ 2.53 = ₹ 5.06	40.56
Total cost	**145.56**

Note: Secondary Distribution can also be done using repeated distribution Method

Nov-18 Q5(b)(ii) 5Marks

M/s. NOP Limited has its own power plant and generates its own power. Information regarding power requirements and power used are as follows:

	Production Dept.		Service Dept.	
	A	B	X	Y
	(Horse power hours)			
Needed capacity production	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, costs 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 67500 hours and 48750 hours respectively.

Required:

1. Prepare overheads distribution sheet.
2. Calculate factory overhead per labour hour for the dept. A and dept. B.

Solution:

1. Overheads distribution Sheet

Item	Basis	Total Amount (₹)	Production Departments		Service Departments	
			A (₹)	B (₹)	X (₹)	Y (₹)
Variable overheads (₹ 12.60 lakhs - ₹ 4.20 lakhs)	Horse Power hours used	8,40,000	2,40,000	3,00,000	1,80,000	1,20,000
Fixed Overheads	Horse power for Capacity production	4,20,000	1,20,000	1,50,000	90,000	60,000
Total Overheads		12,60,000	3,60,000	4,50,000	2,70,000	1,80,000
Service dept X allocated to A, B & Y	As per the ratio given 6:4:2	(2,70,000)	1,35,000	90,000		45,000
Service dept Y allocated to A & B	As per the ratio of 4:1	(1,80,000+ 4 5000 = 2,25,000)	1,80,000	45,000		
Total Overheads of Production departments			6,75,000	5,85,000		

2. Calculation of Factory overhead per labour hour

Item	Production Departments	
	A (₹)	B (₹)
Total overheads	6,75,000	5, 85,000
Direct labour hours	67,500	48,750
Factory overheads per hour	**10**	**12**

July-21 Q1(b)

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

Departments Main Department:	Expenses (in ₹)	Area in (Sq. Mtr)	Number of Employees
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:

(i) Prepare a Statement showing the distribution of expenses of Service Departments to the Main Departments using the "Step Ladder method" of Overhead Distribution.

(ii) Compute the Rate per hour of each Main Department, 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.

Solution:

(i) Schedule Showing the Distribution of Expenses of Service Departments using Step ladder method.

	Main Department			Service Department	
	Purchase (₹)	Packing(₹)	Distribution (₹)	Maintenance (₹)	Personnel (₹)
Expenses	5,00,000	8,00,000	3,50,000	6,40,000	3,20,000
Distribution of Maintenance Department	1,92,000	2,40,000	1,12,000	(6,40,000)	96,000

(12:15:7:-:6)					
Distribution of Personnel Department (800:1700:700:-:-)	1,04,000	2,21,000	91,000	-	(4,16,000)
Total	7,96,000	12,61,000	5,53,000	-	-

(ii) Calculation of Expenses rate per hour of Main Department

	Purchase	Packing	Distribution
Total apportioned expenses (₹)	7,96,000	12,61,000	5,53,000
Total Hours worked	4,380 (12 x 365)	8,760 (24 x 365)	2,920 (8 x 365)
Expenses rate per hour (₹)	**181.74**	**143.95**	**189.38**

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1 (Old Course Practice Manual Q12)

E-books is an online book retailer. The Company has four departments. The two sales departments are Corporate Sales and Consumer Sales. The two support – departments are Administrative (Human Resources Accounting) and Information Systems each of the sales departments conducts merchandising and marketing operations independently.

The following data are available for October, 2013:

Departments	Revenues	Number of Employees	Processing time used (in minutes)
Corporate Sales	₹ 16,67,750	42	2,400
Consumer Sales	₹ 8,33,875	28	2,000
Administrative	--	14	400
Information system	--	21	1,400

Cost incurred in each of four departments for October, 2013 are as follow:

Corporate Sales	₹ 12,97,751
Consumer Sales	₹ 6,36,818
Administrative	₹ 94,510
Information systems	₹ 3,04,720

The company uses number of employees as a basis to allocate Administrative costs and processing time as a basis to allocate Information systems costs.

Required:

(i) Allocate the support department costs to the sales departments using the direct method.

(ii) Rank the support departments based on percentage of their services rendered to other support departments. Use this ranking to allocate support costs based on the step-down allocation method.

(iii) How could you have ranked the support departments differently?

(iv) Allocate the support department costs to two sales departments using the reciprocal allocation method.

Solution:

(i) Statement showing the allocation of support department costs to the sales departments (using the Direct Method)

Particulars	Basis of allocation	Sales department		Support department	
		Corporate sales (₹)	Consumer sales (₹)	Administrative (₹)	Informatio nsystems (₹)
Cost incurred		12,97,751	6,36,818	94,510	3,04,720
Re-allocation of cost of administrative department	Number of employees (6:4:–:–)	56,706	37,804	(94,510)	---

Re-allocation of costs of information systems department	Processing time (6:5:–:–)	1,66,211	1,38,509	---	(3,04,720)
Total		15,20,668	8,13,131		

(ii) Ranking of support departments based on percentage of their services rendered to other support departments

- Administration support department provides 23.077% ($\frac{21}{42 + 28 + 21} \times 100$) of its services to Information systems support department. Thus 23.077% of ₹94,510 = ₹ 21,810.

- Information system support department provides 8.33% ($\frac{400}{2,400 + 2,000 + 400} \times 100$) of its services to Administration support department. Thus 8.33% of ₹3,04,720 = ₹ 25,383.

Statement showing allocation of support costs
(By using step-down allocation method)

Particulars	Basis of allocation	Sales department		Support department	
		Corporate sales	Consumer sales	Administrative	Information systems.
		(₹)	(₹)	(₹)	(₹)
Cost incurred		12,97,751	6,36,818	94,510	3,04,720
Re-allocation of cost of administrative department	Number of employees (6:4:–:3)	43,620	29,080	(94,510)	21,810 3,26,530
Re-allocation of costs of information systems department	Processing time (6:5:–:–)	1,78,107	1,48,423		(3,26,530)
Total		15,19,478	8,14,321		

(iii) An alternative ranking is based on the rupee amount of services rendered to other service departments, using the rupee figures obtained under requirement (ii) This approach would use the following sequence of ranking.

- Allocation of information systems overheads as first (₹25,383 provided to administrative).
- Allocated administrative overheads as second (₹21,810 provided to information systems).

(iv) Working notes:

1. Percentage of services provided by each service department to other service department and sales departments.

Particulars	Service departments		Sale departments	
	Administrative	Information system	Corporate Sales	Consumer Sales
Administrative	–	23.08%	46.15%	30.77%
Information systems	8.33%	–	50%	41.67%

2. **Total cost of the support department:** (By using simultaneous equation method). Let AD and IS be the total costs of support departments Administrative and Information systems respectively. These costs can be determined by using the following simultaneous equations:

	AD	=	94,510 + 0.0833 IS
	IS	=	3,04,720 + 0.2308 AD
Or,	AD	=	94,510 + 0.0833 {3,04,720 + 0.2308 AD}
Or,	AD	=	94,510 + 25,383 + 0.01922 AD
Or,	0.98077AD	=	1,19,893
Or,	AD	=	₹1,22,243
and	IS	=	₹3,32,934

Statement showing the allocation of support department costs to the sales departments (Using reciprocal allocation method)

Particulars	Sales department	
	Corporate sales (₹)	Consumer sales (₹)
Costs incurred	12,97,751	6,36,818
Re-allocation of cost administrative department (46.16% and 30.77% of ₹1,22,243)	56,427	37,614
Re-allocation of costs of information systems department (50% and 41.67% of ₹3,32,934)	1,66,467	1,38,734
Total	15,20,645	8,13,166

Question-2 (Old Course Practice Manual Q13)

ABC Ltd. has three production departments P1, P2 and P3 and two service departments S1 and S2. The following data are extracted from the records of the Company for the month of October, 2013:

(₹)

Rent and rates	62,500
General lighting	7,500
Indirect Wages	18,750
Power	25,000
Depreciation on machinery	50,000
Insurance of machinery	20,000
Other Information:	

	P1	P2	P3	S1	S2
Direct wages (₹)	37,500	25,000	37,500	18,750	6,250
Horse Power of Machines used	60	30	50	10	
Cost of machinery (₹)	3,00,000	4,00,000	5,00,000	25,000	25,000

Floor space (Sq. ft)	2,000	2,500	3,000	2,000	500
Number of light points	10	15	20	10	5
Production hours worked	6,225	4,050	4,100	□	□

Expenses of the service departments S1 and S2 are reapportioned as below:

	P1	P2	P3	S1	S2
S1	20%	30%	40%	□	10%
S2	40%	20%	30%	10%	□

Required:

(i) Compute overhead absorption rate per production hour of each production department.

(ii) Determine the total cost of product X which is processed for manufacture in department P1, P2 and P3 for 5 hours, 3 hours and 4 hours respectively, given that its direct material cost is ₹ 625 and direct labour cost is ₹ 375.

Solution:

Primary Distribution Summary

Item of cost	Basis of apportionment	Total (₹)	P1 (₹)	P2 (₹)	P3 (₹)	S1 (₹)	S2 (₹)
Direct wages	Actual	25,000	--	--	--	18,750	6,250
Rent and Rates	Floor area (4 : 5 : 6 : 4 : 1)	62,500	12,500	15,625	18,750	12,500	3,125
General lighting	Light points (2 : 3 : 4 : 2 : 1)	7,500	1,250	1,875	2,500	1,250	625
Indirect wages	Direct wages (6 : 4 : 6 : 3 : 1)	18,750	5,625	3,750	5,625	2813	938
Power	Horse Power of machines used (6 : 3 : 5 : 1)	25,000	10,000	5,000	8,333	1,667	□

Depreciation of machinery	Value of machinery (12 : 16 : 20 : 1 : 1)	50,000	12,000	16,000	20,000	1,000	1,000
Insurance of machinery	Value of machinery (12 : 16 : 20 : 1 : 1)	20,000	4,800	6,400	8,000	400	400
		2,08,750	46,175	48,650	63,208	38,380	12,338

Overheads of service cost centres Let S1 be the overhead of service cost centre S1 and S2 be the overhead of service cost centre S2.

S1 = 38,380 + 0.10 S2

S2 = 12,338 + 0.10 S1

Substituting the value of S2 in S1 we get S1 = 38,380 + 0.10 (12,338 + 0.10 S1)

S1 = 38,380 + 1,233.80 + 0.01 S1

0.99 S1 = 39,613.80

∴S1 = ₹40,014.

∴S2 = 12,338 + 0.10 x 40,014.

= ₹16,339

Secondary Distribution Summary

Particulars	**Total (₹)**	**P1 (₹)**	**P2 (₹)**	**P3 (₹)**
Allocated and Apportioned over-heads as per primary distribution	1,58,033	46,175	48,650	63,208
S_1	40,014	8,003	12,004	16,006
S_2	16,339	6,536	3,268	4,902
		60,714	63,922	84,116

(i) Overhead rate per hour

	P1	*P2*	*P3*
Total overheads cost	₹60,714	₹63,922	₹84,116
Production hours worked	6,225	4,050	4,100
Rate per hour (₹)	₹9.75	₹15.78	₹20.52

(ii) Cost of Product X

	(₹)
Direct material	625.00
Direct labour	375.00
Prime cost	1,000.00
Production on overheads	
P_1 5 hours x ₹9.75 = 48.75	
P2 3 hours x ₹15.78 = 47.34	
P3 4 hours x ₹20.52 = 82.08 Factory cost	178.17
Factory cost	1,178.17

Question-3 (Old Course Practice Manual Q14)

A company has three production departments (M1, M2 and A1) and three service department, one of which Engineering service department, servicing the M1 and M2 only. The relevant information are as follows:

	Product X	Product Y
M_1	10 Machine hours	6 Machine hours
M_2	4 Machine hours	14 Machine hours
A_1	14 Direct Labour hours	18 Direct Labour hours

The annual budgeted overhead cost for the year are

	Indirect Wages (₹)	Consumable Supplies(₹)
M_1	46,520	12,600
M_2	41,340	18,200
A_1	16,220	4,200
Stores	8,200	2,800
Engineering Service	5,340	4,200
General Service	7,520	3,200

		(₹)
-	Depreciation on Machinery	39,600
-	Insurance of Machinery	7,200
-	Insurance of Building (Total building insurance cost for M1 is one third of annual premium)	3,240
-	Power	6,480
-	Light	5,400
-	Rent	12,675

(The general service deptt. is located in a building owned by the company. It is valued at ₹6,000 and is charged into cost at notional value of 8% per annum. This cost is additional to the rent shown above)

The value of issues of materials to the production departments are in the same proportion as shown above for the Consumable supplies.

The following data are also available:

Department	Book value Machinery (₹)	Area (Sq. ft.)	Effective H.P. hours %	Production Direct Labour hour	Capacity Machine hour
M_1	1,20,000	5,000	50	2,00,000	40,000
M_2	90,000	6,000	35	1,50,000	50,000

A_1	30,000	8,000	05	3,00,000	-
Stores	12,000	2,000	-	-	-
Engg. Service	36,000	2,500	10	-	-
General Service	12,000	1,500	-	-	-

Required:

(i) Prepare a overhead analysis sheet, showing the bases of apportionment of overhead to departments.

(ii) Allocate service department overheads to production department ignoring the apportionment of service department costs among service departments.

(iii) Calculate suitable overhead absorption rate for the production departments.

(iv) Calculate the overheads to be absorbed by two products, X and Y.

Solution:

(i) Summary of Apportionment of Overheads

(₹)

Items	Basis of Apportionment	Total Amount	Production Deptt.			Service Deptt.		
			M1	M2	A1	Store Service	Engineering Service	General Service
Indirect wages	Allocation given	1,25,140	46,520	41,340	16,220	8,200	5,340	7,520
Consumable stores	Allocation given	45,200	12,600	18,200	4,200	2,800	4,200	3,200
Depreciation	Capital value of machine (20:15:5:2:6:2)	39,600	15,840	11,880	3,960	1,584	4,752	1,584
Insurance of Machine	Capital value of machine (20:15:5:2:6:2)	7,200	2,880	2,160	720	288	864	288

Insurance on Building	1/3rd to M1 Balance area basis (-:12:16:4:5:3)	3,240	1,080	648	864	216	270	162
Power	HP Hr% (10:7:1:-:2:-)	6,480	3,240	2,268	324	-	648	-
Light	Area (10:12:16:4:5:3)	5,400	1,080	1,296	1,728	432	540	324
Rent*	Area (10:12:16:4:5:-)	12,675	2,697	3,236	4,315	1,079	1,348	--
Total		2,44,935	85,937	81,028	32,331	14,599	17,962	13,078

*Rent to be apportioned among the departments which actually use the rented building. The notional rent is imputed cost and is not included in the calculation.

(ii) Allocation of service departments overheads

Service Deptt.	Basis of Apportionment	Production Deptt.			Service Deptt.		
		M1	M2	A1	Store Service	Engineering Service	General Service
Store	Ratio of consumable value (126 :182 : 42)	5,256	7,591	1,752	(14,599)	-	-

Engineering service	In Machine hours Ratio of M1 and M2 (4 : 5)	7,983	9,979	-	-	(17,962)	-
General service	Labour hour Basis (20 : 15 : 30)	4,024	3,018	6,036	-	-	(13,078)
Production Department allocated in (i)		85,937	81,028	32,331			
Total		1,03,200	1,01,616	40,119			

(iii) Overhead Absorption rate

	M1	M2	A1
Total overhead allocated	1,03,200	1,01,616	40,119
Machine hours	40,000	50,000	-
Labour hours	-	-	3,00,000
Rate per machine hour	2.58	2.032	-
Rate per Direct labour	-₹	-	0.134

(iv) Statement showing overhead absorption for Product X and Y

Machine Deptt.	Absorption Rate	Product X		Product Y	
		Hours	(₹)	Hours	(₹)
M_1	2.58	10	25.80	6	15.48
M_2	2.032	4	8.13	14	28.45
A_1	0.134	14	1.88	18	2.41
			35.81		46.34

Question-4 (Old Course Practice Manual Q15)

The following account balances and distribution of indirect charges are taken from the accounts of a manufacturing concern for the year ending on 31st March, 2014:

Item	Total Amount	Production Departments			Service Departments	
	(₹)	X (₹)	Y (₹)	Z (₹)	A (₹)	B (₹)
Indirect Material	1,25,000	20,000	30,000	45,000	25,000	5,000
Indirect Labour	2,60,000	45,000	50,000	70,000	60,000	35,000
Superintendent's Salary	96,000	-	-	96,000	-	-
Fuel & Heat	15,000					
Power	1,80,000					
Rent & Rates	1,50,000					
Insurance	18,000					
Meal Charges	60,000					
Depreciation	2,70,000					

The following departmental data are also available:

	Production Departments			Service Departments	
	X	Y	Z	A	B
Area (Sq. ft.)	4,400	4,000	3,000	2,400	1,200
Capital Value of Assets (₹)	4,00,000	6,00,000	5,00,000	1,00,000	2,00,000
Kilowatt Hours	3,500	4,000	3,000	1,500	-

Radiator Sections	20	40	60	50	30
No. of Employees	60	70	120	30	20

Expenses charged to the service departments are to be distributed to other departments by the following percentages:

	X	Y	Z	A	B
Department A (%)	30	30	20	-	20
Department B (%)	25	40	25	10	-

Prepare an overhead distribution statement to show the total overheads of production departments after re-apportioning service departments' overhead by using simultaneous equation method. Show all the calculations to the nearest rupee.

Solution:

Primary Distribution of Overheads

Item	Basis	Total Amount (₹)	Production Departments			Service Departments	
			X (₹)	Y (₹)	Z (₹)	A (₹)	B (₹)

Indirect Material	Actual	1,25,000	20,000	30,000	45,000	25,000	5,000
Indirect Labour	Actual	2,60,000	45,000	50,000	70,000	60,000	35,000
Superintendent's Salary	Actual	96,000	-	-	96,000	-	-
Fuel & Heat	Radiator Sections {2:4:6:5:3}	15,000	1,500	3,000	4,500	3,750	2,250
Power	Kilowatt Hours {7:8:6:3:-}	1,80,000	52,500	60,000	45,000	22,500	-
Rent & Rates	Area (Sq. ft.) {22:20:15:12:6}	1,50,000	44,000	40,000	30,000	24,000	12,000
Insurance	Capital Value of Assets {4:6:5:1:2}	18,000	4,000	6,000	5,000	1,000	2,000
Meal Charges	No. of Employees {6:7:12:3:2}	60,000	12,000	14,000	24,000	6,000	4,000
Depreciation	Capital Value of Assets {4:6:5:1:2}	2,70,000	60,000	90,000	75,000	15,000	30,000
Total overheads		11,74,000	2,39,000	2,93,000	3,94,500	1,57,250	90,250

Re-distribution of Overheads of Service Department A and B

Total overheads of Service Departments may be distributed using simultaneous equation method

Let, the total overheads of A = a and the total overheads of B= b

a = 1,57,250 + 0.10 b (i)

or, 10a - b = 15,72,500 [(i) x10]

b = 90,250 + 0.20 a (ii)

or, -0.20a + b = 90,250

Solving equation (i) & (ii)

10a - b = 15,72,500

-0.20a + b = 90,250

9.8a = 16,62,750

a = 1,69,668

Putting the value of a in equation (ii), we get b = 90,250 + 0.20 x 1,69,668

b = 1,24,184

Secondary Distribution of Overheads

	Production Departments		
	X (₹)	Y (₹)	Z (₹)
Total overhead as per primary distribution	2,39,000	2,93,000	3,94,500
Service Department A (80% of 1,69,668)	50,900	50,900	33,934
Service Department B (90% of 1,24,184)	31,046	49,674	31,046
Total	3,20,946	3,93,574	4,59,480

Question-5 (Old Course Practice Manual Q16)

Arnav Ltd. has three production departments M, N and O and two service departments P and Q. The following particulars are available for the month of September, 2013:

	(₹)
Lease rental	35,000
Power & Fuel	4,20,000
Wages to factory supervisor	6,400
Electricity	5,600
Depreciation on machinery	16,100
Depreciation on building	18,000
Payroll expenses	21,000
Canteen expenses	28,000
ESI and Provident Fund Contribution	58,000

Followings are the further details available:

Particulars	M	N	O	P	Q
Floor space (square meter)	1,200	1,000	1,600	400	800
Light points (nos.)	42	52	32	18	16
Cost of machines (₹)	12,00,000	10,00,000	14,00,000	4,00,000	6,00,000
No. of employees (nos.)	48	52	45	15	25
Direct Wages (₹)	1,72,800	1,66,400	1,53,000	36,000	53,000
HP of Machines	150	180	120	-	-
Working hours (hours)	1,240	1,600	1,200	1,440	1,440

The expenses of service department are to be allocated in the following manner:

	M	N	O	P	Q
P	30%	35%	25%	-	10%
Q	40%	25%	20%	15%	-

You are required to calculate the overhead absorption rate per hour in respect of the three production departments.

Solution:

Primary Distribution Summary

Item of cost	Basis of apportionment	Total (₹)	Production Dept.			Service Dept.	
			M (₹)	N (₹)	O (₹)	P (₹)	Q (₹)
Lease rental	Floor space (6 : 5 : 8 : 2 : 4)	35,000	8,400	7,000	11,200	2,800	5,600
Power & Fuel	HP of Machines × Working hours (93: 144 : 72)	4,20,000	1,26,408	1,95,728	97,864	-	-
Supervisor's wages*	Working hours (31 : 40 : 30)	6,400	1,964	2,535	1,901	-	-

Electricity	Light points (21: 26: 16 : 9 : 8)	5,600	1,470	1,820	1,120	630	560
Depreciation on machinery	Value of machinery (6 : 5 : 7 : 2 : 3)	16,100	4,200	3,500	4,900	1,400	2,100
Depreciation on building	Floor space (6 : 5 : 8 : 2 : 4)	18,000	4,320	3,600	5,760	1,440	2,880
Payroll expenses	No. of employees (48: 52: 45: 15: 25)	21,000	5,448	5,903	5,108	1,703	2,838
Canteen expenses	No. of employees (48: 52: 45: 15: 25)	28,000	7,265	7,870	6,811	2,270	3,784
ESI and PF contribution	Direct wages (864: 832: 765: 180: 265)	58,000	17,244	16,606	15,268	3,593	5,289
		6,08,100	**1,76,719**	**2,44,562**	**1,49,932**	**13,836**	**23,051**

* Wages to supervisor is to be distributed to production departments only.

Let 'P' be the overhead of service department P and 'Q' be the overhead of service department Q.

P = 13,836 + 0.15 Q

Q = 23,051 + 0.10 P

Substituting the value of Q in P we get P = 13,836 + 0.15 (23,051 + 0.10 P)

P = 13,836 + 3,457.65 + 0.015 P

0.985 P = 17,293.65

$\therefore$ P = ₹ 17,557

$\therefore$ Q = 23,051 + 0.10 x 17,557

= ₹ 24,806.70 or ₹ 24,807

Secondary Distribution Summary

Particulars	Total (₹)	M (₹)	N (₹)	O (₹)
Allocated and Apportioned over-heads as per primary distribution	5,71,213	1,76,719	2,44,562	1,49,932
P (90% of ₹17,557)	15,801	5,267	6,145	4,389
Q (85% of ₹24,807)	21,086	9,923	6,202	4,961
		1,91,909	2,56,909	1,59,282

Overhead rate per hour

	M	N	O
Total overheads cost (₹)	1,91,909	2,56,909	1,59,282
Working hours	1,240	1,600	1,200
Rate per hour (₹)	154.77	160.57	132.74

Question-6 (Old Course Practice Manual Q18)

PQR Ltd has its own power plant, which has two users, Cutting Department and Welding Department. When the plans were prepared for the power plant, top management decided that its practical capacity should be 1,50,000 machine hours. Annual budgeted practical capacity fixed costs are ₹ 9,00,000 and budgeted variable costs are ₹ 4 per machine-hour. The following data are available:

	Cutting Department	Welding Department	Total
Actual Usage in 2012-13 (Machine hours)	60,000	40,000	1,00,000
Practical capacity for each department (Machine hours)	90,000	60,000	1,50,000

Required

(i) Allocate the power plant's cost to the cutting and the welding department using a single rate method in which the budgeted rate is calculated using practical capacity and costs are allocated based on actual usage.

(ii) Allocate the power plant's cost to the cutting and welding departments, using the dual - rate method in which fixed costs are allocated based on practical capacity and variable costs are allocated based on actual usage.

(iii) Allocate the power plant's cost to the cutting and welding departments using the dual- rate method in which the fixed-cost rate is calculated using practical capacity, but fixed costs are allocated to the cutting and welding department based on actual usage. Variable costs are allocated based on actual usage.

(iv) Comment on your results in requirements (i), (ii) and (iii).

Solution:

Working Notes:

1. Fixed practical capacity cost per machine hour:

Practical capacity (machine hours)	1,50,000
Practical capacity fixed costs (₹)	9,00,000
Fixed practical capacity cost per machine hour (₹ 9,00,000 ÷ 1,50,000 hours)	₹ 6

2. Budgeted rate per machine hour (using practical capacity):
= Fixed practical capacity cost per machine hour + Budgeted variable cost per machine hour
= ₹ 6 + ₹ 4 = ₹10

(i) Statement showing Power Plant's cost allocation to the Cutting & Welding departments by using single rate method on actual usage of machine hours.

	Cutting Department (₹)	Welding Department (₹)	Total (₹)

Power plants cost allocation byusing actual usage (machine hours) (Refer to Working Note 2)	6,00,000 (60,000 hours × ₹10)	4,00,000 (40,000 hours × ₹10)	10,00,000

(ii) Statement showing Power Plant's cost allocation to the Cutting & Welding departments by using dual rate method.

	Cutting Department (₹)	Welding Department (₹)	Total (₹)
Fixed Cost (Allocated on practical capacityfor each department i.e.): (90,000 hours : 60,000 hours)	5,40,000 ($\frac{₹\ 9,00,000 \times 3}{5}$)	3,60,000 ($\frac{₹\ 9,00,000 \times 2}{5}$)	9,00,000
Variable cost (Based on actual usage of machine hours)	2,40,000 (60,000 hours × ₹ 4)	1,60,000 (40,000 hours × ₹4)	4,00,000
Total cost	7,80,000	5,20,000	13,00,000

(iii) Statement showing Power Plant's cost allocation to the Cutting & Welding Departments using dual rate method

	Cutting Department (₹)	Welding Department (₹)	Total (₹)
Fixed Cost Allocation of fixed cost on actual usage basis (Refer to Working Note 1)	3,60,000 (60,000 hours × ₹ 6)	2,40,000 (40,000 hours × ₹ 6)	6,00,000
Variable cost (Based on actual usage)	2,40,000 (60,000 hours × ₹ 4)	1,60,000 (40,000 hours × ₹ 4)	4,00,000
Total cost	6,00,000	4,00,000	10,00,000

(iv) Comments:

Under dual rate method, under (iii) and single rate method under (i), the allocation of

fixed cost of practical capacity of plant over each department are based on single rate. The major advantage of this approach is that the user departments are allocated fixed capacity costs only for the capacity used. The unused capacity cost ₹ 3,00,000 (₹ 9,00,000 – ₹ 6,00,000) will not be allocated to the user departments. This highlights the cost of unused capacity.

Under (ii) fixed cost of capacity are allocated to operating departments on the basis of practical capacity, so all fixed costs are allocated and there is no unused capacity identified with the power plant.

Question-7 (Old Course Practice Manual Q19) (Overhead & Cost-Sheet)

In a manufacturing company factory overheads are charged as fixed percentage basis on direct labour and office overheads are charged on the basis of percentage of factory cost. The following information are available related to the year ending 31st March, 2014 :

	Product A	Product B
Direct Materials	₹ 19,000	₹ 15,000
Direct Labour	₹ 15,000	₹ 25,000
Sales	₹ 60,000	₹ 80,000
Profit	25% on cost	25% on sales price

You are required to find out:

(i) The percentage of factory overheads on direct labour.

(ii) The percentage of office overheads on factory cost.

Solution:

Let, the percentage of factory overheads on direct labour is 'x' and the percentage of office overheads on factory cost is 'y', then the total cost of product A and product B will be as follows:

	Product A (₹)	Product B (₹)
Direct Materials	19,000	15,000
Direct labour	15,000	25,000
Prime Cost	34,000	40,000
Factory overheads (Direct labour x)	150 x	250 x

Factory cost (i)	34,000 + 150 x	40,000 + 250 x
Office overheads (Factory cost y) (ii)	340 y + 1.5 x y	400 y + 2.5 x y
Total Cost [(i) + (ii)]	34,000 + 150 x + 340 y + 1.5 x y	40,000 + 250 x +400 y + 2.5 x y

Total cost on the basis of sales is:

	Product A (₹)	**Product B (₹)**
Sales Less:	60,000	80,000
Profit		
Product A – 25% on cost or 20% on Sales	12,000	
Product B – 25% on sales		20,000
Total Cost	48,000	60,000

Thus,

Total Cost of A is $34,000 + 150x + 340y + 1.5\,xy = 48,000$

Or, $150x + 340y + 1.5\,xy = 14,000$… .....(i)

Total Cost of B is $40,000 + 250x + 400y + 2.5\,xy = 60,000$

Or, $250x + 400y + 2.5\,xy = 20,000$… .....(ii)

Equation (ii) multiplied by 0.6 and after deducting from equation (i), we get

$150x + 340y + 1.5xy = 14,000$ … (i)

$\_150x \pm 240y \pm 1.5xy = \_\ 12,000$ … (ii)

$100y = 2,000$

Or, $y = 20$

Putting value of y in equation (i), we get

$150x + 340 \times 20 + 1.5x \times 20 = 14,000$

Or, $150x + 30x = 14,000 – 6,800$

Or, $180x = 7,200$

Or, x = 40

Hence, (i) the factory overheads on direct labour = 40% and
(ii) the office overheads on factory cost = 20%.

Question-8 (Old Course Practice Manual Q20) (Overhead & Budget)

Maximum production capacity of JK Ltd. is 5,20,000 units per annum. Details of estimated cost of production are as follows:

- Direct material ₹ 15 per unit.
- Direct wages ₹ 9 per unit (subject to a minimum of ₹ 2,50,000 per month).
- Fixed overheads ₹ 9,60,000 per annum.
- Variable overheads ₹ 8 per unit.
- Semi-variable overheads are ₹ 5,60,000 per annum up to 50 per cent capacity and additional ₹1,50,000 per annum for every 25 per cent increase in capacity or a part of it.

JK Ltd. worked at 60 per cent capacity for the first three months during the year 2013-14, but it is expected to work at 90 per cent capacity for the remaining nine months.

The selling price per unit was ₹ 44 during the first three months.

You are required, what selling price per unit should be fixed for the remaining nine months to yield a total profit of ₹15,62,500 for the whole year.

Solution:

Statement of Cost and Sales for the year 2013-14

(Maximum production capacity = 5,20,000 units per annum)

Particulars	First 3 months	Next 9 months	Total
Capacity utilized	60%	90%	
Production	$\frac{5,20,000 \times 3 \times 60\%}{12}$ = 78,000 units	$\frac{5,20,000 \times 9 \times 90\%}{12}$ = 3,51,000 units	4,29,000 units
	(₹)	(₹)	(₹)
Direct materials @ ₹15 per unit	11,70,000	52,65,000	64,35,000
Direct wages @ ₹ 9 per unit or ₹2,50,000 per month whichever ishigher.	7,50,000	31,59,000	39,09,000

Prime cost (A)	19,20,000	84,24,000	1,03,44,000
Overheads			
Fixed	2,40,000	7,20,000	9,60,000
Variable @ ₹8 per unit	6,24,000	28,08,000	34,32,000
Semi Variable *(Refer to WorkingNote-1)*	1,77,500	6,45,000	8,22,500
Total overheads (B)	10,41,500	41,73,000	52,14,500
Total Cost (C) [(A + B)]	29,61,500	1,25,97,000	1,55,58,500
Profit during first 3 months(Bal. figure)	4,70,500		
Sales @ ₹44 per unit (78,000 x ₹ 44)	34,32,000		
Desired profit during next 9 months (₹15,62,500 – ₹4,70,500) (D)		10,92,000	
Sales required for next 9 months ..... (E) [(C + D)]		1,36,89,000	
Total profit			15,62,500
Total Sales			1,71,21,000

Required selling price per unit for last 9 months = Total sales required for last 9 months / Units produced during last 9 months

= ₹1,36,89,000 / 3,51,000 units = ₹39 per unit

Workings:

(1) Semi-variable overheads:

(a) For first 3 months at 60% capacity = ₹(5,60,000 + ₹1,50,000) x 3/12
= ₹7,10,000 x 3/12
= ₹1,77,500.

(b) For remaining 9 months at 90% capacity = ₹(5,60,000 + ₹3,00,000) x 9/12
= ₹8,60,000 x 9/12

= ₹ 6,45,000

Part-II: Machine Hour Rate

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION: 8

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. FIND OUT the machine hour rate, assuming insurance is @ 1% p.a. and the expenses on oil, etc., are ₹ 900 per month.

Hints: MHR = ₹362.10

TEST YOUR KNOWLEDGE

Question-6

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

You are required to COMPUTE the machine hour rate:

(a) For the firm as a whole for the month when the computer was used and when the computer was not used.

(b) For the individual jobs A, B and C.

Hints: MHR = ₹27.5, ₹10

MHR for Job: A = ₹17, B = ₹17, C = ₹27.5

Question-7

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 months period:

Normal available hours per month	208
Absenteeism (without pay) hours	18
Leave (with pay) hours	20
Normal idle time unavoidable-hours	10
Average rate of wages per worker for 8 hours a day.	₹ 20
Production bonus estimated	15% on wages
Value of power consumed	₹ 8,050
Supervision and indirect labour	₹ 3,300
Lighting and electricity	₹1,200

These particulars are for a year Repairs and maintenance including consumables 3% of value of machine, Insurance ₹4,000, Depreciation 10% of original cost, other sundry works expenses ₹12,000, General management expenses ₹54,530.

You are required to WORK OUT a comprehensive machine hour rate for the machine shop.

Hints: MRH = $\frac{₹1,37,480}{5760}$ = ₹23.87

Question-8

Job No. 198 was commenced on October 10, 20X8 and completed on November 1, 20X8. 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, the machine hour rate being ₹ 3.50.

Machine No. 160 used for 30 hours, the machine hour rate being ₹ 4.00. 6 welders worked on the job for five days of 8 hours each : the Direct labour hour per welder is ₹ 0.20.

Expenses not included for CALCULATING the machine hour or direct labour hour rate

total led ₹ 2,000, total direct wages for the period being ₹ 20,000. Ascertain the works costs of job No. 198.

Hints: Work Cost = ₹1,348

B. PAST YEAR EXAM QUESTIONS

Nov-22. 2(a)- 5 marks

USP Ltd. is the manufacturer of 'double grip motorcycle tyres'. In the manufacturing process, it undertakes three different jobs namely, Vulcanising, Brushing and Striping. All of these jobs require 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 months is₹ 2,70,000. An estimate 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 of the robot
Vulcanising	500	400
Brushing	1000	400
Striping	-	1200

You are required to :

(i) 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.

(ii) Compute the Machine Hour Rate for the individual jobs i.e. Vulcanising, Brushing and Striping.

Solution:

Working notes:

(I)	Total machine hours use (500 + 1,000 + 400 + 400 + 1,200)	3,500
(II)	Total machine hours without the use of robot (500 + 1,000)	1,500
(III)	Total machine hours with the use of robot (400 + 400 + 1,200)	2,000
(IV)	Total overheads of the machine per month	
	Rent (₹ 18,000 ÷ 3 months)	6,000
	Depreciation [(₹ 19,20,000 x 10%) ÷ 12 months]	16,000
	Indirect expenses [(₹ 12,00,000 x 20%) ÷ 12 months]	20,000
	Total	42,000
(V)	Robot hire charges for a month (₹ 2,70,000 ÷ 6 months)	₹ 45,000

(VI) Overheads for using machines without robot

= ₹42,000 / 3,500 hrs. x 1,500 hrs = 18,000

(VII) Overheads for using machines with robot

= ₹42,000 / 3,500 hrs. x 2,000 hrs + 45,000 = 69,000

(i) Computation of Machine hour rate for the firm as a whole for a month.

a. When the robot was used: ₹69,000 / 2,000 hrs = ₹34.50 per hours

b. When the robot was not used: ₹18,000 / 1,500 hrs = ₹12 per hours

(ii) Computation of Machine hour rate for the individual job

	Rate per hour	Job					
		Vulcanising		Brushing		Striping	
	(₹)	Hrs.	(₹)	Hrs.	(₹)	Hrs.	(₹)
Overheads							
Without robot	12.00	500	6,000	1,000	12,000	-	-
With robot	34.50	400	13,800	400	13,800	1,200	41,400
Total		900	19,800	1,400	25,800	1,200	41,400
Machine hour rate			22		18.43		34.50

Jan-21. 1(b)- 5 marks

A machine shop has 8 identical machines manned by 6 operators. The machine cannot work without an operator wholly engaged on it. The original cost of all the 8 machines works out to ₹ 32,00,000. The following particulars are furnished for a six months period:

Normal available hours per month per operator	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 and Indirect Labour	₹ 16,500
Lighting and Electricity	₹ 6,000

The following particulars are given for a year:

Insurance	₹ 3,60,000
Sundry work Expenses	₹ 50,000
Management Expenses allocated	₹ 5,00,000
Depreciation	10% on the original cost

Repairs and Maintenance (including consumables): 5% of the value of all the machines.
Prepare a statement showing the comprehensive machine hour rate for the machine shop.

Solution:

Workings:

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

Computation of Comprehensive Machine Hour Rate

Particulars	Amount for six months (₹)
Operators' wages (7,380/8 x100)	92,250
Production bonus (10% on wages)	9,225
Power consumed	40,250
Supervision and indirect labour	16,500
Lighting and Electricity	6,000
Repair and maintenance {(5% × ₹ 32,00,000)/2}	80,000
Insurance (₹ 3,60,000/2)	1,80,000
Depreciation {(₹ 32,00,000 × 10%)/2}	1,60,000
Sundry Work expenses (₹ 50,000/2)	25,000
Management expenses (₹ 5,00,000/2)	2,50,000
Total Overheads for 6 months	**8,59,225**
Comprehensive Machine Hour Rate = ₹ 8,59,225/7,200 hours	**₹ 119.33**

(Note: Machine hour rate may be calculated alternatively. Further, presentation of figures may also be done on monthly or annual basis.)

May-19. 5(b)- 5 marks

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 :

(i) Repair & Maintenance during the whole life of the machine are expected to be ₹ 5,40,000.

(ii) Insurance premium (per annum) 2% of the cost of the machine.

(iii) Oil and Lubricants required for operating the machine (per annum) ₹ 87,384.

(iv) Power consumptions: 10 units per hour @ ₹ 7 per unit. No power consumption during repair and maintenance. •

(v) 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.

Solution:

Effective machine hour = 4,500 – 300 = 4,200 hours

Calculation of Comprehensive machine hour rate

Elements of Cost and Revenue	Amount (₹) Per Annum
Repair and Maintenance (₹5,40,000 ÷15 years)	36,000
Power (4,200 hours × 10 units × ₹7)	2,94,000
Depreciation (₹29,14,800 - ₹1,50,000) / 15 years	1,84,320
Insurance (₹29,14,800 × 2%)	58,296
Oil and Lubricant	87,384
Salary to Operator {(₹24,000×12)/3}	96,000
Total Cost	7,56,000
Effective machine hour	4,200

Total Machine Rate Per Hour	180

C. ADDITIONAL QUESTIONS FOR PRACTICE(PAST YEAR EXAM)

Question-1

A manufacturing unit has purchased and installed a new machine of ₹ 12,70,000 to its fleet of 7 existing machines. The new machine has an estimated life of 12 years and is expected to realise ₹ 70,000 as scrap at the end of its working life. Other relevant data are as follows:

1. Budgeted working hours are 2,592 based on 8 hours per day for 324 days. This includes 300 hours for plant maintenance and 92 hours for setting up of plant.
2. Estimated cost of maintenance of the machine is ₹25,000 p.a.
3. The machine requires a special chemical solution, which is replaced at the end of each week (6 days in a week) at a cost of ₹400 each time.
4. Four operators control operation of 8 machines and the average wages per person amounts to ₹420 per week plus 15% fringe benefits.
5. Electricity used by the machine during the production is 16 units per hour at a cost of ₹ 3 per unit. No electricity is consumed during unproductive maintenance and setting up time.
6. Departmental and general works overhead allocated to the operation during last year was ₹ 50,000. During the current year it is estimated to increase by 10% of this amount.

Calculate machine hour rate, if (a) setting up time is unproductive; (b) setting up time is productive.

Solution :

Working Note:

1. Effective machine hour when set-up time is unproductive:

= Budgeted working hours – (Maintenance time + Setting-up time)

= [2,592 – (300 + 92)] hours. = 2,200 hours.

2. Effective machine hour when set-up time is productive:

= Budgeted working hours – maintenance time

= (2,592 - 300) hours. = 2,292 hours.

3. Operators' wages per annum

Basic wages (4 operators × ₹420 × 54 weeks)	= ₹ 90,720
Add: Fringe benefits (15% of ₹90,720)	= ₹ 13,608
	₹1,04,328

4. Depreciation per annum

$$\frac{₹12,70,000 - ₹70,000}{12 \text{ years}} = ₹1,00,000$$

5. Cost of special chemical solution

324 days ÷ 6 days × ₹ 400 = ₹ 21,600

Computation of Machine hour Rate

	Amount p.a. (₹)	Amount per hour (₹) (when set-up time is unproductive)	Amount per hour (₹) (when set-up time is productive)
Standing charges			
Operators wages	1,04,328		
$\left[\frac{₹1,04,328}{8 \text{machines}} \times \frac{1}{2,200 \text{hours}}\right]$		5.93	
$\left[\frac{₹1,04,328}{8 \text{ machines}} \times \frac{1}{2,292 \text{ hours}}\right]$			5.69

Departmental and general overhead (50,000 × 110%) [₹55,000/8 machines × 1/2,200 hours] [₹55,000/8machines x 1/2,292hours]	55,000	3.13	3.00
(A)	1,59,328	9.06	8.69
Machine Expenses Depreciation [₹1,00,000/2,200 hours] [₹1,00,000/2,292 hours]	1,00,000	45.45	43.63
Electricity (16 units x ₹3)		48.00	48.00
Special chemical solution [₹21,600/2,200 hours] [₹21,600/2,292 hours]	21,600	9.82	9.42
Maintenance [₹25,000/2,200 hours] [₹25,000/2,292 hours]	25,000	11.36	10.91
(B)		114.63	111.96
Machine Hour Rate (A + B)		123.69	120.65

Question-2

From the details furnished below you are required to compute a comprehensive machine-hour rate:

Original purchase price of the machine ₹ 3,24,000

(subject to depreciation at 10% per annum on original cost)

Normal working hours for the month 200 hours

(The machine works for only 75% of normal capacity)

Wages to Machine-man ₹ 125 per day (of 8 hours)

Wages to Helper (machine attendant)	₹ 75 per day (of 8 hours) Power
cost Power cost for the month for the time worked	₹15,000
Supervision charges apportioned for the machine centre	
For the month	₹3,000
Electricity & Lighting for the month	₹ 7,500
Repairs & maintenance (machine) including Consumable stores per month	₹17,500
Insurance of Plant & Building (apportioned) for the year	₹ 16,250
Other general expense per annum	₹ 27,500

The workers are paid a fixed Dearness allowance of ₹1,575 per month. Production bonus payable to workers in terms of an award is equal to 33.33% of basic wages and dearness allowance. Add 10% of the basic wage and dearness allowance against leave wages and holidays with pay to arrive at a comprehensive labour-wage for debit to production.

Solution:

Effective machine hours = 200 hours × 75% = 150 hours

Computation of Comprehensive Machine Hour Rate

	Per month(₹)	Per hour (₹)
Fixed cost		
Supervision charges	3,000.00	
Electricity and lighting	7,500.00	
Insurance of Plant and building (₹16,250 ÷12)	1,354.17	
Other General Expenses (₹27,500÷12)	2,291.67	
Depreciation (₹32,400÷12)	2,700.00	
	16,845.84	112.31
Direct Cost		
Repairs and maintenance	17,500.00	116.67
Power	15,000.00	100.00
Wages of machine man		44.91
Wages of Helper		32.97
Machine Hour rate (Comprehensive)		406.86

Wages per machine hour

	Machine man	Helper
Wages for 200 hours Machine-man (₹125× 25)	₹3,125.00	---
Helper (₹75× 25)	---	₹1,875.00
Dearness Allowance (DA)	₹1,575.00	₹1,575.00
	₹4,700.00	₹3,450.00
Production bonus (1/3 of Basic and DA)	1,567.00	1,150.00
Leave wages (10% of Basic and DA)	470.00	345.00
	6,737.00	4,945.00
Effective wage rate per machine hour	₹44.91	₹32.97

Question-3

A machine shop cost centre contains three machines of equal capacities. To operate these three machines nine operators are required i.e. three operators on each machine. Operators are paid ₹20 per hour. The factory works for fourtyeight hours in a week which includes 4 hours set up time. The work is jointly done by operators. The operators are paid fully for the forty eight hours. In additions they are paid a bonus of 10 per cent of productive time. Costs are reported for this company on the basis of thirteen four-weekly period.

The company for the purpose of computing machine hour rate includes the direct wages of the operator and also recoups the factory overheads allocated to the machines. The following details of factory overheads applicable to the cost centre are available:

- Depreciation 10% per annum on original cost of the machine. Original cost of the each machine is ₹52,000.
- Maintenance and repairs per week per machine is ₹60.
- Consumable stores per week per machine are ₹75.
- Power : 20 units per hour per machine at the rate of 80 paise per unit.
- Apportionment to the cost centre : Rent per annum ₹5,400, Heat and Light per annum ₹9,720, foreman's salary per annum ₹12,960 and other miscellaneous expenditure per annum ₹ 18,000.

Required:

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

(ii) Calculate machine hour rate.

Solution:

Effective Machine hour for four-week period
= Total working hours – unproductive set-up time
= {(48 hours × 4 weeks) – {(4 hours × 4 weeks)}
= (192 – 16) hours) =176 hours.

1. **Computation of cost of running one machine for a four week period**

		(₹)	(₹)
(A)	Standing charges (per annum)		
	Rent	5,400.00	
	Heat and light Forman's	9,720.00	
	salary	12,960.00	
	Other miscellaneous expenditure	18,000.00	
	Standing charges (per annum)	46,080.00	
	Total expenses for one machine for four week period [₹46,080 / 3machines x 13 four - week period]		1,181.54
	Wages (48 hours × 4 weeks × ₹ 20 × 3 operators)		11,520.00
	Bonus {(176 hours × ₹ 20 × 3 operators) x 10%}		1,056.00
	Total standing charges		13,757.54
(B)	Machine Expenses		400.00
	Depreciation = (₹52,000 x 10% x 1 / 13 four-week period)		
	Repairs and maintenance (₹60 x 4 weeks)		240.00
	Consumable stores (₹ 75 x 4 weeks)		300.00
	Power (176 hours x 20 units x₹ 0 .80)		2,816.00
	Total machine expenses		3,756.00
(C)	Total expenses (A) + (B)		17,513.54

2. Machine hour rate = ₹ 17,513.54 / 176 hours = ₹ 99.51

Question-4 (Old Course Practice Manual Q1)

In a factory, a machine is considered to work for 208 hours in a month. It includes maintenance time of 8 hours and set up time of 20 hours.

The expense data relating to the machine are as under:

- Cost of the machine is ₹ 5,00,000. Life 10 years. Estimated scrap value at the end of life is ₹ 20,000.

		(₹)
–	Repairs and maintenance per annum	60,480
–	Consumable stores per annum	47,520
–	Rent of building per annum (The machine under reference occupies 1/6 of the area)	72,000
–	Supervisor's salary per month (Common to three machines)	6,000
–	Wages of operator per month per machine	2,500
–	General lighting charges per month allocated to the machine	1,000
–	Power 25 units per hour at ₹ 2 per unit	

Power is required for productive purposes only. Set up time, though productive, does not require power. The Supervisor and Operator are permanent. Repairs and maintenance and consumable stores vary with the running of the machine.

Required

Calculate a two-tier machine hour rate for (a) set up time, and (b) running time

Solution:

Working Notes:

1. (i) Effective hours for standing charges (208 hours – 8 hours) = 200 hours
   (ii) Effective hours for variable costs (208 hours – 28 hours) = 180 hours

2. Standing Charges per hour

	Cost per month (₹)	Cost per hour (₹) (Cost per month ÷ 200 hours)
Supervisor's salary ₹6,000 / 3 machines	2,000	10.00

Rent of building $\frac{1}{6} \times \frac{72,000}{12 \text{ months}}$	1,000	5.00
General lighting	1,000	5.00
Total Standing Charges	4,000	20.00

Machine running expenses per hour

	Cost per month (₹)	*Cost per hour (₹)*
Depreciation $\frac{₹(5,00,000 - 20,000)}{10 \text{ years}} \times \frac{1}{12 \text{ months}}$	4,000	20.00 $\left(\frac{₹4,000}{200 \text{ hours}}\right)$
Wages	2,500	12.50 $\frac{₹2,500}{200 \text{ hours}}$
Repairs & Maintenance $\frac{₹ 60,480}{12 \text{ months}}$	5,040	28.00 $\frac{₹5,040}{180 \text{ hours}}$
Consumable stores $\frac{₹ 47,520}{12 \text{ months}}$	3,960	22.00 $\frac{₹3,960}{180 \text{ hours}}$
Power (25 units × ₹2 × 180 hours)	9,000	50.00
Total Machine Expenses	24,500	132.50

Computation of Two – tier machine hour rate

	Set up time rateper machine hour (₹)	**Running time rateper machine hour (₹)**
Standing Charges	20.00	20.00
Machine expenses :		

Depreciation	20.00	20.00
Repair and maintenance	–	28.00
Consumable stores	–	22.00
Power	–	50.00
Machine hour rate of overheads	40.00	140.00
Wages	12.50	12.50
Comprehensive machine hour rate	52.50	152.50

Question-5 (Old Course Practice Manual Q6)

You are given the following information of the three machines of a manufacturing department of X Ltd.:

	Preliminary estimates of expenses (per annum)			
	Total (₹)	Machines		
		A (₹)	B (₹)	C (₹)
Depreciation	20,000	7,500	7,500	5,000
Spare parts	10,000	4,000	4,000	2,000
Power	40,000			
Consumable stores	8,000	3,000	2,500	2,500
Insurance of machinery	8,000			
Indirect labour	20,000			
Building maintenance expenses	20,000			
Annual interest on capital outlay	50,000	20,000	20,000	10,000
Monthly charge for rent and rates	10,000			
Salary of foreman (per month)	20,000			
Salary of Attendant (per month)	5,000			

(The foreman and the attendant control all the three machines and spend equal time on them.) The following additional information is also available:

	Machines

	A	B	C
Estimated Direct Labour Hours	1,00,000	1,50,000	1,50,000
Ratio of K.W. Rating	3	2	3
Floor space (sq. ft.)	40,000	40,000	20,000

There are 12 holidays besides Sundays in the year, of which two were on Saturdays. The manufacturing department works 8 hours in a day but Saturdays are half days. All machines work at 90% capacity throughout the year and 2% is reasonable for breakdown.

You are required to :
Calculate predetermined machine hour rates for the above machines after taking into consideration the following factors:
•An increase of 15% in the price of spare parts.
•An increase of 25% in the consumption of spare parts for machine 'B' & 'C' only.
•20% general increase in wages rates.

Solution:

(a) Computation of Machine Hour Rate

	Basis of apportionment	Total (₹)	Machines		
			A (₹)	B (₹)	C (₹)
(A) Standing Charges					
Insurance	Depreciation Basis (3:3:2)	8,000	3,000	3,000	2,000
Indirect Labour	Direct Labour (2:3:3)	24,000	6,000	9,000	9,000
Building maintenance expenses	Floor Space (2:2:1)	20,000	8,000	8,000	4,000
Rent and Rates	Floor Space (2:2:1)	1,20,000	48,000	48,000	24,000
Salary of foreman	Equal	2,40,000	80,000	80,000	80,000
Salary of attendant	Equal	60,000	20,000	20,000	20,000
Total standing charges		4,72,000	1,65,000	1,68,000	1,39,000
Hourly rate for standing charges			84.70	86.24	71.36
(B) Machine Expenses:					

Depreciation	Direct	20,000	7,500	7,500	5,000
Spare parts	Final estimates	13,225	4,600	5,750	2,875
Power	K.W. rating (3:2:3)	40,000	15,000	10,000	15,000
Consumable Stores	Direct	8,000	3,000	2,500	2,500
Total Machine expenses		81,225	30,100	25,750	25,375
Hourly Rate for Machine expenses			15.45	13.22	13.03
Total (A + B)		553,225	1,95,100	1,93,750	1,64,375
Machine Hour rate			100.15	99.46	84.38

Working Notes:

(i) Calculation of effective working hours:

No. of full off-days = No. of Sunday + No. of holidays
= 52 + 12 = 64 days

No. of half working days = 52 days – 2 holidays = 50 days

No. of full working days = 365 days – 64 days – 50 days = 251 days Total working Hours = {(251 days × 8 hours) + (50 days × 4 hours)}
= 2,008 hours + 200 = 2,208 hours.

Total effective hours = Total working hours × 90% - 2% for break-down
= 2,208 hours × 90% - 2% (2,208 hours × 90%)
= 1,987.2 hours – 39.74 hours
= 1947.46 or Rounded up to 1948 hours.

(ii) Amount of spare parts is calculated as under:

	A (₹)	**B (₹)**	**C (₹)**
Preliminary estimates	4,000	4,000	2,000
Add: Increase in price @ 15%	600	600	300
	4,600	4,600	2,300
Add: Increase in consumption @ 25%	-	1,150	575
Estimated cost	4,600	5,750	2,875

(iii) Amount of Indirect Labour is calculated as under:

	(₹)
Preliminary estimates	20,000
Add: Increase in wages @ 20%	4,000

	24,000

(iv) Interest on capital outlay is a finance cost, therefore it has been excluded from the cost accounts.

Question-6 (Nov 20 Old Course Q2(a))

PQR Ltd. has provided the following information for Departments A and B of its factory:

Preliminary Estimates of expenses (Per Annum)			
	Total (₹)	Dept A (₹)	Dept B (₹)
Power	15,000	-	-
Spare parts	8,000	3,000	5,000
Consumable stores	5,000	2,000	3,000
Depreciation on machinery	30,000	10,000	20,000
Insurance on machinery	3,000	1,000	2,000
Indirect labour	40,000	-	-
Building maintenance	7,000	-	-

The final estimates of expenses are to be prepared on the basis of above figures after taking into consideration the following factors:

(a) An increase of 10 per cent in the price of spare parts.

(b) An increase of 20 per cent in the consumption of spare parts for Department B only.

(c) Increase in the straight line method of depreciation from 10 per cent on the original value of machinery to 12 per cent.

(d) 15 per cent increase in wage rates of Indirect Labour.

The following information is also available:

	Dept. A	Dept. B
Estimated Direct Labour hours	80,000	1,20,000
Ratio of K.W. Rating	3	2
Floor space (sq. ft.)	15,000	20,000

There are 12 holidays besides Sundays in the year. The manufacturing department works 8 hours in a day. All machines work at 90% capacity throughout the year. (Assume 365 days in a year).

You are required to work out the Machine Hour rates for Departments A and B.

Solution:

(a) Computation of Machine Hour Rate

	Basis of apportionment	Total (₹)	Department	
			A (₹)	B (₹)
(A) Standing Charges				
Insurance	Direct	3,000	1,000	2,000
Indirect Labour	Direct Labour (2:3)	46,000	**18,400**	**27,600**
Building maintenance expenses	Floor Space (3:4)	7,000	**3,000**	**4,000**
Total standing charges (A)		56,000	22,400	33,600
Hourly rate for standing charges (H1)			10.33	15.50
(B) Machine Expenses:				
Power	K.W. rating (3:2)	15,000	**9,000**	**6,000**
Spare parts	Final estimates	9,900	**3,300**	**6,600**
Consumable Stores	Direct	5,000	**2,000**	**3,000**
Depreciation on machinery	Final estimates	36,000	**12,000**	**24,000**
Total Machine expenses (B)		65,900	**26,300**	**39,600**
Hourly Rate for Machine expenses (H2)			12.13	18.27
Total Cost (A + B)		**1,21,900**	**48,700**	**73,200**
Machine Hour rate* (H1+H2)			**22.46**	**33.76**

*Alternatively, Machine Hour rate can be calculated as total Cost ÷ total effective hours.

Working Notes:

i. Calculation of effective working hours:

No. of off-days = No. of Sundays + No. of holidays

= 52 + 12 = 64 days
No. of working days = 365 days – 64 days = 301 days
Total working Hours = 301 days × 8 hours
= 2,408 hours
Total effective hours = Total working hours × 90%
= 2,408 hours × 90%
= 2,167.2 or Rounded up to 2,168 hours

ii. Amount of Indirect Labour is calculated as under:

Particulars	**(₹)**
Preliminary estimates	40,000
Add: Increase in wages @ 15%	6,000
Estimated total cost of Indirect labour	46,000

iii. Amount of spare parts is calculated as under:

Particulars	**A (₹)**	**B (₹)**
Preliminary estimates	3,000	5,000
Add: Increase in price @ 10%	300	500
	3,300	5,500
Add: Increase in consumption @ 20%	-	1,100
Estimated cost of spare parts	3,300	6,600

iv. Amount of Depreciation of machinery is calculated as under:

Particulars	**A (₹)**	**B (₹)**
Preliminary estimates	10,000	20,000
Add: Increase in depreciation {₹ 10,000 x 2 (12-10) /10}	2000	4000
Estimated Depreciation (Current depreciation x 12/10)	12,000	24,000

Question-7 (RTP May 21 Old Course)

A manufacturing unit has purchased and installed a new machine at a cost of ₹ 24,90,000

to its fleet of 5 existing machines. The new machine has an estimated life of 12 years and is expected to realise ₹ 90,000 as scrap value at the end of its working life.
Other relevant data are as follows:

(i) Budgeted working hours are 2,496 based on 8 hours per day for 312 days. Plant maintenance work is carried out on weekends when production is totally halted. The estimated maintenance hours are 416. During the production hours machine set -up and change over works are carried out. During the set-up hours no production is done. A total 312 hours are required for machine set-ups and change overs.

(ii) An estimated cost of maintenance of the machine is ₹ 2,40,000 p.a.

(iii) The machine requires a component to be replaced every week at a cost of ₹ 2,400.

(iv) There are three operators to control the operations of all the 6 machines. Each operator is paid ₹ 30,000 per month plus 20% fringe benefits.

(v) Electricity: During the production hours including set-up hours, the machine consumes 60 units per hour. During the maintenance the machine consumes only 10 units per hour. Rate of electricity per unit of consumption is ₹ 6.

(vi) Departmental and general works overhead allocated to the operation during last year was ₹ 5,00,000. During the current year it is estimated to increase by 10%.

Required:
Compute the machine hour rate.

Solution:

Working Note:

1. Effective machine hour:
   = Budgeted working hours – Machine Set-up time
   = 2,496 hours – 312 hours = 2,184 hours.

2. Operators' salary per annum:

Salary (3 operators × ₹ 30,000 × 12months)	₹ 10,80,000
Add: Fringe benefits (20% of ₹ 10,80,000)	₹ 2,16,000
	₹ 12,96,000

3. Depreciation per annum
   = $\frac{₹24,90,000 - ₹90,000}{12 \text{ Years}}$ = ₹ 2,00,000

Computation of Machine hour Rate

		Amount p.a. (₹)	Amount per hour (₹)
Standing charges Operators' Salary ₹12,96,000 / 6 machines × 1 / 2,184 hours		12,96,000	98.90
Departmental and general overheads: (₹ 5,00,000 × 110%) ₹5,50,000 / 6 machines x 1 / 2,184 hours		5,50,000	41.97
	(A)	18,46,000	140.87
Machine Expenses Depreciation ₹ 2,00,000 / 2,184 hours		2,00,000	91.58
Electricity:			
During working hours (2,496 hours × 60 units x ₹ 6)		8,98,560	411.43
During maintenance hours (416 hours × 10 units x ₹ 6)		24,960	11.43
Component replacement cost (2,400 × 52 weeks)		1,24,800	57.14
Machine maintenance cost		2,40,000	109.89
	(B)	14,88,320	681.47
Machine Hour Rate	(A + B)		822.34

Question-8 (RTP Jan 21 Old Course)

You are given the following information of the three machines of a manufacturing department of X Ltd.:

	Preliminary estimates of expenses (per annum)			
		Machines		
	Total (₹)	A (₹)	B (₹)	C (₹)
Depreciation	2,00,000	75,000	75,000	50,000
Spare parts	1,00,000	40,000	40,000	20,000
Power	4,00,000			

Consumable stores	80,000	30,000	25,000	25,000
Insurance of machinery	80,000			
Indirect labour	2,00,000			
Building maintenance expenses	2,00,000			
Annual interest on capital outlay	1,00,000	40,000	40,000	20,000
Monthly charge for rent and rates	20,000			
Salary of foreman (per month)	42,000			
Salary of Attendant (per month)	12,000			

(The foreman and the attendant control all the three machines and spend equal time on them.)
The following additional information is also available:

	Machines		
	A	B	C
Estimated Direct Labour Hours	1,00,000	1,50,000	1,50,000
Ratio of K.W. Rating	3	2	3
Floor space (sq. ft.)	40,000	40,000	20,000

There are 12 holidays besides Sundays in the year, of which two were on Saturdays. The manufacturing department works 8 hours in a day but Saturdays are half days. All machines work at 90% capacity throughout the year and 2% is reasonable for breakdown.

You are required to:
CALCULATE predetermined machine hour rates for the above machines after taking into consideration the following factors:

- An increase of 15% in the price of spare parts.
- An increase of 25% in the consumption of spare parts for machine 'B' & 'C' only.
- 20% general increase in wages rates.

Solution:
Computation of Machine Hour Rate

	Basis of apportionment	Total (₹)	Machines		
			A (₹)	B (₹)	C (₹)
(A) Standing Charges					
Insurance	Depreciation	80,000	30,000	30,000	20,000

		Basis (3:3:2)				
	Indirect Labour	Direct Labour (2:3:3)	2,40,000	60,000	90,000	90,000
	Building maintenance expenses	Floor Space (2:2:1)	2,00,000	80,000	80,000	40,000
	Rent and Rates	Floor Space (2:2:1)	2,40,000	96,000	96,000	48,000
	Salary of foreman	Equal	5,04,000	1,68,000	1,68,000	1,68,000
	Salary of attendant	Equal	1,44,000	48,000	48,000	48,000
	Total standing charges		14,08,000	4,82,000	5,12,000	4,14,000
	Hourly rate for standing charges			247.43	262.83	212.53
(B)	**Machine Expenses:**					
	Depreciation	Direct	2,00,000	75,000	75,000	50,000
	Spare parts	Final estimates	1,32,250	46,000	57,500	28,750
	Power	K.W. rating(3:2:3)	4,00,000	1,50,000	1,00,000	1,50,000
	Consumable Store	Direct	80,000	30,000	25,000	25,000
	Total Machine expenses					
	Hourly Rate for Machine expenses					
	Total (A + B)					
	Machine Hour rate					
	Stores					
	Total Machine expenses		8,12,250	3,01,000	2,57,500	2,53,750
	Hourly Rate for Machine expenses			154.52	132.19	130.26

Total (A + B)	22,20,250	7,83,000	7,69,500	6,67,750
Machine Hour rate		401.95	395.02	342.79

Working Notes:

(i) Calculation of effective working hours:

No. of full off-days = No. of Sunday + No. of holidays
= 52 + 12 = 64 days

No. of half working days = 52 days – 2 holidays = 50 days

No. of full working days = 365 days – 64 days – 50 days = 251 days Total working Hours = {(251 days × 8 hours) + (50 days × 4 hours)}
= 2,008 hours + 200 = 2,208 hours.

Total effective hours = Total working hours × 90% - 2% for break- down
= 2,208 hours × 90% - 2% (2,208 hours × 90%)
= 1,987.2 hours – 39.74 hours
= 1947.46 or Rounded up to 1948 hours.

(ii) Amount of spare parts is calculated as under:

	A (₹)	**B (₹)**	**C (₹)**
Preliminary estimates	40,000	40,000	20,000
Add: Increase in price @ 15%	6,000	6,000	3,000
	46,000	46,000	23,000
Add: Increase in consumption @ 25%	-	11,500	5,750
Estimated cost	46,000	57,500	28,750

(iii) Amount of Indirect Labour is calculated as under:

	(₹)
Preliminary estimates	2,00,000
Add: Increase in wages @ 20%	40,000
	2,40,000

(iv) Interest on capital outlay is a finance cost, therefore it has been excluded from the cost accounts.

Part-III: Treatment of under and over absorption of overhead

A. QUESTIONS FROM STUDY MATERIAL

TEST YOUR KNOWLEDGE

Question-9

In a 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 was in respect of expenses of the previous year booked in the current month (August). Actual production was 40,000 units, of which 30,000 units were sold. On analysing the reasons, it was found that 60% of the under-absorbed overhead was due to defective planning and the rest was attributed to normal cost increase. EXPLAIN how would you treat the under-absorbed overhead in the cost accounts?

Hints: Under absorption = 10,000, SR = ₹0.10 P.U.

Question-10 (Dec 21 Q5(b))

In a manufacturing unit, factory overhead was recovered at a pre-determined 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 lakh 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.

EXPLAIN how would unabsorbed overheads be treated in Cost Accounts?

Hints: Under absorption = 4,00,000, SR = ₹4 P.U.

Question-11

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 Overheads (₹)	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 :

1. Calculate the overhead absorption rate as per the current policy of the company and determine the selling price of the Job No. CW 7083.

2. 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.
3. Determine the selling price of Job CW 7083 based on the overhead application rates calculated in (ii) above.
4. 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.

Hints:

(i) Over absorption rate = 125% of Direct Wages.
Selling price = ₹4,660.50

(ii)

Department	Recovery Rate
Machine	4.50 per machine hour
Assembly	1.40 per labour hour
Packing	2.50 per labour hour

(iii) Selling price = ₹4,989.40

(iv)

	Machine	Assembly	Packing
Current Policy	(2,70,000)	2,53,500	(22,500)
Proposed Policy	42,000	42,000	15,000

Question-12

The total overhead expenses of a factory are ₹4,46,380. Taking into account the normal working of the factory overhead war recovered in production at ₹ 1.25 per hour. The actual hours worked were 2,93,104. STATE how would you proceed to close the books of accounts, assuming that besides 7,800 units produced of which 7,000 were sold, there were 200 equivalent units in work-in- progress?

On investigation, it was found that 50% of the unabsorbed overhead was on account of increase in the cost of indirect materials and indirect labour and the remaining 50% was due to factory inefficiency. Also give the profit implication of the method suggested.

Hints: Under recovery = 80,000, SR = 5 P.U.

Question-13

ABC Ltd. manufactures a single product and absorbs the production overheads at a pre-determined rate of ₹ 10 per machine hour.

At the end of financial year 20X8-X9, it has been found that actual production overheads incurred were ₹ 6,00,000. It included ₹ 45,000 on account of 'written off' obsolete stores and ₹ 30,000 being the wages paid for the strike period under an award.
The production and sales data for the year 20X8-X9 is as under:

Production:

Finished goods	20,000 units
Work-in-progess (50% complete in all respects)	8,000 units

Sales:

Finished goods	18,000 units

The actual machine hours worked during the period were 48,000. It has been found that one-third of the under-absorption of production overheads was due to lack of production planning and the rest was attributable to normal increase in costs.

1. Calculate the amount of under-absorption of production overheads during the year 20x8-x9; and
2. Show the accounting treatment of under-absorption of production overheads.

Hints: Under recovery = 45,000, SR = ₹1.25 P.U.

Question-14

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, 20X8 is given below:

	(₹)	(₹)
Direct materials (all items)		780.00
Direct labour (manual) 20 hours @₹ 15 per hour		300.00
Machine facilities :		
Machine No. I : 4 hours @ ₹ 45	180.00	
Machine No. II : 6 hours @ ₹ 65	390.00	570.00
Total		1,650.00
Overheads @ ₹ 8 per hour on 20 manual hours		160.00
Total cost		1,810.00

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.
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, 20X8, 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.

Hints: Total amount = ₹2,000, Supplementary rate = ₹2,
Machine facilities (Supplementary rate): M1 = 15, M2 = 15

B. PAST YEAR EXAM QUESTIONS

Nov'19 Q2(b) 10 Marks

ABS enterprises produces a product and adopts the policy to recover factory overheads applying blanket rate based on mchine hours. The cost records of the concern reveal following information :

Budgeted production overheads	₹10,35,000
Budgeted machine hour rate	90,000
Actual machine hour worked	45,000
Actual production overheads	₹8,80,000
Production overheads (actual) include:-	
Paid to worker as per count's award	₹50,000
Wages paid for strike period	₹38,000
Stores written off	₹22,000
Expenses of previous year booked in C.Y.	₹18,500
Production-	
Finished goods	30,000 units
Sale of finished goods	27,000 units

The analysis of cost information reveals that 1/3 of the under absorption of overheads was due to defective production planning and balance was attributable to increase in costs.
You are required :

1. To find out the amount of under absorption of overheads.
2. To give the ways of treating it in cost accounts.
3. To apportion the under absorbed overheads over the items.

C. ADDITIONAL QUESTIONS FOR PRACTICE(PAST YEAR EXAM)

Question-1

PQR manufacturers – a small scale enterprise produces a single product and has adopted a policy to recover the production overheads of the factory by adopting a single blanket rate based on machine hours. The budgeted production overheads of the factory are ₹ 10,08,000 and budgeted machine hours are 96,000.

For a period of first six months of the financial year 2013-2014, following information were extracted from the books:

Actual production overheads	₹6,79,000
Amount included in the production overheads:	
Paid as per court's order	₹ 45,000
Expenses of previous year booked in current year	₹ 10,000
Paid to workers for strike period under an award	₹ 42,000
Obsolete stores written off	₹ 18,000

Production and sales data of the concern for the first six months are as under:

Production:	
Finished goods	22,000 units
Works-in-progress (50% complete in every respect)	16,000 units

Sale:

Finished goods	18,000 units

The actual machine hours worked during the period were 48,000 hours. It is revealed from the analysis of information that ¼ of the under-absorption was due to defective production policies and the balance was attributable to increase in costs.

You are required:

(i) to determine the amount of under absorption of production overheads for the period,
(ii) to show the accounting treatment of under-absorption of production overheads, and
(iii) to apportion the unabsorbed overheads over the items.

Solution:

Amount of under absorption of production overheads during the period of first six months of the year 2013-2014:

	Amount (₹)	Amount (₹)
Total production overheads actually incurred during the period		6,79,000
Less: Amount paid to worker as per court order	45,000	
Expenses of previous year booked in the current year	10,000	
Wages paid for the strike period under an award		
Obsolete stores written off	42,000	
Less: Production overheads absorbed as per machine hour rate (48,000 hours × ₹10.50*)	18,000	1,15,000
		5,64,000
Amount of under absorbed production overheads		5,04,000
		60,000

Budgeted Machine hour rate (Blanket rate) = ₹ 10,08,000 / 96,000 hours = ₹ 10.50 per hour

(ii) Accounting treatment of under absorbed production overheads: As, one fourth of the under absorbed overheads were due to defective production policies, this being abnormal, hence should be debited to Costing Profit and Loss Account.
Amount to be debited to Costing Profit and Loss Account = (60,000 * ¼) ₹ 15,000.
Balance of under absorbed production overheads should be distributed over Works in progress, Finished goods and Cost of sales by applying supplementary rate*.
Amount to be distributed = (60,000 * ¾) ₹45,000.

Supplementary rate = ₹ 45,000 / 30,000 units = ₹ 1.50 per unit

(iii) Apportionment of under absorbed production overheads over WIP, Finished goods and Cost of sales:

	Equivalent completed units	Amount (₹)
Work-in-Progress (16,000 units × 50% ×1.50)	8,000	12,000
Finished goods (4,000 units × 1.50)	4,000	6,000
Cost of sales (18,000 units × 1.50)	18,000	27,000
Total	30,000	45,000

Question-2 (Old Course Practice Manual Q9)

Your company uses a historical cost system and applies overheads on the basis of "pre determined" rates. The following are the figure from the Trial Balance as at 30th September, 2013:-

Manufacturing overheads	₹ 4,26,544 Dr.
Manufacturing overheads applied	₹ 3,65,904 Cr.
Work-in-progress	₹ 1,41,480 Dr.
Finished goods stocks	₹ 2,30,732 Dr.
Cost of goods sold	₹ 8,40,588 Dr.

Give two methods for the disposal of the unabsorbed overheads and show the profit implications of each method.

Solution:

Calculation of manufacturing overhead under absorbed	(₹)
Actual overheads	4,26,544
Overhead recovered (applied)	3,65,904
Under absorption (recovery) of overhead	60,640

The two methods for the disposal of the under-absorbed overheads in this problem may be:-

(1) Write off the under – absorbed overhead to Costing Profit & Loss Account.

(2) Use supplementary rate, to recover the under-absorbed overhead.

According to first method, the total unabsorbed overhead amount of ₹60,640 will be written off to Costing Profit & Loss Account. The use of this method will reduce the profits of the concern by ₹ 60,640 for the period.

According to second method, a supplementary rate may be used to adjust the overhead cost of each cost unit. The under-absorbed amount in total may, at the end of the accounting period, be apportioned on ratio basis to the three control accounts, viz, Work-in-progress,

Finished goods stock and Cost of goods sold account. Apportioning of under-absorbed overhead can be carried out by using direct labour hours/ machine hours/ the value of the balances in each of these accounts, as the basis. Prorated figures of under-absorbed overhead over Work-in-progress, Finished goods stock and Cost of goods sold in this question on the basis of values, of the balances in each of these accounts are as follows:-

	Additional Overhead (Under-absorbed) Total		
	(₹)	(₹)	(₹)
Work-in-progress	1,41,480	7,074*	1,48,554
Finished Goods Stock	2,30,732	11,537@	2,42,269
Cost of Goods Sold	8,40,588	42,029#	8,82,617
	12,12,800	60,640	12,73,440

By using this method, the profit for the period will be reduced by ₹42,029 and the value of stock will increase by ₹18,611. The latter will affect the profit of the subsequent period.
Working Notes
The apportionment of under-absorbed overhead over Work-in-progress, Finished goods stock and Cost of goods sold on the basis of their value in the respective account is as follows:-

*Overhead to be absorbed by work-in-progress = ₹60,640 / 12,12,800 x 1,41,480 = ₹7,074

@Overhead to be absorbed by finished goods = ₹60,640 / 12,12,800 x 2,30,732 = ₹11,537

#Overhead to be absorbed by cost of goods sold = ₹60,640 / 12,12,800 x 8,40,588 = ₹42,029

MISCELLANEOUS

Question-1

A machine was purchased from a manufacturer who claimed that his machine could produce 36.5 tonnes in a year consisting of 365 days. Holidays, break-down, etc., were normally allowed in the factory for 65 days. Sales were expected to be 25 tonnes during the year and the plant actually produced 25.2 tonnes during the year. You are required to state the following figures:

- Rated Capacity.
- Practical Capacity.
- Normal Capacity.
- Actual Capacity.

Solution:

(a) Rated capacity 36.5 tonnes

(Refers to the capacity of a machine or a plant as indicated by its manufacturer)

(b) Practical capacity 30.0 tonnes

[Defined as actually utilised capacity of a plant i.e. $\frac{36.5 \text{ tonnes}}{365 \text{ days}} \times (365 - 65)$ days]

(c) Normal capacity 25.0 tonnes

(It is the capacity of a plant utilized based on sales expectancy)

(d) Actual capacity 25.2 tonnes

(Refers to the capacity actually achieved)

Question-2

Following information is available for the first and second quarter of the year 2013-14 of ABC Limited:

	Production (in units)	**Semi-variable cost (₹)**
Quarter I	36,000	2,80,000
Quarter II	42,000	3,10,000

You are required to segregate the semi-variable cost and calculate:

(a) Variable cost per unit; and

(b) Total fixed cost.

Solution:

(a) Variable Cost per Unit = $\frac{\text{Change in Semi - variable cost under two production level}}{\text{Change in production quantity in two levels}}$

$= \frac{₹3,10,000 - ₹2,80,000}{42,000 \text{units} - 36,000 \text{units}}$

= ₹ 5 per units

(b) Total Fixed Cost= Semi Variable Cost for 36,000 units – Variable cost for 36,000 units

= ₹ 2,80,000 – (36,000 units × ₹ 5)

= ₹ 1,00,000

Chapter. 4: Activity Based Costing

A. QUESTION FROM STUDY MATERIAL

Question-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, 20X8 are as follows:

	A	B	C
Production quantity (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:**

	(₹)
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. **Data on Cost Drivers was as follows:**

	A	B	C
For complete production:			
Batches of material	10	5	15
Per unit of production:			
Number of Machine operators	6	3	2

You are requested to:

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.

STATE what are the reasons for the different product costs under the two approaches?

Hints:

Product Cost	Absorption Costing (₹)	ABC (₹)
A	86,000	1,00,360
B	96,750	86,940
C	52,800	48,256

Question-2

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 Inspections	Number of Inspections	10,000 Inspections	₹ 3,00,000

The company makes three products M, S and T. For the year ended March 31, 20X9, 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:

(i) COMPUTE the costs allocated to each product from each activity.

(ii) CALCULATE the cost of unused capacity for each activity.

(iii) DISCUSS the factors the management considers in choosing a capacity level to compute the budgeted fixed overhead cost rate.

Hints: (i)

Product	M	S	T
Power	40,000	80,000	60,000
Quality Inspection	1,05,000	75,000	90,000

(ii) Cost of unused capacity = ₹50,000

Question-3

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, 20X8 are ₹ 12,42,500 and 20,000 hours respectively. The information about Company's products is as follows:

	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		
X : 4 hours @ ₹ 150 per hour	₹ 450	₹ 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:

	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:

(i) 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.

(ii) Assuming use of activity-based costing, COMPUTE the unit manufacturing costs

of the equipment Y and Z, if the budgeted manufacturing volume is achieved.

(iii) 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 over-costed) for each equipment.

Hints:

Unit Manufacturing Cost	Y	Z
Direct Labour Hours	936.38	1,298.50
ABC	976.80	1,266.16

Question-4

'Humara - Apna' bank offers three products, viz., deposits, Loans and Credit Cards. The bank has selected 4 activities for a detailed budgeting exercise, following activity based costing methods.

The bank wants to know the product wise total cost per unit for the selected activities, so that prices may be fixed accordingly.

The following information is made available to formulate the budget:

Activity	Present Cost (₹)	Estimation for the budget period
ATM Services:		
(a) Machine Maintenance	4,00,000 2,00,000	All fixed, no change. Fully fixed, no change.
(b) Rents	1,00,000	Expected to double during budget period.
(c) Currency Replenishment Cost	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 lac statements are made. In the budget period, 5 lac statements are expected. For every increase of one lac statement, one lac 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

(i) Calculate the budgeted rate for each activity.
(ii) Prepare the budgeted cost statement activity wise.
(iii) Find the budgeted product cost per account for each product using (i) and (ii) above.

Solution:

Statement Showing "Budgeted Cost per unit of the Product"

Activity	Activity Cost (Budgeted) (₹)	Activity Driver	No. of Units of Activity Driver (Budget)	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 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
Customer 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

TEST YOUR KNOWLEDGE

Question-1

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 @ ₹ 20	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.

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

(i) Calculate the cost per unit of each product using traditional method of absorbing all production overheads on the basis of machine hours.

(ii) Calculate the cost per unit of each product using activity based costing principles.

Solution:

(i) Statement Showing "Cost per unit - Traditional Method"

Particulars of Costs	**P** (₹)	**Q** (₹)	**R** (₹)
Direct Materials	90	80	120
Direct Labour [(4, 12, 8 hours) x ₹20]	80	240	160
Production Overheads [(10, 18, 14 hours) x ₹6]	60	108	84
Cost *per unit*	230	428	364

(ii) Statement Showing "Cost per unit - Activity Based Costing"

Products	**P**	**Q**	**R**
Production (units)	3,000	5,000	20,000
	(₹)	(₹)	(₹)
Direct Materials (90, 80, 120)	2,70,000	4,00,000	24,00,000
Direct Labour (80, 240, 160)	2,40,000	12,00,000	32,00,000
Machine Related Costs @ ₹1.80 *per hour* (30,000, 90,000, 2,80,000)	54,000	1,62,000	5,04,000
Setup Costs @ ₹9,600 *per setup* (20, 10, 20)	1,92,000	96,000	1,92,000
Inspection Costs @ ₹4,800 *per inspection* (100, 40, 60)	4,80,000	1,92,000	2,88,000
Purchase Related Costs @ ₹750 *per purchase* (60, 100, 160)	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

Question-2

RST Limited specializes in the distribution of pharmaceutical products. It buys from the pharmaceutical companies and resells to each of the three different markets.

(i) General Supermarket Chains

(ii) Drugstore Chains

(iii) Chemist Shops

The following data for the month of April, 20X9 in respect of RST Limited has been reported:

	General Supermarket Chains (₹)	Drugstore Chains (₹)	Chemist Shop (₹)
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, 20X9 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, 20X9 are as follows:

Activity Area	**Total costs in April, 20X9 (₹)**	**Total Units of Cost Allocation Base used in April, 20X9**
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
Shelf-stocking at customer store	28,160	1,760 hours

Other data for April, 20x9 include the following:

	General Supermarket	Drugstore Chains	Chemist Shop

	Chains		
Total numbers 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 number of cartons shipped Per store delivery	300	80	16
Average number of hours of shelf-stocking per store delivery	3	0.6	0.1

Required:

(i) COMPUTE for April, 20X9 gross-margin percentage for each of its three distribution channels and compute RST Limited's operating income.

(ii) COMPUTE the April, 20X9 rate per unit of the cost-allocation base for each of the five activity areas.

(iii) COMPUTE the operating income of each distribution channel in April, 20X9 using the activity-based costing information. Comment on the results. What new insights are available with the activity-based cost information?

(iv) DESCRIBE four challenges one would face in assigning the total April, 20X9 operating costs of ₹ 8,27,970 to five activity areas.

Hints: (i)

Particular	Super Market	Drug Store	Chemist
Gross Margin	2.91%	4.76%	9.09%

Operating income = 3.72%

(iii)

Particular	Super Market	Drug Store	Chemist
Operating Income	2.33%	3.96%	5.96%

Question-3

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:

	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
Kilometers 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:

(i) COMPUTE the customer-level operating income of each of five retail customers now being examined (A, B, C, D and E). Comment on the results.

(ii) STATE what insights are gained by reporting both the list selling price and the actual selling price for each customer?

Hints:

Customer	A	B	C	D	E
Operating Income	53,090	2,23,531	6,90,375	7,39,757	274

Question-4 (Dec 21 Q3(b))

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 current year 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 current year:

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 onstore shelves and on- going 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:

(i) 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.

(ii) If Family Store allocates support costs (all costs other than cost of goods sold) to product lines using and activity-based costing system, CALCULATE the operating income and operating income as a % of revenues for each product line.

Hints:

(i) Operating Income: 10,20,000; Operating income as a percentage of revenues: 4.97%

(ii) Operating Income: 10,20,000; Operating income as a percentage of revenues: 4.97%

Question-5

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 are as follows:

	BABYSOFT- Gold		BABYSOFT- Pearl		BABYSOFT- Diamond	
Productionof soaps (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:
(i) PREPARE a statement showing the unit costs and total costs of each product using the absorption costing method.
(ii) PREPARE a statement showing the product costs of each product using the ABC approach.
(iii) STATE what are the reasons for the different product costs under the two approaches?

Hints:
(i)

	BABYSOFT-Gold (₹)	**BABYSOFT-Pearl (₹)**	**BABYSOFT-Diamond (₹)**
Total unit costs	189.00	244.17	291.50
Total costs	**7,56,000**	**7,32,510**	**5,83,000**

(ii)

	BABYSOFT-Gold (₹)	BABYSOFT-Pearl (₹)	BABYSOFT-Diamond (₹)
Total unit costs	192.48	243.70	285.72
Total costs	7,69,920	7,31,100	5,71,440

(iii) 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

B. PAST YEAR EXAM QUESTIONS

May-23. Q4(b) (5 marks)

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 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 Expenses	10,66,475
Indirect labour	13,16,250
Repair & Maintenance	1,28,775
	33,75,000

Required:

(i) Calculate the overhead rate per labour hour under Absorption Costing.

(ii) Prepare a cost statement showing overhead cost per unit for each product - 'A', 'B' and 'C' as per Activity based Costing.

Solution:

(i) Calculation of Overhead rate per hour

$$\frac{\text{Total Overheads}}{\text{Total Hours}}$$

$$\frac{33,75,000}{22,500} = ₹\ 150 \text{ per hour}$$

(ii) Statement showing overhead cost per unit as per Activity Based Costing

			Product		
Overheads	**Cost Driver**	**Total**	**A**	**B**	**C**
		₹	**₹**	**₹**	**₹**
Rent & Taxes	Floor space (50:45:62)	8,63,500	2,75,000	2,47,500	3,41,000
Electricity	Power Consumption (32:28:40)	10,66,475	3,41,272	2,98,613	4,26,590
Indirect labour	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		33,75,000	11,06,022	10,05,563	12,63,415
Units			50,000	45,000	62,000
Cost per Unit			**22.12**	**22.35**	**20.38**

Nov-22. Q2(c) (4 marks)

XYZ Ltd. is engaged in manufacturing two products- Express Coffee and Instant Coffee. It furnishes the following data for a year:

Product	**Actual Output (units)**	**Total Machine hours**	**Total Numberof Purchaseorders**	**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	**₹**
Machine Processing costsSet	7,00,000
up related costs	7,68,000
Purchase related costs	6,80,000

You are required to:

(i) Compute the costs allocated to each product – Express Coffee and Instant Coffee from each activity on the basis of Activity- Based Costing (ABC) method.

(ii) Find out the overhead cost per unit of each product – Express coffee and Instant coffee based on (i) above.

Solution:

(iii) Estimation of Cost-Driver rate

Activity	Overhead cost (₹)	Cost-driver level	Cost driver rate (₹)
Machine processing	7,00,000	1,40,000 Machine hours	5
Set up Costs	7,68,000	64 Number of set up	12,000
Purchase related Costs	6,80,000	544 Number of purchase order	1250

Cost Allocation under Activity based Costing

	Express Coffee (₹)	Instant Coffee (₹)
Overhead Cost		
Machine processing (Cost Driver rate - ₹ 5) (or 20,000:1,20,000)	5 × 20,000 = 1,00,000	5 × 1,20,000 = 6,00,000
Set up Costs (Cost Driver rate - ₹ 12,000)) (or 20:44)	12,000 × 20 = 2,40,000	12,000 × 44 = 5,28,000
Purchase related Costs (Cost Driver rate - ₹ 1250) (or 160:384)	1,250 × 160 = 2,00,000	1,250 × 384 = 4,80,000
Total overhead cost	5,40,000	16,08,000

(iv) Overhead Cost per unit

Per unit Overhead cost	(₹)	(₹)
5,40,000 /5,000	108	
16,08,000/60,000		26.80

Jan-21. Q4(b) (10 marks)

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:

	X	Y	Z
Production Quantity (units) Cost per unit:	1200	1440	1968
Direct Material (₹) Direct Labour (₹)	90 18	84 20	176 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.

Solution:

Traditional Absorption Costing

	X	**Y**	**Z**	**Total**

(a) Quantity (units)	1,200	1,440	1,968	4608
(b) Direct labour per unit (₹)	18	20	30	-
(c) Direct labour hours (a × b)/₹ 4	5,400	7,200	14,760	27,360

Overhead rate per direct labour hour:

= Budgeted overheads /Budgeted labour hours

= (₹ 50,000 + ₹ 40,000 + ₹ 28,240 + ₹ 1,28,000) / 27,360 hours

= ₹ 2,46,240 / 27,360 hours

= ₹ 9 per direct labour hour

Unit Costs:

	X	Y	Z
Direct Costs:			
- Direct Labour (₹)	18.00	20.00	30.00
- Direct Material (₹)	90.00	84.00	176.00
Production Overhead: (₹)	40.50 $\left(\frac{9 \times 18}{4}\right)$	45.00 $\left(\frac{9 \times 20}{4}\right)$	67.50 $\left(\frac{9 \times 30}{4}\right)$
Total cost per unit (₹)	**148.50**	**149.00**	**273.50**

2. Calculation of Cost-Driver level under Activity Based Costing

	X	Y	Z	Total
Quantity (units)	1,200	1,440	1,968	-
No. of orders (to be rounded off for fraction)	48 (1200 / 25)	58 (1440 / 25)	79 (1968 / 25)	185
No. of production runs	25 (1200 / 48)	30 (1440 / 48)	41 (1968 / 48)	96
No. of Inspections (done for each production run)	25	30	41	96
Maintenance hours	1,600	1,600	3,200	6400

Calculation of Cost-Driver rate

Activity	Budgeted Cost (₹) (a)	Cost-driver level (b)	Cost Driver rate (₹) (c) = (a) / (b)
Material procurement	50,000	185	270.27
Set-up	40,000	96	416.67
Quality control	28,240	96	294.17
Maintenance	1,28,000	6,400	20.00

Calculation of total cost of products using Activity Based Costing

Particulars	Product		
	X (₹)	Y (₹)	Z (₹)
Direct Labour	18.00	20.00	30.00
Direct Material	90.00	84.00	176.00
Prime Cost per unit (A)	108.00	104.00	206.00
Material procurement	10.81 [(48 x 270.27)/1200]	10.89 [(58 x 270.27)/1440]	10.85 [(79 x 270.27)/1968]
Set-up	8.68 [(25 x 416.67)/1200]	8.68 [(30 x 416.67)/ 1440]	8.68 [(41 x 416.67)/ 1968]
Quality control	6.13 [(25 x 294.17)/1200]	6.13 [(30 x 294.17)/ 1440]	6.13 [(41 x 294.17)/ 1968]
Maintenance	26.67 [(1,600 x 20)/1200]	22.22 [(1,600 x 20)/ 1440]	32.52 [(3,200 x 20)/ 1968]
Overhead Cost per unit (B)	52.29	47.92	58.18
Total Cost per unit (A + B)	**160.29**	**151.92**	**264.18**

Note: Question may also be solved assuming no. of orders for material procurement to be 25 for each product.

Nov-20. Q5(b) (6 marks)

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 :

	(₹)
Ordering costs	64,000
Delivery costs	1,58,200
Shelf Stocking costs	87,560

Required:

(i) Calculate cost driver's rate.

(ii) Calculate total cost of each product using Activity Based Costing.

Solution:

(i) Calculation Cost-Driver's rate

Activity	Overhead cost (₹)	Cost-driver level	Cost driver rate (₹)
	(A)	(B)	(C) = (A)/(B)
Ordering	64,000	34 + 32 + 14 = 80 no. of purchase orders	**800**
Delivery	1,58,200	110 + 64 + 52 = 226 no. of deliveries	**700**
Shelf stocking	87,560	110 + 160 + 170 = 440 shelf stocking hours	**199**

(ii) Calculation of total cost of products using Activity Based Costing

Particulars	Fruit Juices		
	Apple (₹)	Orange (₹)	Mixed Fruit (₹)
Material cost	80,000 (10,000 x ₹ 8)	90,000 (15,000 x ₹ 6)	1,00,000 (20,000 x ₹ 5)

Direct labour cost	50,000 (10,000 x ₹ 5)	60,000 (15,000 x ₹ 4)	60,000 (20,000 x ₹ 3)
Prime Cost (A)	1,30,000	1,50,000	1,60,000
Ordering cost	**27,200** (800 x 34)	**25,600** (800 x 32)	**11,200** (800 x 14)
Delivery cost	**77,000** (700 x 110)	**44,800** (700 x 64)	**36,400** (700 x 52)
Shelf stocking cost	**21,890** (199 x 110)	**31,840** (199 x 160)	**33,830** (199 x 170)
Overhead Cost (B)	1,26,090	1,02,240	81,430
Total Cost (A + B)	**2,56,090**	**2,52,240**	**2,41,430**

Nov-19. Q2(a) (10 marks)

PQR Ltd. has decided to analyze 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 at ₹ 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 Customer 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 expedited deliveries	0	0	0	0	2

Its five activities and their cost drivers are:

Activity	**Cost Driver Rate**
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:

(i) COMPUTE the customer-level operating income of each of five retail customers by using the Cost Drivers rates

(ii) Examine the results to give your comments on customer 'D' in comparison with customer 'C' and on customer 'E' in comparison with customer 'A'.

Solution:

Working note:

Computation of revenues (at listed price), discount, cost of goods sold and customer level operating activities costs:

Particular	Customers				
	A	B	C	D	E
Cases sold: (a)	9,360	14,200	62,000	38,000	9,800
Revenues (at listed price)(₹): (b) {(a) × ₹ 54)}	5,05,440	7,66,800	33,48,000	20,52,000	5,29,200
Discount (₹): (c) {(a) × Discount per case}	-	8,520 (14,200 cases × ₹ 0.6)	3,10,000 (62,000 cases × ₹ 5)	1,44,400 (38,000 cases × ₹ 3.80)	52,920 (9,800 cases × ₹ 5.40)
Cost of goods sold (₹): (d) {(a) × ₹ 45}	4,21,200	6,39,000	27,90,000	17,10,000	4,41000
Customer level operating activities costs					
Order taking costs (₹): (No.of purchase × ₹ 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 vehicles travel costs (₹) (Kms travelled bydelivery vehicles × ₹ 4 per km.)	3,200	2,880	4,800	6,400	9,600
Product handling costs (₹) {(a) ×₹ 2}	18,720	28,400	1,24,000	76,000	19,600
Cost of expeditingdeliveries (₹) {No. of expedited deliveries × ₹ 100}	-	-	-	-	200
Total cost of customer level operating activities (₹)	29,120	43,080	1,44,400	93,600	43,200

(i) Computation of Customer level operating income

Particular	Customers				
	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)
Revenues (At list price) (Refer to working note)	5,05,440	7,66,800	33,48,000	20,52,000	5,29,200
Less: Discount (Refer to working note)	-	8,520	3,10,000	1,44,400	52,920
Revenue (At actual price)	5,05,440	7,58,280	30,38,000	19,07,600	4,76,280
Less: Cost of goodssold (Refer to working note)	4,21,200	6,39,000	27,90,000	17,10,000	4,41000
Gross margin	84,240	1,19280	2,48,000	1,97,600	35,280
Less: Customer level operating activities costs (Refer to working note)	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)

(ii) Comments

Customer D in comparison with 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 in comparison with 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.

May-19. Q3(b) (10 marks)

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:

	Equipment	
	A	**B**
Budgeted Production Volume	3,200 units	3,850 units
Direct Material Cost	₹ 350 per unit	₹ 400 per unit
Direct Labour Cost A: 3 hours @ ₹ 120 per hour B: 4 hours @ ₹ 120 per hour	₹ 360	₹ 480

Overheads of ₹ 15,00,000 can be identified with the following three major activities:

Order Processing:	₹ 3,00,000
Machine Processing:	₹10,00,000
Product Inspection:	₹ 2,00,000

These activities are driven by the number of orders processed, machine hours worked and inspection hours respectively. The data relevant to these activities is as follows:

	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:

(i) Prepare a statement showing the manufacturing cost per unit of each product using the absorption costing method assuming the budgeted manufacturing volume is attained.

(ii) Determine cost driver rates and prepare a statement showing the manufacturing cost per unit of each product using activity based costing, assuming the budgeted manufacturing volume is attained.

(iii) 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.

Solution:

(i) Overheads application base: Direct labour hours

	Equipment	**Equipment**
	A (₹)	**B (₹)**
Direct material cost	350	400
Direct labour cost	360	480
Overheads*	180	240

	890	1120

*Pre-determined rate = Budgeted overheads = ₹15,00,000 = ₹60
Budgeted direct labour hours 25,000 hours

(ii) Estimation of Cost-Driver rate

Activity	Overhead cost (₹)	Cost-driver level	Cost driver rate (₹)
Order processing	3,00,000	600 Orders processed	500
Machine processing	10,00,000	50,000 Machine hours	20
Inspection	2,00,000	15,000 Inspection hours	10
		Equipment A (₹)	Equipment B (₹)
Direct material cost		350	400
Direct labour cost		360	480
Prime Cost(A)		710	880
Overhead Cost			
Order processing 400: 200		2,00,000	1,00,000
Machine processing 22,500: 27,500		4,50,000	5,50,000
Inspection 5,000: 15,000		50,000	1,50,000
Total overhead cost		7,00,000	8,00,000

(Overheads cost per unit for each overhead can also be calculated)

Per unit cost	**A (₹)**	**B (₹)**
7,00,000 /3,200 (B)-A	218.75	
8,00,000/ 3,850 (B)-B		207.79
Unit manufacturing cost (A+B)	928.75	1,087.79

(iii) Calculation of Cost Distortion

	Equipment A (₹)	**Equipment B (₹)**
Unit manufacturing cost–using direct labour hours as an application base	890.00	1,120.00
Unit manufacturing cost-using activity based costing	928.75	1,087.79

Cost distortion	-38.75	32.21

Nov-18. Q3(b) (10 marks)

M/s. HMB Limited is producing a product in 10 batches each of 15000 units in a year and incurring following overheads their on:

	Amount (₹)
Material procurement	22,50,000
Maintenance	17,30,000
Set-up	6,84,500
Quality control	5,14,800

The prime costs for the year amounted to ₹ 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	1500
Maintenance hours	9080
No. of set-ups	2250
No. of inspections	2710

The company has produced a batch of 15000 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:

Materials orders	48 orders
Maintenance hours	810 hours
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.

Solution:

Working Note:

Overhead absorption rate = 51,79,300 x 100 = 17.18%

3,01,39,000

(i) Cost of Product Under Absorption Costing

Item of Cost	Amount (₹)
Material	26,38,700
Wages	3,75,200
Prime Cost	30,13,900
Overheads: 51,79,300 ×30,13,900 3,01,39,000	5,17,930
Total Cost	35,31,830
Units	15,000
Cost per unit	235.46

(ii) Cost driver rate, total cost and cost per unit on the basis of activity-based costing method Absorption Costing

Calculation of Cost Driver rate:

Activity	₹.	Activity Volume	Cost Driver Rate
Material Procurement	22,50,000	1500	1500
Maintenance	17,30,000	9080	190.53
Setup	6,84,500	2250	304.22
Quality Control	5,14,800	2710	189.96

Calculation of total Cost and cost per unit:

Item of Cost	Amount (₹)
Material	26,38,700
Wages	3,75,200
Prime Cost	30,13,900
Material Purchase (22,50,000 x 48) /1,500	72,000
Maintenance (17,30,000 x 810) / 9,080	1,54,328
Setup (6,84,500 x 40) / 2,250	12,169
Quality Control (5,14,800 x 25) / 2,710	4,749
Total Cost	32,57,146
Unit	15,000

Cost per unit	217.14

May-18. Q4(a) (10 marks)

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 costs	5,79,988
Purchase related costs	5,04,992

Calculate the overhead cost per unit of each Product - Gel Pen and Ball Pen on the basis of:

(i) Traditional method of charging overheads

(ii) Activity based costing method and

(iii) Find out the difference in cost per unit between both the methods.

Solution:

(i) Statement Showing Overhead Cost per unit "Traditional Method"

	Gel Pen (₹)	Ball Pen (₹)
Units	5,500	24,000
Overheads (₹) (Refer to W.N.)	4,80,000 (20 x 24,000 hrs.)	10,80,000 (20 x 54,000 hrs.)
Overhead Rate per unit (₹)	87.27 (₹ 4,80,000 / 5,500 units)	45 (₹ 10,80,000 /24,000 units)

Working Notes:

Overhead Rate per Machine Hour

$$= \frac{\text{Total overhead incurred by a company}}{\text{Total machine hours}}$$

$$= \frac{₹4,75,020 + 5,79,988 + 5,04,992}{} = ₹15,60,000$$

24,000 hours + 54,000 hours 78,000 hours

= ₹20 per machine hour

(ii) Statement Showing "Activity Based Overhead Cost"

Activity Cost Pool	Cost Driver	Ratio	Total Amount (₹)	Gel Pen (₹)	Ball Pen (₹)
Volume Related Activity Costs	Machine hours	24:54	4,75,020	1,46,160	3,28,860
Setup Related Costs	No. of Setups	30:56	5,79,988	2,02,321	3,77,667
Purchase Related Costs	No. of Purchase Orders	240:448	5,04,992	1,76,160	3,28,832
Total Cost				5,24,641	10,35,359
Output (units)				5,500	24,000
Unit Cost (Overheads)				95.39	43.13

(iii)

	Gel Pen (₹)	Ball Pen (₹)
Overheads Cost per unit (₹) (Traditional Method)	87.27	45
Overheads Cost per unit (₹) (ABC)	95.39	43.13
Difference *per unit*	-8.12	+1.87

(Volume related activity cost, set up related costs and purchase related cost can also be calculated under Activity Base Costing using Cost driver rate. However, there will be no changes in the final answer.)

July-21. Q3(b) (10 marks)

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	No. of Production runs	600 Production runs	1,80,000
Quality Inspections	No. of Inspection	8000 Inspections	2,40,000

The consumption of activities during the period is as under:

Activity / Products	P	Q	R

Direct Labour hours	10,000	8,000	6,000
Production runs	200	180	160
Quality Inspection	3,000	2,500	1,500

You are required to:

(i) Compute the costs allocated to each Product from each Activity.

(ii) Calculate the cost of unused capacity for each Activity.

(iv) A potential customer has approached the company for supply of 12,000 units of a new product. 'S' to be delivered in lots of 1500 units per quarter. This will involve an initial design cost of ₹ 30,000 and per quarter production will involve the following:

Direct Material Direct Labour hours	₹ 18,000 1,500 hours
No. of Production runs	15
No. of Quality Inspection	250

Prepare cost sheet segregating Direct and Indirect costs and compute the Sales value per quarter of product 'S' using ABC system considering a markup of 20% on cost.

Solution:

(i) Statement of cost allocation to each product from each activity

	Product			
	P (₹)	**Q (₹)**	**R (₹)**	**Total (₹)**
Direct Labour hours (Refer to working note)	1,00,000 (10,000 Labour hours × ₹10)	80,000 (8,000 Labour hours × ₹10)	60,000 (6,000 Labour hours × ₹10)	2,40,000
Production runs (Refer toworking note)	60,000 (200 Productionruns × ₹300)	54,000 (180 Productionruns × ₹300)	48,000 (160 Productionruns × ₹300)	1,62,000

Quality Inspections (Refer to working note)	90,000 (3,000 Inspections × ₹30)	75,000 (2,500 Inspections × ₹30)	45,000 (1,500 Inspections × ₹30)	2,10,000

Working note:

Rate per unit of cost driver

Direct Labour hours	(₹ 3,00,000/30,000 Labour hours)	₹10 per Labour hour
Production runs	(₹ 1,80,000/600 Production runs)	₹300 per Production run
Quality Inspection	(₹ 2,40,000/8,000 Inspections)	₹30 per Inspection

(ii) Computation of cost of unused capacity for each activity

Particulars	**(₹)**
Direct Labour hours [(₹3,00,000 – ₹2,40,000) or (6,000 x ₹10)]	60,000
Production runs [(₹1,80,000 – ₹1,62,000) or (60 x ₹300)]	18,000
Quality Inspection [(₹2,40,000 – ₹2,10,000) or (1,000 x ₹30)]	30,000
Total cost of unused capacity	**1,08,000**

(iii) Cost sheet and Computation of Sales value per quarter of product 'S' using ABC System

Particulars	**(₹)**
1500 units of product 'S' to be delivered per quarter	
Initial design cost per quarter (₹30,000 / 8 quarters)	3,750
Direct Material Cost	18,000
Direct Labour Cost (1,500 Labour hours x ₹10)	15,000
Direct Costs (A)	**36,750**
Set up Cost (15 Production runs × ₹300)	4,500
Inspection Cost (250 Inspections × ₹30)	7,500
Indirect Costs (B)	**12,000**
Total Cost (A + B)	48,750
Add: Mark-up (20% on cost)	**9,750**
Sale Value	**58,500**
Selling Price per unit 'S' (₹58,500/1500 units)	**39**

May-22. Q5(a) (10 marks)

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:

Product	Labour Hrs.per unit	Machine Hrs. per unit	Materials perUnit[1]	Volume inUnits
AX	1.00	2.00	35	7,500
BX	0.90	1.50	25	12,500
CX	1.50	2.50	45	25,000

[1] Material cost per unit

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:

Particulars	%
Cost relating to set-ups	40
Cost relating to machinery	10
Cost relating to material handling	30
Costs relating to inspection	20
Total production overhead	100

The following activity volumes are associated with the product line for the period as a whole. Total activities for the period:

Product	No. of set-ups	No. of movements of Materials	No. of inspections
AX	350	200	200
BX	450	280	400
CX	740	675	900
Total	1,540	1,155	1,500

Required:

(i) Calculate the cost per unit for each product using the conventional method.

(ii) Calculate the cost per unit for each product using activity based costing method.

Solution:

(i) Statement showing "Cost per unit" using "conventional method"

Particulars of Costs	AX (₹)	BX (₹)	CX (₹)
Direct Materials	35	25	45
Direct Labour	20	18	30
Production Overheads	60	45	75

Cost *per unit*	**115**	**88**	**150**

(ii) Statement Showing "Cost per unit using "Activity Based Costing"

Products	AX	BX	CX
Production (units)	7,500	12,500	25,000
	(₹)	**(₹)**	**(₹)**
Direct Materials	2,62,500	3,12,500	11,25,000
Direct Labour	1,50,000	2,25,000	7,50,000
Machine Related Costs	**45,000**	**56,250**	**1,87,500**

Products	AX	BX	CX
Setup Costs	**2,62,500**	**3,37,500**	**5,55,000**
Material handling Cost	**1,50,000**	**2,10,000**	**5,06,250**
Inspection Costs	**77,000**	**1,54,000**	**3,46,500**
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:

Calculation of Total Machine hours

Particulars	AX	BX	CX
(A) Machine hours per unit	2	1.5	2.5
(B) Production (units)	7,500	12,500	25,000
(C) Total Machine hours (A× B)	15,000	18,750	62,500

Total Machine hours = 96,250

Total Production overheads = 96,250 × 30 = ₹ 28,87,500

Calculation of Cost Driver Rate

Cost Pool	%	Overheads (₹)	Cost Driver (Basis)	Cost Driver (Units)	Cost DriverRate (₹)
Set up	40	11,55,000	No of set ups	1,540	750 per set up
Machine Operation	10	2,88,750	Machine hours	96,250	3 per machine hour
Material Handling	30	8,66,250	No of material movement	1,155	750 per material movement

Inspection	20	5,77,500	No of inspection	1,500	385 per inspection

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

A company manufactures three products namely A, B and C in a factory. The following cost data for the month of March, 20X8 are as under:

Activity	A	B	C
Unit produced	10,000	15,000	20,000
Direct labour hour per unit	3	4.5	4
Machine hour per unit	6	4	5
Set-up of machines	20	25	30
Number of orders	15	12	10
Machine operating cost (₹)	34,50,000		
Machine set-up cost (₹)	4,36,000		
Order processing cost (₹)	2,56,000		

Required:

(i) IDENTIFY Cost pool, Cost drivers.
(ii) CALCULATE cost driver rate.
(iii) CALCULATE overheads rate per unit using activity- based costing method.

Solution:

(i) Identification of Cost pools and cost drivers:

Cost Pools	Cost Drivers
Machine operating cost	No. of machine hours
Machine set-up cost	No. of machine set-ups
Order processing cost	No. of orders

(ii) Calculation of cost driver rate:

Cost Pools	Cost (₹)	Cost Drivers	Rate per cost driver (₹)
Machine operating cost	34,50,000	2,20,000 machine hours {(10,000×6)+(15,000×4)+(20,000×5)}	15.68

Machine set-up cost	4,36,000	75 set-ups (20+25+30)	5,813.33
Order processing cost	2,56,000	37 orders (15+12+10)	6,918.92

(iii) Calculation of overhead rate per unit using ABC:

Activity	Cost driver rate (₹)	Products					
		A		B		C	
		Total Cost	Rate per unit		Rate per unit		Rate per unit
	(i)	(ii) = (i)×Cost driver	(iii) ÷ units	(ii) = (i)×Cost driver	(iii) ÷ units	(ii) = (i)×Cost driver	(iii) ÷ units
Machine operating cost	15.68	9,40,800 (15.68×60000)	94.08	9,40,800 (15.68×60000)	62.72	15,68,000 (15.68×1,00000)	78.40
Machine set-up cost	5,813.33	1,16,267 (5,813.33×20)	11.63	1,45,333 (5,813.33×25)	9.69	1,74,400 (5,813.33×30)	8.72
Order processing cost	6,918.92	1,03,784 (6,918.92×15)	10.38	83,027 (6,918.92×12)	5.54	69,189 (6,918.92×10)	3.46

Question-2

CDE Ltd. is following Activity based costing. Budgeted overheads, cost drivers and volume are as follows:

Cost pool	Budgeted overheads (₹)	Cost driver	Budgeted volume
Material Procurement	18,42,000	No. or orders	1,200
Material handling	8,50,000	No. of movement	1,240
Maintenance	24,56,000	Maintenance hours	17,550

Set-up	9,12,000	No. of set-ups	1,450
Quality control	4,42,000	No. of inspection	1,820

The company has produced a batch of 7,600 units, its material cost was ₹24,62,000 and wages ₹4,68,500. Usage activities of the said batch are as follows:

Material orders	56
Material movements	84
Maintenance hours	1,420 hours
Set-ups	60
No. of inspections	18

Required:

(i) CALCULATE cost driver rates.

(ii) CALCULATE the total and unit cost for the batch.

Solution:

(i) Calculation of cost driver rate:

Cost pool	Budgeted overheads (₹)	Cost driver	Cost driver rate (₹)
Material procurement	18,42,000	1,200	1,535.00
Material handling	8,50,000	1,240	685.48
Maintenance	24,56,000	17,550	139.94
Set-up	9,12,000	1,450	628.97
Quality control	4,42,000	1,820	242.86

(ii) Calculation of cost for the batch:

Particulars	Amount (₹)	Amount (₹)

Material cost		24,62,000.00
Wages		4,68,500.00
Overheads:		
- Material procurement (₹1,535×56 orders)	85,960.00	
- Material handling (₹685.48×84 movements)	57,580.32	
- Maintenance (₹139.94×1,420 hours)	1,98,714.80	
- Set-up (₹628.97×60 set-ups)	37,738.20	
- Quality control (₹242.86×18 inspections)	4,371.48	3,84,364.80
Total Cost		33,14,864.80
No. of units		7,600
Cost per units		436.17

Question-3

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	40,00,000
Quality Inspections	Number of Inspections	10,000 Inspections	60,00,000

The company makes three products M, S and T. For the year ended March 31, 20X7, 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:

(i) PREPARE a statement showing cost allocation to each product from each activity.

(ii) CALCULATE the cost of unused capacity for each activity.

(iii) STATE the factors the management considers in choosing a capacity level to compute the budgeted fixed overhead cost rate.

Solution:

(i) Statement of cost allocation to each product from each activity

	Product			
	M (₹)	**S (₹)**	**T (₹)**	**Total (₹)**
Power (Refer to working note)	8,00,000 (10,000 kWh ×₹80)	16,00,000 (20,000 kWh ×₹80)	12,00,000 (15,000 kWh ×₹80)	36,00,000
Quality Inspections (Refer to working note)	21,00,000 (3,500 inspections ×₹600)	15,00,000 (2,500 inspections ×₹600)	18,00,000 (3,000 inspections ×₹600)	54,00,000

Working Note:

Rate per unit of cost driver:

Power :(₹40,00,000 ÷ 50,000 kWh) = ₹80/kWh

Quality Inspection :(₹60,00,000 ÷ 10,000 inspections) = ₹600 per inspection

(i) Calculation of cost of unused capacity for each activity:

	(₹)
Power (₹40,00,000 – ₹36,00,000)	4,00,000
Quality Inspections (₹60,00,000 – ₹54,00,000)	6,00,000
Total cost of unused capacity	10,00,000

(ii) 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 for any capacity level.

Question-4

Linex Limited manufactures three products P, Q and R which are similar in nature and are usually produced in production runs of 100 units. Product P and R require both machine hours and assembly hours, whereas product Q requires only machine hours. The overheads incurred by the company during the first quarter are as under:

Machine Department expenses…….....	18,48,000
Assembly Department expenses…….	6,72,000
Setup costs…….	90,000
Stores receiving cost…….	1,20,000
Order processing and dispatch…….	1,80,000
Inspect and Quality control cost…….	36,000

The date related to the three products during the period are as under:

	P	Q	R
Units produced and sold	15,000	12,000	18,000
Machine hours worked	30,000 hrs.	48,000 hrs.	54,000 hrs.
Assembly hours worked (direct labour hours)	15,000 hrs.	-	27,000 hrs.
Customers orders executed (in numbers)	1,250	1,000	1,500
Number of requisitions raised on the stores	40	30	50

Required

Prepare a statement showing details of overhead costs allocated to each product type using activity based costing.

Solution:

Calculation of "Activity Rate"

Cost Pool	Cost (₹) [A]	Cost Driver [B]	Cost Driver Rate (₹) [C] = [A]÷[B]
Machine Department Expenses	18,48,000	Machine Hours (1,32,000 hrs.)	14.00
Assembly Department Expenses	6,72,000	Assembly Hours (42,000 hrs.)	16.00
Setup Cost	90,000	No. of Production Runs (450*)	200.00
Stores Receiving Cost	1,20,000	No. of Requisitions Raised on the Stores (120)	1,000.00
Order Processing and Dispatch	1,80,000	No. of Customers Orders Executed (3,750)	48.00

Inspection and Quality Control Cost	36,000	No. of Production Runs (450*)	80.00
Total (₹)	29,46,000		

*Number of Production Run is 450 (150 + 120 + 180)

Statement Showing "Overheads Allocation"

Particulars of Cost	Cost Driver	P	Q	R	Total
Machine Department Expenses	Machine Hours	4,20,000 (30,000 × ₹14)	6,72,000 (48,000 × ₹14)	7,56,000 (54,000 × ₹14)	18,48,000
Assembly Department Expenses	Assembly Hours	2,40,000 (15,000 × ₹16)	---	4,32,000 (27,000 × ₹16)	6,72,000
Setup Cost	No. of Production Runs	30,000 (150 × ₹200)	24,000 (120 × ₹200)	36,000 (180 × ₹200)	90,000
Stores Receiving Cost	No. of Requisitions Raised on the Stores	40,000 (40 × ₹1,000)	30,000 (30 ×₹1,000)	50,000 (50 × ₹1,000)	1,20,000
Order Processing and Dispatch	No. of Customers Orders Executed	60,000 (1,250 × ₹48)	48,000 (1,000 × ₹48)	72,000 (1,500 × ₹48)	1,80,000
Inspection and Quality Control Cost	No. of Production Runs	12,000 (150 × ₹80)	9,600 (120 × ₹80)	14,400 (180 × ₹80)	36,000
Overhead (₹)		8,02,000	7,83,600	13,60,400	29,46,000

Question-5

G-2020 Ltd. is a manufacturer of a range of goods. The cost structure of its different products is as follows:

Particulars	Product A	Product B	Product C	
Direct Materials	50	40	40	₹/u
Direct Labour @ ₹ 10/ hour	30	40	50	₹/u
Production Overheads	30	40	50	₹/u
Total Cost	110	120	140	₹/u
Quantity Produced	10,000	20,000	30,000	Units

G-2020 Ltd. was absorbing overheads on the basis of direct labour hours. A newly appointed management accountant has suggested that the company should introduce ABC system and has identified cost drivers and cost pools as follows:

Activity Cost Pool	Cost Driver	Associated Cost
Stores Receiving	Purchase Requisitions	2,96,000
Inspection	Number of Production Runs	8,94,000
Dispatch	Orders Executed	2,10,000
Machine Setup	Number of Setups	12,00,000

The following information is also supplied:

Details	Product A	Product B	Product C
No. of Setups	360	390	450
No. of Orders Executed	180	270	300
No. of Production Runs	750	1,050	1,200
No. of Purchase Requisitions	300	450	500

Required

Calculate activity based production cost of all the three products.

Solution:

The total production overheads are ₹26,00,000:

Product A: 10,000 × ₹ 30 = ₹ 3,00,000

Product B: 20,000 × ₹ 40 = ₹ 8,00,000

Product C: 30,000 × ₹ 50 = ₹ 15,00,000

On the basis of ABC analysis this amount will be apportioned as follows:

Statement Showing "Activity Based Production Cost"

Activity Cost Pool	Cost Driver	Ratio	Total Amount (₹)	A (₹)	B (₹)	C (₹)
Stores Receiving	Purchase Requisition	6:9:10	2,96,000	71,040	1,06,560	1,18,400
Inspection	Production Runs	5:7:8	8,94,000	2,23,500	3,12,900	3,57,600
Dispatch	Orders Executed	6:9:10	2,10,000	50,400	75,600	84,000
Machine Setups	Setups	12:13:15	12,00,000	3,60,000	3,90,000	4,50,000
Total Activity Cost				7,04,940	8,85,060	10,10,000

Quantity Sold	10,000	20,000	30,000
Unit Cost (Overheads)	70.49	44.25	33.67
Add: Conversion Cost	80	80	90
Total	150.49	124.25	123.67

Question-6

Bank of HK operated for years under the assumption that profitability can be increased by increasing Rupee volumes. But that has not been the case. Cost analysis has revealed the following:

Activity	Activity Cost (₹)	Activity Driver	Activity Capacity
Providing ATM Service	1,00,000	No. of Transactions	2,00,000
Computer Processing	10,00,000	No. of Transactions	25,00,000
Issuing Statements	8,00,000	No. of Statements	5,00,000
Customer Inquiries	3,60,000	Telephone Minutes	6,00,000

The following annual information on three products was also made available:

Activity Driver	Checking Accounts	Personal Loans	Gold Visa
Units of Product	30,000	5,000	10,000
ATM Transactions	1,80,000	0	20,000
Computer Transactions	20,00,000	2,00,000	3,00,000
Number of Statements	3,00,000	50,000	1,50,000
Telephone Minutes	3,50,000	90,000	1,60,000

Required

(i) Calculate rates for each activity.

(ii) Using the rates computed in requirement (i), calculate the cost of each product.

Solution:

Statement Showing "Activity Rate"

Activity	Activity Cost [a] (₹)	Activity Driver	No. of Units of Activity Driver [b]	Activity Rate [a] / [b] (₹)
Providing ATM Service	1,00,000	No. of ATM Transactions	2,00,000	0.50
Computer	10,00,00	No. of Computer	25,00,000	0.40

Processing	0	Transactions		
Issuing Statements	8,00,000	No. of Statements	5,00,000	1.60
Customer Inquiries	3,60,000	Telephone Minutes	6,00,000	0.60

Statement Showing "Cost of Product"

Activity	Checking Accounts (₹)	Personal Loans (₹)	Gold Visa (₹)
Providing ATM Service	90,000 (1,80,000 tr.×₹ 0.50)	---	10,000 (20,000 tr. × ₹ 0.50)
Computer Processing	8,00,000 (20,00,000 tr. × ₹ 0.40)	80,000 (2,00,000 tr. × ₹ 0.40)	1,20,000 (3,00,000 tr. × ₹ 0.40)
Issuing Statements	4,80,000 (3,00,000 st. × ₹ 1.60)	80,000 (50,000 st. × ₹ 1.60)	2,40,000 (1,50,000 st. × ₹ 1.60)
Customer Inquiries	2,10,000 (3,50,000 min. × ₹ 0.60)	54,000 (90,000 min. × ₹ 0.60)	96,000 (1,60,000 min. × ₹ 0.60)
Total Cost [a]	₹ 15,80,000	₹ 2,14,000	₹ 4,66,000
Units of Product [b]	30,000	5,000	10,000
Cost of each Product [a] / [b]	52.67	42.80	46.60

Question-7

The following are Product Alpha's data for next year budget:

Activity	Cost Driver	Cost Driver Volume / Year	Cost Pool (₹)
Purchasing	Purchase orders	1,500	75,000
Setting	Batches produced	2,800	1,12,000
Materials handling	Materials movements	8,000	96,000
Inspection	Batches produced	2,800	70,000
Machining costs	Machine hours	50,000	1,50,000

Purchase orders……..25

Output ..... …..15,000 units

Production batch size ..... …..100 units

Materials movements per batch…..6

Machine hours per unit… 0.1

Required

(i) Calculate the budgeted overhead costs using activity based costing principles.

(ii) Calculate the budgeted overhead costs using absorption costing (absorb overhead using machine hours).

(iii) How can the company reduce the ABC for Product Alpha?

Solution:

(i) 'Budgeted Overhead Costs' using 'Activity Based Costing'

Computation of 'Cost per unit of Cost Driver'

Activity	Cost Driver	Cost Pool [(a)]	Cost Driver Volume / Yr [(b)]	Cost / Unit of Cost Driver [(a) / (b)]
Purchasing	Purchase Orders	₹ 75,000	1,500	₹ 50 per Purchase Order
Setting	Batches Produced	₹ 112,000	2,800	₹ 40 per Batch
Materials Handling	Material Movements	₹ 96,000	8,000	₹ 12 per Movement
Inspection	Batches Produced	₹ 70,000	2,800	₹ 25 per Batch
Machining	Machine Hours	₹ 150,000	50,000	₹ 3 per Machine Hour

Computation of the **'Volume of Cost Drivers'** consumed by 'Product Alpha' Purchase Orders (given) = 25

Batches (15,000 / 100) = 150

Materials Movement (150 batches × 6) = 900

Machine Hours (15,000 units × 0.1) = 1,500

Computation of the 'Overheads Cost' for 'Product Alpha'

Activity	Cost Driver	Costing Rate / Cost Driver Unit (₹)	Overhead Cost (₹)
Purchasing	Purchase Orders	50	₹1,250 (25 Order × ₹50)
Setting	Batches Produced	40	₹6,000 (150 Batches × ₹ 40)
Material Handling	Material Movements	12	₹10,800 (900 Movement × ₹12)

Inspection	Batches Produced	25	₹ 3,750 (150 Batches × ₹ 25)
Machining	Machine Hours	3	₹ 4,500 (1,500 Hours × ₹ 3)
Total			₹ 26,300

(ii) 'Budgeted Overheads Costs' using 'Absorption Costing'

Budgeted Overheads = ₹ 503,000

(₹ 75,000 + ₹ 96,000 + ₹ 112,000 + ₹ 70,000 + ₹ 150,000)

Budgeted Absorption Cost per Machine Hour = ₹10.06

(₹503,000 / 50,000 Hours)

Budgeted Machining Hours for Product Alpha = 1,500 hrs.

Budgeted Absorbed Overhead (1,500 hrs. × ₹ 10.06) = ₹15,090

(iii) Ways in which the company can reduce the ABC for 'Product Alpha'

- Reduce the number of batches by increasing the batch size which will then reduce the setting up overhead, materials handling and inspection costs.
- Reduce the number of purchase orders.
- Innovate ways of speeding up production so that the machining hours are reduced.

Question-8 (RTP Q4- May 21)

The following budgeted information relates to N Ltd. for the year 2021:

	Products		
	X	**Y**	**Z**
Production and Sales (units)	1,00,000	80,000	60,000
	(₹)	**(₹)**	**(₹)**
Selling price per unit	90	180	140
Direct cost per unit	50	90	95
	Hours	**Hours**	**Hours**
Machine department (machine hours per unit)	3	4	5
Assembly department (direct labour hours per unit)	6	4	3

The estimated overhead expenses for the year 2021 will be as below: Machine Department ₹ 73,60,000

Assembly Department ₹ 55,00,000

Overhead expenses are apportioned to the products on the following basis:

Machine Department On the basis of machine hours

Assembly Department On the basis of labour hours

After a detailed study of the activities the following cost pools and their respective cost drivers are found:

Cost Pool	Amount (₹)	Cost Driver	Quantity
Machining services	64,40,000	Machine hours	9,20,000 hours
Assembly services	44,00,000	Direct labour hours	11,00,000 hours
Set-up costs	9,00,000	Machine set-ups	9,000 set-ups
Order processing	7,20,000	Customer orders	7,200 orders
Purchasing	4,00,000	Purchase orders	800 orders

As per an estimate the activities will be used by the three products:

	Products		
	X	Y	Z
Machine set-ups	4,500	3,000	1,500
Customer orders	2,200	2,400	2,600
Purchase orders	300	350	150

You are required to PREPARE a product-wise profit statement using:

(i) Absorption costing method;
(ii) Activity-based method.

Solution:

(i) Profit Statement using Absorption costing method:

	Particulars	Product			Total
		X	Y	Z	
A.	Sales Quantity	1,00,000	80,000	60,000	2,40,000
B.	Selling price per unit (₹)	90	180	140	
C.	Sales Value (₹) [A×B]	90,00,000	1,44,00,000	84,00,000	3,18,00,000
D.	Direct cost per unit (₹)	50	90	95	
E.	Direct Cost (₹) [A×D]	50,00,000	72,00,000	57,00,000	1,79,00,000
F.	Overheads:				
(i)	Machine department (₹) (Working note-1)	24,00,000	25,60,000	24,00,000	73,60,000
(ii)	Assembly department (₹) (Working note-1)	30,00,000	16,00,000	9,00,000	55,00,000
G.	Total Cost (₹) [E+F]	1,04,00,000	1,13,60,000	90,00,000	3,07,60,000
H.	Profit (C-G)	(14,00,000)	30,40,000	(6,00,000)	10,40,000

(ii) Profit Statement using Activity based costing (ABC) method:

	Particulars	Product			Total
		X	Y	Z	
A.	Sales Quantity	1,00,000	80,000	60,000	
B.	Selling price per unit(₹)	90	180	140	
C.	Sales Value (₹) [A×B]	90,00,000	1,44,00,000	84,00,000	3,18,00,000
D.	Direct cost per unit (₹)	50	90	95	
E.	Direct Cost (₹) [A×D]	50,00,000	72,00,000	57,00,000	1,79,00,000
F.	Overheads: (Refer working note-3)				
(i)	Machining services (₹)	21,00,000	22,40,000	21,00,000	64,40,000
(ii)	Assembly services (₹)	24,00,000	12,80,000	7,20,000	44,00,000
(iii)	Set-up costs (₹)	4,50,000	3,00,000	1,50,000	9,00,000
(iv)	Order processing (₹)	2,20,000	2,40,000	2,60,000	7,20,000
(v)	Purchasing (₹)	1,50,000	1,75,000	75,000	4,00,000
G.	Total Cost (₹) [E+F]	1,03,20,000	1,14,35,000	90,05,000	3,07,60,000
H.	Profit (₹) (C-G)	(13,20,000)	29,65,000	(6,05,000)	10,40,000

Working Notes:

1.

		Products			
		X	Y	Z	Total
A.	Production (units)	1,00,000	80,000	60,000	
B.	Machine hours per unit	3	4	5	
C.	Total Machine hours [A×B]	3,00,000	3,20,000	3,00,000	**9,20,000**
D.	Rate per hour (₹)	8	8	8	
E.	Machine Dept. cost [C×D]	24,00,000	25,60,000	24,00,000	**73,60,000**
F.	Labour hours per unit	6	4	3	
G.	Total labour hours [A×F]	6,00,000	3,20,000	1,80,000	**11,00,000**
H.	Rate per hour (₹)	5	5	5	

I	Assembly Dept. cost [G×H]	30,00,000	16,00,000	9,00,000	**55,00,000**

Machine hour rate = ₹73,60,000 / 9,20,000 Hours = ₹8

Labour hour rate = ₹55,00,000 / 11,00,000 Hours = ₹5

2. Calculation of cost driver rate

Cost Pool	Amount (₹)	Cost Driver	Quantity	Driver rate (₹)
Machining services	64,40,000	Machine hours	9,20,000 hours	7.00
Assembly services	44,00,000	Direct labour hours	11,00,000 hours	4.00
Set-up costs	9,00,000	Machine set-ups	9,000 set-ups	100.00
Order processing	7,20,000	Customer orders	7,200 orders	100.00
Purchasing	4,00,000	Purchase orders	800 orders	500.00

3. Calculation of activity-wise cost

		Products			
		X	Y	Z	Total
A.	Machining hours (Refer Working note-1)	3,00,000	3,20,000	3,00,000	9,20,000
B.	Machine hour rate (₹) (Refer Working note-2)	7	7	7	
C.	Machining servicescost (₹) [A×B]	21,00,000	22,40,000	21,00,000	64,40,000
D.	Labour hours (Refer Working note-1)	6,00,000	3,20,000	1,80,000	11,00,000
E.	Labour hour rate (₹) (Refer Working note-2)	4	4	4	
F.	Assembly services cost (₹) [D×E]	24,00,000	12,80,000	7,20,000	44,00,000
G.	Machine set-ups	4,500	3,000	1,500	9,000

H.	Rate per set-up (₹) (Refer Working note-2)	100	100	100	
I.	Set-up cost (₹) [G×H]	4,50,000	3,00,000	1,50,000	9,00,000
J.	Customer orders	2,200	2,400	2,600	7,200
K.	Rate per order (₹) (Refer Working note-2)	100	100	100	
L.	Order processing cost (₹) [J×K]	2,20,000	2,40,000	2,60,000	7,20,000
M.	Purchase orders	300	350	150	800
N.	Rate per order (₹) (Refer Working note-2)	500	500	500	
O.	Purchasing cost (₹) [M×N]	1,50,000	1,75,000	75,000	4,00,000

Chapter 5: Cost Sheet

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 1

The following data relates to the manufacture of a standard product during the month of April, 20X8:

Raw materials	₹ 1,80,000
Direct wages	₹ 90,000
Machine hours worked (hours)	10,000
Machine hour rate (per hour)	₹ 8
Administration overheads	35,000
Selling overheads (per unit)	5
Units produced	4,000
Units sold	3,600
Selling price per unit	125

You are required to PREPARE a cost sheet in respect of the above showing:

(i) Cost per unit

(ii) Profit for the month

Hints: (i) ₹101.25, (ii) ₹82,000

ILLUSTRATION 2

The following information has been obtained from the records of ABC Corporation for the period from June 1 to June 30, 20X8.

	On June 1, 20X8 (₹)	*On June 30, 20X8 (₹)*
Cost of raw materials	60,000	50,000
Cost of work-in-process	12,000	15,000
Cost of stock of finished goods	90,000	1,10,000
Purchase of raw materials during June' 20X8		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) Raw materials consumed;
(b) Prime cost;
(c) Factory cost;
(d) Cost of goods sold; and
(e) Net profit.

Hints: (a) ₹4,90,000, (b) ₹7,30,000, (c) ₹8,27,000, (d) ₹8,57,000, (e) ₹1,18,000

ILLUSTRATION 3

Arnav Inspat Udyog Ltd. has the following expenditures for the year ended 31st March, 2021:

Sl. No.		Amount (₹)	Amount (₹)
(i)	Raw materials purchased		10,00,00,000
(ii)	GST paid on the above purchases @18% (eligible for input tax credit)		1,80,00,000
(iii)	Freight inwards		11,20,600
(iv)	Wages paid to factory workers		29,20,000
(v)	Contribution made towards employees' PF & ESIS		3,60,000
(vi)	Production bonus paid to factory workers		2,90,000
(vii)	Royalty paid for production		1,72,600
(viii)	Amount paid for power & fuel		4,62,000
(ix)	Amount paid for purchase of moulds and patterns (life is equivalent to two years production)		8,96,000
(x)	Job charges paid to job workers		8,12,000
(xi)	Stores and spares consumed		1,12,000
(xii)	Depreciation on:		
	Factory building	84,000	
	Office building	56,000	
	Plant & Machinery	1,26,000	
	Delivery vehicles	86,000	3,52,000
(xiii)	Salary paid to supervisors		1,26,000
(xiv)	Repairs & Maintenance paid for:		
	Plant & Machinery	48,000	
	Sales office building	18,000	
	Vehicles used by directors	19,600	85,600
(xv)	Insurance premium paid for:		
	Plant & Machinery	31,200	
	Factory building	18,100	
	Stock of raw materials & WIP	36,000	85,300

(xvi)	Expenses paid for quality control check activities		19,600
(xvii)	Salary paid to quality control staffs		96,200
(xviii)	Research & development cost paid for improvement in production process		18,200
(xix)	Expenses paid for pollution control and engineering & maintenance		26,600
(xx)	Expenses paid for administration of factory work		1,18,600
(xxi)	Salary paid to functional mangers:		
	Production control	9,60,000	
	Finance & Accounts	9,18,000	
	Sales & Marketing	10,12,000	28,90,000
(xxii)	Salary paid to General Manager		12,56,000
(xxiii)	Packing cost paid for:		
	Primary packing necessary to maintain quality	96,000	
	For re-distribution of finished goods	1,12,000	2,08,000
(xxiv)	Wages of employees engaged indistribution of goods		7,20,000
(xxv)	Fee paid to auditors		1,80,000
(xxvi)	Fee paid to legal advisors		1,20,000
(xxvii)	Fee paid to independent directors		2,20,000
(xxviii)	Performance bonus paid to sales staffs		1,80,000
(xxix)	Value of stock as on 1st April, 2020:		
	Raw materials	18,00,000	
	Work-in-process	9,20,000	
	Finished goods	11,00,000	38,20,000
(xxx)	Value of stock as on 31st March, 2021:		
	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 required to PREPARE Statement of cost for Arnav Ispat Udyog Ltd. for the year ended 31st March, 2021, showing (i) Prime cost, (ii) Factory cost, (iii) Cost of Production, (iv) Cost of goods sold and (v) Cost of sales.

Hints: (i) ₹10,74,25,200 (ii) ₹10,80,83,100 (iii) ₹ 10,93,05,700 (iv) ₹10,86,05,700 (v) ₹11,35,03,300

TEST YOUR KNOWLEDGE

Question-1

The books of Adarsh Manufacturing Company present the following data for the month of April, 20X9:

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 Material	8,000	10,600
Work in progress	10,500	14,500
Finished goods	17,600	19,000

Other data are :

	(₹)
Selling expenses	3,500
General and administrative expenses	2,500
Sales for the month	75,000

You are required to:

(i) COMPUTE the value of materials purchased.

(ii) PREPARE a cost statement showing the various elements of cost and also the profit earned.

Hints: (i) Material Purchased = ₹36,500, (ii) Profit earned = ₹13,000

Question-2

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 sell 100% of its output at ₹5,000 per unit provided it can uncured the following further expenditures:

1. It give gifts items costing ₹30 per unit of sale.
2. It has lucky draw every month giving the first prize of ₹50,000; 2nd prize of ₹25,000; 3rd prize of ₹10,000 and three consolation of prizes of ₹5,000 each to customers buying the product.
3. it spends ₹ 1,00,000 on refreshments serve every month to its customers.
4. 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.

Hints:

Capacity	30%	100%
Profit (₹)	38,00,000	1,04,00,000

Note: Customer's prize cost = ₹1,00,000

Question-3

From the following particulars, you are required to PREPARE monthly cost sheet of Aditya Industries:

	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

Hints:

Particulars	Amount (₹)	Cost per unit (₹)
Prime Cost	1,80,09,600	92.83
Cost of Production	1,83,78,400	94.73
Cost of Goods Sold	1,51,70,280	94.81
Cost of Sales	1,85,89,280	116.18

Question-4

The following figures are extracted from the Trial Balance of Go-getter Co. on 30th September, 20X8.

	Dr. (₹)	Cr. (₹)
Inventories:		
Finshed Stock	80,000	
Raw Materials	1,40,000	
Work-in-Process	2,00,000	
Office Appliances	17,400	
Plant & Machinery	4,60,500	
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 Deptt.—Salaries and Expenses	18,000	
Office Salary and Expenses	8,600	
Interest on Borrowed funds	2,000	

Further details are available as follows:

1. Closing inventories

Finished goods	1,15,000
Raw Material	1,80,000
Work-in-progess	1,92,000

2. Accrued Expenses on:

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

3. Depreciation to be provided on:

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

4. 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 Go-getter Co. for the year ended 30th September, 20X8 along with supporting schedules of:
   (i) Cost of Sales.
   (ii) Selling and Distribution Expenses.
   (iii) Administration Expenses.

   Hints: Cost of sales = ₹7,14,020, Net Profit = ₹35,980

B. PAST YEAR QUESTION

May 23 Q3(b) 10 marks

The following information is available from SN Manufacturing Limited's for the month of April 2023.

	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*
Purchases 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)		*₹ 6920*
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 is completed in one month.

Required:

(i) 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 of sales).

(ii) Calculate the selling price per unit if profit is charged at 20 percent on sales.

Solution:

Cost Sheet for the month of April 2023

Particulars	Amount (₹)	Amount (₹)
Raw materials consumed: Raw materials purchased	6,95,000	
Add: Carriage inward	36,200	
Add: Value of opening stock of raw materials	42,500	
Less: Value of closing stock of raw materials	(38,600)	7,35,100
Direct wages paid		3,22,800
Royalty paid for production		35,800

Amortised cost of special designs, moulds and patterns (₹153,600 ÷ 12)		12,800
Power, fuel and haulage (factory)*		70,600
Prime Cost*		11,77,100
Salary and wages of supervisor and foremen		28,000
Gross Works Cost		12,05,100
Add: Opening stock of WIP		42,500
Less: Closing stock of WIP		(42,800)
Factory/ Works Cost		12,04,800
Research and development cost	31,680	
Primary packing cost	6,920	38,600
Cost of Production		12,43,400
Add: Opening stock of finished goods (₹ 8.05 × 2,500 units)		20,125
Less: Value of closing stock [(2,500+152,000 -1,52,600) × (12,43,400÷152000)		(15,542)
Cost of Goods Sold		12,47,983
Add: Administrative overheads		46,765
Add: Selling and distribution expenses (₹ 0.20 × 1,52,600)		30,520
Cost of Sales		13,25,268
Add: Profit (20% on Sales or 25% on cost of sales)		3,31,317
Sales value		16,56,585
Selling price per unit (₹ 16,56,585 ÷ 1,52,600 units)		10.86

*May be taken as part of Factory / Works cost, however Total Factory Cost will remain the same. If taken as part of factory cost then prime cost will be ₹ 11,06,500.

Alternative Solution (Based on work-in-progress figure of ₹ 45,500 as on 1st April 2023 as per Hindi part of Question paper)

Particulars	**Amount (₹)**	**Amount (₹)**
Raw materials consumed:		
Raw materials purchased	6,95,000	

Add: Carriage inward	36,200	
Add: Value of opening stock of raw materials	42,500	
Less: Value of closing stock of raw materials	(38,600)	7,35,100
Direct wages paid		3,22,800
Royalty paid for production		35,800
Amortised cost of special designs, moulds and patterns(₹153,600 ÷ 12)		12,800
Power, fuel and haulage (factory)*		70,600
Prime Cost		**11,77,100**
Salary and wages of supervisor and foremen		28,000
Gross Works Cost		12,05,100
Add: Opening stock of WIP		45,500
Less: Closing stock of WIP		(42,800)
Factory/ Works Cost		**12,07,800**
Research and development cost	31,680	
Primary packing cost	6,920	38,600
Cost of Production		**12,46,400**
Add: Opening stock of finished goods (₹ 8.05 × 2,500 units)		20,125
Less: Value of closing stock [(2,500+1,52,000 -1,52,600) × (12,46,400÷1,52,000)		(15,580)
Cost of Goods Sold		**12,50,945**
Add: Administrative overheads		46,765
Add: Selling and distribution expenses (₹ 0.20 × 1,52,600)		30,520
Cost of Sales		**13,28,230**
Add: Profit (20% on Sales or 25% on cost of sales)		3,32,058
Sales value		16,60,288
Selling price per unit (₹ 16,60,288 ÷ 1,52,600 units)		**10.88**

*May be taken as part of Factory / Works cost, however Total Factory Cost will remain the same. If taken as part of factory cost then prime cost will be ₹ 11,06,500.

Dec. 21 Q2(a) 10 marks

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.

(1) Leather sheets and cotton clothes are the main inputs and the estimated requirement per bag is two metres of leather sheets and one metre of cott on cloth. 2,000 metre of leather sheets and 1,000 metre of cotton cloths are purchased at ₹ 3,20,000 and ₹ 15,000 respectively. Freight paid on purchases is ₹ 8,500.

(2) Stitching and finishing need 2,000 man hours at ₹ 80 per hour.

(3) Other direct costs of ₹ 10 per labour hour is incurred.

(4) G Ltd. have 4 machines at a total cost of ₹ 22,00,000. Machines have a life of 10 years with a scrap value of 10% of the original cost. Depreciation is charged on a straight-line method.

(5) The monthly cost of administration and sales office staffs are ₹ 45,000 and ₹ 72,000 respectively. G Ltd. pays ₹ 1,20,000 per month as rent for a 2,400 sq. feet factory premises. The administrative and sales office occupies 240 sq. feet and 200 sq. feet

respectively of factory space.

(6) Freight paid on delivery of finished bags is ₹ 18,000.

(7) During the month, 35 kgs of scrap (cuttings of leather and cotton) are sold at ₹ 150 per kg.

(8) There are no opening and closing stocks of input materials. There is a finished stock of 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:

(i) Cost of Raw Material Consumed
(ii) Prime Cost
(iii) Works/Factory Cost
(iv) Cost of Production
(v) Cost of Goods Sold
(vi) Cost of Sales

Solution:

(a) No. of bags manufactured = 1,000 units

Cost sheet for the month of September 2021

	Particulars	**Total Cost (₹)**	**Cost per unit (₹)**
1.	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
	(i) Cost of material consumed	3,43,500	343.50
2.	Direct wages (₹80 × 2,000 hours)	1,60,000	160.00
3.	Direct expenses (₹10 × 2,000 hours)	20,000	20.00
4.	**(ii) Prime Cost**	5,23,500	523.50
5.	Factory Overheads: Depreciation on machines {(₹ 22,00,000 × 90%) ÷ 120 months}	16,500	16.50
	Apportioned cost of factory rent	98,000	98.00
6.	**(iii) Works/ Factory Cost**	6,38,000	638.00
7.	*Less:* Realisable value of cuttings (₹150×35 kg.)	(5,250)	(5.25)
8.	**(iv) Cost of Production**	6,32,750	632.75
9.	*Add:* Opening stock of bags	0	
10.	*Less:* Closing stock of bags (100 bags × ₹632.75)	(63,275)	
11.	**(v) Cost of Goods Sold**	5,69,475	632.75
12.	*Add:* Administrative Overheads:		
	- Staff salary	45,000	50.00
	- Apportioned rent for administrative office	12,000	13.33
13.	*Add:* Selling and Distribution Overheads		
	- Staff salary	72,000	80.00
	- Apportioned rent for sales office	10,000	11.11

	- Freight paid on delivery of bags	18,000	20.00
14.	**(vi) Cost of Sales**	7,26,475	807.19

Apportionment of Factory rent:

To factory building {(₹ 1,20,000 ÷ 2400 sq. feet) × 1,960 sq. feet} = ₹ 98,000

To administrative office {(₹ 1,20,000 ÷ 2400 sq. feet) × 240 sq. feet} = ₹ 12,000

To sale office {(₹ 1,20,000 ÷ 2400 sq. feet) × 200 sq. feet} = ₹ 10,000

Jan .21 Q2(b) 10 marks

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 (₹)
Inventory:		
Raw material	20,000	25,000
Work-in-progress	20,000	30,000
Finished goods	50,000	60,000
Other details:		
Selling expenses		22,000
General & Admin. expenses		18,000

You are required to prepare a cost sheet for the month of April 2020 showing:

(i) Prime Cost

(ii) Works Cost

(iii) Cost of Production

(iv) Cost of Goods sold

(v) Cost of Sales and Profit earned.

Solution:

Cost Sheet for the Month of April 2020

Particulars	**(₹)**
Opening stock of Raw Material	20,000
Add: Purchases [Refer Working Note-2]	1,65,000
Less: Closing stock of Raw Material	(25,000)
Raw material consumed	1,60,000
Add: Direct labour cost	1,20,000

Prime cost	**2,80,000**
Add: Factory overheads	1,00,000
Gross Works cost	**3,80,000**
Add: Opening work-in-progress	20,000
Less: Closing work-in-progress	(30,000)
Works Cost	**3,70,000**
Cost of Production	**3,70,000**
Add: Opening stock of finished goods	50,000
Less: Closing stock of finished goods	(60,000)
Cost of goods sold	**3,60,000**
Add: General and administration expenses*	18,000
Add: Selling expenses	22,000
Cost of sales	**4,00,000**
Profit {Balancing figure (₹ 5,00,000 – ₹ 4,00,000)}	1,00,000
Sales	5,00,000

*General and administration expenses have been assumed as not relating to the production activity.

Working Note:

1. Computation of the raw material consumed

Particulars	**(₹)**
Cost of Sales	4,00,000
Less: General and administration expenses	(18,000)
Less: Selling expenses	(22,000)
Cost of goods sold	3,60,000
Add: Closing stock of finished goods	60,000
Less: Opening stock of finished goods	(50,000)
Cost of production/Gross works cost	3,70,000
Add: Closing stock of work-in-progress	30,000
Less: Opening stock of work-in-progress	(20,000)
Works cost	3,80,000
Less: Factory overheads $\frac{₹\ 1,20,000}{120} \times 100$	(1,00,000)
Prime cost	2,80,000
Less: Direct labour	(1,20,000)
Raw material consumed	1,60,000

2. Computation of the raw material purchased

Particulars	**(₹)**
Closing stock of Raw Material	25,000
Add: Raw Material consumed	1,60,000
Less: Opening stock of Raw Material	(20,000)
Raw Material purchased	1,65,000

Nov.20 Q2(a) 10 marks

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 Materials	8,00,000
Direct Wages	4,48,000
Production Overhead	1,92,000
Total	14,40,000

It is further ascertained that :

(1) Direct materials cost in Super Pen was twice as much of direct material in Normal Pen.

(2) Direct wages for Normal Pen were 60% of those for Super Pen.

(3) Production overhead per unit was at same rate for both the types.

(4) Administration overhead was 200% of direct labour for each.

(5) Selling cost was ₹ 1 per Super pen.

(6) Production and sales during the year were as follow :

Production		Sales	
	No. of units		No. of units
Super Pen	40,000	Super Pen	36,000
Normal Pen	1,20,000		

(7) 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

Solution:

Preparation of Cost Sheet for Super Pen

No. of units produced = 40,000 units

No. of units sold = 36,000 units

Particulars	**Per unit (₹)**	**Total (₹)**
Direct materials (Working note- (i))	8.00	**3,20,000**
Direct wages (Working note- (ii))	4.00	**1,60,000**
Prime cost	12.00	4,80,000
Production overhead (Working note- (iii))	1.20	**48,000**
Factory Cost	13.20	5,28,000
Administration Overhead* (200% of direct wages)	8.00	**3,20,000**
Cost of production	21.20	8,48,000
Less: Closing stock (40,000 units – 36,000 units)	-	**(84,800)**
Cost of goods sold i.e. 36,000 units	21.20	7,63,200
Selling cost	1.00	**36,000**
Cost of sales/ Total cost	**22.20**	**7,99,200**
Profit	**7.80**	**2,80,800**
Sales value (₹ 30 × 36,000 units)	30.00	**10,80,000**

Working Notes:

(i) Direct material cost per unit of Normal pen = M

Direct material cost per unit of Super pen = 2M

Total Direct Material cost = 2M × 40,000 units + M × 1,20,000 units

Or, ₹ 8,00,000 = 80,000 M + 1,20,000 M

Or, $M = \frac{₹\ 8,00,000}{2,00,000} = ₹\ 4$

Therefore, Direct material Cost per unit of Super pen = 2 × ₹ 4 = ₹ 8

(ii) Direct wages per unit for Super pen = W

Direct wages per unit for Normal Pen = 0.6W

So, (W x 40,000) + (0.6W x 1,20,000) = ₹ 4,48,000

W = ₹ 4 per unit

(iii) Production overhead per unit = ₹1,92,000 / (40,000 + 1,20,000)

= ₹ 1.20

Production overhead for Super pen = ₹ 1.20 × 40,000 units = ₹ 48,000

* Administration 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.

Assumption: It is assumed that in point (1) and (2) of the Question, direct materials cost and direct wages respectively is related to per unit only.

Note: Direct Material and Direct wages can be calculated in alternative ways.

Nov.19 Q3(b) 10 marks

XYZ a manufacturing firm, has revealed following information for Sept, 2019:

	1st Sept. (₹)	30th Sept. (₹)
Raw material	2,42,000	2,92,000
Works in progess	2,00,000	5,00,000

The firm has incurred following expenses for a targeted production of 1,00,000 units during the month:

	(₹)
Consumable stores and spare for factory	3,50,000
Research and development cost for process improvement	2,50,000
Quality control cost	2,00,000
Packing cost (secondary) per unit of goods sold	2
Lease rent for 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 units which is 4% of targeted production, realizes ₹61 per unit.

Closing stock is valued at cost of production (Excluding admin. Exp.).

Cost of goods sold, excluding admin. Exp. Amoutnig to ₹78,26,000.

Direct employees cost is ½ of the cost of material consumed.

Selling price to the output is ₹110 per unit .

You are required to :

1. Calculate the value of material purchase.
2. Prepared cost sheet showing profit earned by the firm.

Solution:

Workings:

1. Calculation of Sales Quantity:

Particular	Units
Production units	1,00,000
Less: Defectives (4%×1,00,000 units)	4,000
Less: Closing stock of finished goods	5,000
No. of units sold	91,000

2. Calculation of Cost of Production

Particular	Amount (₹)
Cost of Goods sold (given)	78,26,000
Add: Value of Closing finished goods ($\frac{₹\ 78,26,000}{91,000\ units} \times 5,000\ units$)	4,30,000
Cost of Production	82,56,000

3. Calculation of Factory Cost

Particular	Amount (₹)
Cost of Production	82,56,000
Less: Quality Control Cost	(2,00,000)
Less: Research and Development Cost	(2,50,000)
Add: Credit for Recoveries/Scrap/By-Products/ misc. income (1,00,000 units × 4% × ₹ 61)	2,44,000
Factory Cost	80,50,000

4. Calculation of Gross Factory Cost

Particular	Amount (₹)
Cost of Factory Cost	80,50,000
Less: Opening Work in Process	(2,00,000)
Add: Closing Work in Process	5,00,000
Cost of Gross Factory Cost	83,50,000

5. Calculation of Prime Cost

Particular	Amount (₹)
Cost of Gross Factory Cost	83,50,000
Less: Consumable stores & spares	(3,50,000)
Less: Lease rental of production assets	(2,00,000)
Prime Cost	78,00,000

6. Calculation of Cost of Materials Consumed & Labour cost
Let Cost of Material Consumed = M and Labour cost = 0.5M
Prime Cost = Cost of Material Consumed + Labour Cost
78,00,000 = M + 0.5M

M = 52,00,000
Therefore, Cost of Material Consumed = ₹ 52,00,000 and
Labour Cost = ₹ 26,00,000

(i) Calculation of Value of Materials Purchased

Particular	Amount (₹)
Cost of Material Consumed	52,00,000
Add: Value of Closing stock	2,92,000
Less: Value of Opening stock	(2,42,000)
Value of Materials Purchased	**52,50,000**

Cost Sheet

Sl.	Particulars	Total Cost (₹)
1.	Direct materials consumed:	
	Opening Stock of Raw Material	2,42,000
	Add: Additions/ Purchases [balancing figure as per requirement (i)]	**52,50,000**
	Less: Closing stock of Raw Material	(2,92,000)
	Material Consumed	**52,00,000**
2.	Direct employee (labour) cost	**26,00,000**
3.	Prime Cost (1+2)	**78,00,000**
4.	Add: Works/ Factory Overheads Consumable stores and spares	**3,50,000**
	Lease rent of production asset	**2,00,000**
5.	Gross Works Cost (3+4)	**83,50,000**
6.	Add: Opening Work in Process	**2,00,000**
7.	Less: Closing Work in Process	**(5,00,000)**
8.	Works/ Factory Cost (5+6-7)	**80,50,000**
9.	Add: Quality Control Cost	**2,00,000**
10.	Add: Research and Development Cost	**2,50,000**
11.	Less: Credit for Recoveries/Scrap/By-Products/misc. income	**(2,44,000)**
12.	Cost of Production (8+9+10-11)	**82,56,000**
13.	Add: Opening stock of finished goods	**-**
14.	Less: Closing stock of finished goods (5000 Units)	**(4,30,000)**
15.	Cost of Goods Sold (12+13-14)	**78,26,000**
16.	Add: Administrative Overheads (General)	**2,24,000**
17.	Add: Secondary packing	**1,82,000**
18.	Add: Selling Overheads& Distribution Overheads	**4,13,000**
19.	Cost of Sales (15+16+17+18)	**86,45,000**
20.	Profit	**13,65,000**
21.	Sales 91,000 units@ ₹ 110 per unit	**1,00,10,000**

May.19 O2(a) 10 marks

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:

(i) Direct Material ₹ 40 per unit

(ii) Direct Labour ₹ 30 per unit (subject to a minimum of ₹ 48,000 p.m.)

(iii) Factory Overheads:

(a) Fixed ₹ 3,60,000 per annum

(b) Variable ₹ 10 per unit

(c) 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.

(iv) Administrative Overheads ₹ 5, 18,400 per annum (fixed)

(v) Selling overheads are incurred at ₹ 8 per unit.

(vi) Each unit of raw material yields scrap which is sold at the rate of ₹ 5 per unit.

(vii) In year 2019, the factory worked at 50% capacity for the first three months but it was expected that it would work at 80% capacity for the remaining nine months.

(viii) During the first three months, the selling price per unit was ₹ 145.

You are Required to:

(i) Prepare a cost sheet showing Prime Cost, Works Cost, Cost of Production and Cost of Sales.

(ii) Calculate the selling price per unit for remaining nine months to achieve the total annual profit of ₹ 8,76,600.

Solution

(i) Cost Sheet of M/s Areeba Pvt. Ltd. for the year 2019.
Normal Capacity: 36,000 units p.a.

Particulars	3 Months 4,500 Units		9 Months 21,600 units	
	Amount (₹)	Cost per unit (₹)	Amount (₹)	Cost per unit (₹)
Direct material	1,80,000		8,64,000	
Less: Scrap	(22,500)		(1,08,000)	
Materials consumed	1,57,500	35	7,56,000	35
Direct Wages	1,44,000	32	6,48,000	30
Prime Cost	**3,01,500**	67	**14,04,000**	65
Factory overheads:				
- Fixed	90,000		2,70,000	
- Variable	45,000		2,16,000	
- Semi variable	27,000	36	1,51,200	29.50
Works Cost	**4,63,500**	103	**20,41,200**	94.50
Add: Administrative overheads	1,29,600	28.80	3,88,800	18
Cost of Production	**5,93,100**	131.80	**24,30,000**	112.5
Selling Overheads	36,000	8	1,72,800	8
Cost of Sales	**6,29,100**	139.80	**26,02,800**	120.5

Working Notes:

1. Calculation of Costs

Particulars	**4,500 units**	**21,600 units**
	Amount (₹)	**Amount (₹)**
Material	1,80,000 (₹ 40 × 4,500 units)	8,64,000 (₹40 × 21,600 units)
Wages	1,44,000 (Max. of ₹ 30 × 4,500 units = ₹1,35,000 and ₹ 48,000 × 3 months = ₹1,44,000)	6,48,000 (21600 Units×30)
Variable Cost	45,000 (₹10 × 4,500 units)	2,16,000 (₹10 × 21,600 units)
Semi-variable Cost	27,000 ($\frac{₹\ 1,08,000}{12\ \text{Months}}$ ×3 Months)	1,51,200[($\frac{₹\ 1,08,000}{12\ \text{Months}}$ ×9 Months)
		+46,800(for 20 % increase) +23,400(for 10% increase)
Selling Overhead	36,000 (₹8 × 4,500 units)	1,72,800(₹ 8 × 21,600 units)

Notes:

1. Alternatively scrap of raw material can also be reduced from Work cost.
2. Administrative overhead may be treated alternatively as a part of general overhead. In that case, Works Cost as well as Cost of Production will be same i.e. ₹ 4,63,500 and Cost of Sales will remain same as ₹ 6,29,100.

(ii) Calculation of Selling price for nine months period

Particulars	**Amount (₹)**
Total Cost of sales ₹ (6,29,100+26,02,800)	32,31,900
Add: Desired profit	8,76,600
Total sales value	41,08,500
Less: Sales value realised in first three months (₹145 × 4,500 units)	(6,52,500)
Sales Value to be realised in next nine months	**34,56,000**
No. of units to be sold in next nine months	21,600
Selling price per unit (₹ 34,56,000 ÷ 21,600 units)	**160**

Nov. 18 Q2(a) 10 Marks

Following details are provided by M/s ZIA Private Limited for the quarter ending 30 September, 2018:

(i)	Direct expenses	₹ 1,80,000
(ii)	Direct wages being 175% of factory overheads	₹ 2,57,250
(iii)	Cost of goods sold	₹ 18,75,000
(iv)	Selling & distribution overheads	₹ 60,000
(v)	Sales	₹ 22,10,000
(vi)	Administration overheads are 10% of factory overheads	

Stock details as per Stock Register:

Particulars	30.06.2018 ₹	30.09.2018 ₹
Raw material	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:

(i) Raw material consumed
(ii) Prime cost
(iii) Factory cost
(iv) Cost of goods sold
(v) Cost of sales and profit

Solution:

Cost Sheet
(for the quarter ending 30 September 2018)

	Amount (₹)
(i) Raw materials consumed	
Opening stock of raw materials	2,45,600
Add: Purchase of materials	12,22,650*
Less: Closing stock of raw materials	(2,08,000)
Raw materials consumed	12,60,250
Add: Direct wages (1,47,000×175%)	2,57,250
Direct Expenses	1,80,000
(ii) Prime cost	**16,97,500**
Add: Factory overheads (2,57,250/175%)	1,47,000
Gross Factory cost	18,44,500
Add: Opening work-in-process	1,70,800
Less: Closing work-in-process	(1,90,000)
(iii) Factory cost	**18,25,300**
Add: Administration overheads (10% of factory overheads)	14,700
Add: Opening stock of finished goods	3,10,000
Less: Closing stock of finished goods	(2,75,000)
(iv) Cost of goods sold	**18,75,000**
Add: Selling & distribution overheads	60,000
Cost of sales	19,35,000
(v) Net Profit	**2,75,000**
Sales	22,10,000

*(18,75,000 + 2,75,000 – 3,10,000 – (1,47,000 × 10%) + 1,90,000 –1,70,800 – (2,57,250 × 100/175%) - 1,80,000 – 2,57,250 + 2,08,000 – 2,45,600) = 12,22,650

Working notes:

Purchase of raw materials = Raw material consumed + Closing stock - opening stock of raw material

Raw material consumed = Prime cost - Direct wages - Direct expenses

Factory Overheads = 2,57,250*100/175

Prime cost = Factory cost + Closing WIP – Opening WIP – Factory overheads

Factory Cost = Cost of Production goods sold + Closing stock of Finished goods – Opening stock of finished goods – Administrative overheads

Net Profit = Sales - Cost of sales

Alternative solution

Cost Sheet
(for the quarter ending 30 September 2018)

	Amount (₹)
(i) Raw materials consumed	
Opening stock of raw materials	2,45,600
Add: Purchase of materials	12,37,350*
Less: Closing stock of raw materials	(2,08,000)
Raw Material consumed	12,74,950
Add: Direct wages (1,47,000×175%	2,57,250
Direct Expenses	1,80,000
(ii) Prime cost	**17,12,,200**
Add: Factory overheads (2,57,250/175%)	1,47,000
Gross Factory cost	18,59,200
Add: Opening work-in-process	1,70,800
Less: Closing work-in-process	(1,90,000)
(iii) Factory cost/works cost/cost of production	**18,40,000**
Add: Opening stock of finished goods	3,10,000
Less: Closing stock of finished goods	(2,75,000)
(iv) Cost of goods sold	**18,75,000**
Add: Administration overheads (10% of factory overheads)	14,700
Add: Selling & distribution overheads	60,000
Cost of sales	19,49,700
(v) Net Profit	**2,60,300**
Sales	22,10,000

*(18,75,000 + 2,75,000 – 3,10,000 + 1,90,000 –1,70,800 – 1,47,500 - 1,80,000 – 2,57,250 + 2,08,000 – 2,45,600) = 12,37,350

Working notes:

Purchase of raw materials = Raw material consumed + Closing stock - opening stock of raw material

Raw material consumed = Prime cost - Direct wages - Direct expenses Factory Overheads = 257250*100/175

Prime cost = Factory cost + Closing WIP – Opening WIP – Factory overheads

Factory Cost = Cost of Production goods sold + Closing stock of Finished goods – Opening stock of finished goods

Net Profit = Sales - Cost of sales

May.18 Q2(a) 10 Marks

Following information relate to a manufacturing concern for the year ended 31 st March, 2018:

	₹
Raw Material (opening)	2,28,000
Raw Material (closing)	3,05,000
Purchases of Raw Material	42,25,000
Freight Inwards	1,00,000

Direct wages paid	12,56,000
Direct wages-outstanding at the end of the year	1,50,000
Factory Overheads	20% of prime cost
Work-in-progress (opening)	1,92,500
Wo9rk-in-progres (closing)	1,40,700
Administrative Overheads (related to production)	1,73,000
Distribution Expenses	₹ 16 per unit
Finished Stock (opening)-1217 Units	6,08,500
Sale of scrap of material	8,000

The firm produced 14000 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 14153 units at a price of ₹ 618 per unit during the year.
Prepare cost sheet of the firm.

Solution:

Cost sheet for the year ended 31st March, 2018.

Units produced - 14,000 units
Units sold - 14,153 units

Particulars	**Amount (₹)**
Raw materials purchased	42,25,000
Add: Freight Inward	1,00,000
Add: Opening value of raw materials	2,28,000
Less: Closing value of raw materials	(3,05,000)
	42,48,000
Less: Sale of scrap of material	8,000
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 ₹ Prime Cost)	11,29,200
Add: Opening value of W-I-P	1,92,500
Less: Closing value of W-I-P	(1,40,700)
Factory Cost	68,27,000
Add: Administrative overheads	1,73,000
Cost of Production	70,00,000
Add: Value of opening finished stock	6,08,500
Less: Value of closing finished stock [₹ 500(70,00,000/14,000) × 1,064) (1,217+ 14,000 – 14,153 = 1,064 units)	(5,32,000)
Cost of Goods Sold	70,76,500
Distribution expenses (₹ 16 × 14,153 units)	2,26,448
Cost of Sales	73,02,948
Profit (Balancing figure)	14,43,606
Sales (₹ 618 × 14,153 units)	87,46,554

Nov.15 Q2(a) 8 Marks

M.L. Auto Ltd. is a manufacturer of auto components and the details of its expenses for the year 2014 are given below:

	(₹)
(i) Opening Stock of Material	1,50,000
(ii) Closing Stock of Material	2,00,000
(iii)Purchase of Material	18,50,000
(iv)Direct Labour	9,50,000
(v) Factory Overhead	3,80,000
(vi)Administrative Overhead	2,50,400

During 2015, the company has received an order from a car manufacturer where it estimates that the cost of material and labour will be ₹ 8,00,000 and ₹ 4,50,000 respectively. M.L. Auto Ltd. charges factory overhead as a percentage of direct labour and administrative overhead as a percentage of factory cost based on previous year's cost.

Cost of delivery of the components at customer's premises is estimated at ₹ 45,000.

You are required to:

(i) Calculate the overhead recovery rates based on actual costs for 2014.

(ii) Prepare a detailed cost statement for the order received in 2015 and the price to be quoted if the company wants to earn a profit of 10% on sales.

Solution:

(i) Calculation of Overhead Recovery Rate:

$$\text{Factory Overhead Recovery Rate} = \frac{\text{Factory Overhead in 2014}}{\text{Direct Labour Costs in 2014}} \times 100$$

$$= \frac{₹\ 3,80,000}{₹9,50,000} \times 100 = 40\% \text{ of Direct labour}$$

Administrative Overhead Recovery Rate

$$= \frac{\text{Administrative Overhead in 2014}}{\text{Factory Costs in 2014 (W.N.)}} \times 100$$

$$= \frac{₹\ 2,50,400}{₹\ 31,30,000} \times 100 = 8\% \text{ of Factory Cost}$$

Working Note:

Calculation of Factory Cost in 2014

Particulars	**Amount (₹)**
Opening Stock of Material	1,50,000
Add: Purchase of Material	18,50,000
Less: Closing Stock of Material	(2,00,000)
Material Consumed	18,00,000
Direct Labour	9,50,000
Prime Cost	27,50,000
Factory Overhead	3,80,000
Factory Cost	31,30,000

(ii) Detailed Cost Statement for the Order received from M.L. Auto Ltd. during 2015

Particulars	Amount (₹)
Material	8,00,000
Labour	4,50,000
Factory Overhead (40% of ₹ 4,50,000)	1,80,000
Factory Cost	14,30,000
Administrative Overhead (8% of ₹ 14,30,000)	1,14,400
Cost of delivery	45,000
Total Cost	15,89,400
Add: Profit @ 10% of Sales or 11.11% of cost or 1/9 of 15,89,400	1,76,600
Sales value (Price to be quoted for the order) (₹ 15,89,400 /0.9)	17,66,000

Hence the price to be quoted is ₹17,66,000 if the company wants to earn a profit of 10% on sales.

July'21 Q2(a) 10 marks

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

Particulars	Amount (in ₹)
Stock of Raw material 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 on 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

- Store overheads on materials are 10% of material consumed.
- Factory overheads are 20% of the Prime cost.

- 10% of the output was rejected and a sum of ₹ 5,000 was realized on sale of scrap.
- 10% of the 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.
- The total output was 8000 units during the month.

You are required to prepare a Cost Sheet for the above period showing the:

(i) Cost of Raw Material consumed.
(ii) Prime Cost
(iii) Work Cost
(iv) Cost of Production
(v) Cost of Sales

Solution:

Statement of Cost for the month of March, 2021

Particulars	Amount (₹)	Amount (₹)
(i) Cost of Material Consumed:		
Raw materials purchased (₹ 2,00,000 – ₹ 40,000)	1,60,000	
Carriage inwards	20,000	
Add: Opening stock of raw materials	80,000	
Less: Closing stock of raw materials	(30,000)	**2,30,000**
Direct Wages		1,20,000
Direct expenses:		
Cost of special drawing	30,000	
Hire charges paid for Plant	24,000	54,000
(ii) Prime Cost		**4,04,000**
Carriage on return	6,000	
Store overheads (10% of material consumed)	23,000	
Factory overheads (20% of Prime cost)	80,800	
Additional expenditure for rectification of defective products (refer working note)	2,160	1,11,960
Gross factory cost		5,15,960
Add: Opening value of W-I-P		50,000
Less: Closing value of W-I-P		(24,000)
(iii) Works/ Factory Cost		**5,41,960**
Less: Realisable value on sale of scrap		(5,000)
(iv) Cost of Production		**5,36,960**
Add: Opening stock of finished goods		-
Less: Closing stock of finished goods		-
Cost of Goods Sold		**5,36,960**
Administrative overheads:		
Maintenance of office building	2,000	
Salary paid to Office staff	25,000	

Legal Charges	2,500	29,500
Selling overheads:		
Expenses for participation in Industrial exhibition	8,000	8,000
Distribution overheads:		
Depreciation on delivery van	6,000	
Warehousing charges	1,500	7,500
(v) Cost of Sales		**5,81,960**

Alternative Solution
(considering Hire charges paid for Plant as indirect expenses)

Statement of Cost for the month of March, 2021

Particulars	Amount (₹)	Amount (₹)
Cost of Material Consumed:		
Raw materials purchased (₹ 2,00,000 – ₹ 40,000)	1,60,000	
Carriage inwards	20,000	
Add: Opening stock of raw materials	80,000	
Less: Closing stock of raw materials	(30,000)	**2,30,000**
Direct Wages		1,20,000
Direct expenses:		
Cost of special drawing	30,000	30,000
Prime Cost		3,80,000
Hire charges paid for Plant	24,000	
Carriage on return	6,000	
Store overheads (10% of material consumed)	23,000	
Factory overheads (20% of Prime cost)	76,000	
Additional expenditure for rectification of defective products (refer working note)	2,160	1,31,160
Gross factory cost		5,11,160
Add: Opening value of W-I-P		50,000
Less: Closing value of W-I-P		(24,000)
Works/ Factory Cost		5,37,160
Less: Realisable value on sale of scrap		(5,000)
Cost of Production		5,32,160
Add: Opening stock of finished goods		-
Less: Closing stock of finished goods		-
Cost of Goods Sold		5,32,160
Administrative overheads:		
Maintenance of office building	2,000	

Salary paid to Office staff	25,000	
Legal Charges	2,500	29,500
Selling overheads:		
	8,000	
Expenses for participation in Industrial exhibition		8,000
Distribution overheads:		
Depreciation on delivery van	6,000	
Warehousing charges	1,500	7,500
Cost of Sales		5,77,160

Working Notes:

1. Number of Rectified units

Total Output	8,000 units	
Less: Rejected 10%	800 units	
Finished product	7,200 units	
Rectified units (10% of finished product)		720 units

2. Proportionate additional expenditure on 720 units
   = 20% of proportionate direct wages
   = 0.20 x (₹ 1,20,000/8,000) x 720
   = ₹ 2,160

May'22 Q3(b) 10 marks

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:

I. Prepare a Cost Sheet for the above period showing the:
   (i) Cost of Raw Material consumed
   (ii) Prime Cost
   (iii) Factory Cost
   (iv) Cost of Production
   (v) Cost of goods sold
   (vi) Cost of Sales

II. Calculate selling price per unit, if sale is made at a profit of 20% on sales.

Solution:

Statement of Cost (for the month of April, 2022)

S. No.	Particulars	Amount (₹)	Amount (₹)
(i)	Opening stock of Raw material	10,000	
	Add: Purchase of Raw material	2,80,000	
	Less: Closing stock of raw materials	(40,000)	
	Raw material consumed		2,50,000
	Manufacturing wages		70,000
(ii)	Prime Cost		3,20,000
	Factory/work overheads:		
	Depreciation on plant	15,000	
	Lease rent of production Asset	10,000	
	Expenses paid for pollution control and engineering & Maintenance	1,000	26,000
(iii)	Factory/Work Cost		3,46,000
	Expenses paid for quality control checkactivity		4,000
	Research and Development Cost		5,000
	Administration Overheads (Production)		15,000
	Primary Packing Cost		8,000
(iv)	Cost of Production		3,78,000
	Add: Opening stock of finished goods		28,000
	Less: Closing stock of finished goods		(50,400)
(v)	Cost of Goods Sold		3,55,600
	Advertisement expenses		1,300
	Packing cost for re-distribution offinished goods sold		1,500
(vi)	Cost of Sales		3,58,400

Note: Valuation of Closing stock of finished goods

$$= \frac{3,78,000}{3000 \text{ units}} \times 400 \text{ Units}$$

$$= ₹50,400$$

II. Cost per unit sold $= \frac{3,85,400}{200 + 3,000 - 400} \times ₹128$ per unit

$\therefore$ Selling Price $= \frac{128}{80\%} = ₹160$ per unit

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

ABC Ltd. has furnished the following information from the financial books for the year ended 31st March, 2014:

Profit & Loss Account

	(₹)		(₹)
To Opening stock (500 units at ₹ 140 each)	70,000	By Sales (10,250 units)	28,70,000
To Material consumed	10,40,000	By Closing stock	
To Wages	6,00,000	(250 units at ₹ 200 each)	50,000
To Gross profit c/d	12,10,000		
	29,20,000		29,20,000
To Factory overheads	3,79,000	By Gross profit b/d	12,10,000
To Administration overheads	4,24,000	By Interest	1,000
To Selling expenses	2,20,000	By Rent received	40,000
To Bad debts	16,000		
To Preliminary expenses	20,000		
To Net profit	1,92,000		
	12,51,000		12,51,000

The cost sheet shows the cost of materials at ₹ 104 per unit and the labour cost at ₹ 60 per unit. The factory overheads are absorbed at 60% of labour cost and administration overheads at 20% of factory cost. Selling expenses are charged at ₹ 24 per unit. The opening stock of finished goods is valued at ₹ 180 per unit.

You are required to prepare:

(i) A statement showing profit as per Cost accounts for the year ended 31st March, 2014; and

(ii) A statement showing the reconciliation of profit as disclosed in Cost accounts with the profit Shown in Financial accounts.

Solution:

Statement of Profit as per Cost Accounts

	Units	(₹)
Opening stock @ ₹ 180 per unit	500	90,000
Cost of production @ ₹ 240 per unit (Refer Working Note 1)	10,000	24,00,000
Total	10,500	24,90,000
Less: Closing stock @ ₹ 240 per unit	(250)	(60,000)
	10,250	24,30,000
Selling expenses @ ₹ 24 per unit		2,46,000

Cost of sales		26,76,000
Profit (Balancing figure)		1,94,000
Sales	10,250	28,70,000

Working Notes:

1. **Statement of Cost (10,000 units)**

	Total cost (₹)	Cost per unit (₹)
Materials	10,40,000	104.00
Wages	6,00,000	60.00
Factory Overhead 60% of wages	3,60,000	36.00
Factory cost	20,00,000	200.00
Administrative overhead 20% of factory cost	4,00,000	40.00
Total cost	24,00,000	240.00

2. **Statement of Differences between the two set of accounts:**

	Financial A/c (₹)	Cost A/c (₹)	Difference (₹)	Remarks (₹)
Factory overhead	3,79,000	3,60,000	19,000	Under recovery
Administrative overhead	4,24,000	4,00,000	24,000	Under recovery
Selling expenses	2,20,000	2,46,000	26,000	Over recovery
Opening stock	70,000	90,000	20,000	Over recovery
Closing stock	50,000	60,000	10,000	Over recovery

Reconciliation Statement

		(₹)
Profit as per cost accounts		1,94,000
Add: Over-recovery of selling overhead in Cost A/c		26,000
Add: Over-valuation of opening stock in Cost A/c		20,000
Add: Income excluded from Cost A/c		
Interest	1,000	
Rent	40,000	41,000
Less: Under recovery of Overhead in Cost A/c		
Factory Overhead	19,000	
Administrative Overhead	24,000	(43,000)
Less: Over-valuation of closing stock in Cost A/c		(10,000)
Less: Expenses excluded from Cost A/c		
Bad debts	16,000	
Preliminary expenses	20,000	(36,000)
Profit as per financial account		1,92,000

Question-2 (RTP May 21 – Q5)

RTA Ltd. has the following expenditures for the year ended 31st December, 2020:

Sl. No.		Amount (₹)	Amount (₹)
(i)	Raw materials purchased		5,00,00,000
(ii)	Freight inward		9,20,600
(iii)	Wages paid to factory workers		25,20,000
(iv)	Royalty paid for production		1,80,000
(v)	Amount paid for power & fuel		3,50,000
(vi)	Job charges paid to job workers		3,10,000
(vii)	Stores and spares consumed		1,10,000
(viii)	Depreciation on office building		50,000
(ix)	Repairs & Maintenance paid for:		
	- Plant & Machinery	40,000	
	- Sales office building	20,000	60,000
(x)	Insurance premium paid for:		
	- Plant & Machinery	28,200	
	- Factory building	18,800	47,000
(xi)	Expenses paid for quality control checkactivities		18,000
(xii)	Research & development cost paid for improvement in production process		20,000
(xiii)	Expenses paid for pollution control andengineering & maintenance		36,000
(xiv)	Salary paid to Sales & Marketing mangers		5,60,000
(xv)	Salary paid to General Manager		6,40,000
(xvi)	Packing cost paid for:		
	- Primary packing necessary to maintain quality		
	- For re-distribution of finished goods		1,26,000
(xvii)	Fee paid to independent directors	46,000	1,20,000
(xviii)	Performance bonus paid to sales staffs	80,000	1,20,000
(xix)	Value of stock as on 1stJanuary, 2020:		
	- Raw materials	10,00,000	
	- Work-in-process	8,60,000	
	- Finished goods	12,00,000	30,60,000
(xx)	Value of stock as on 31stDecember, 2020:		
	- Raw materials	8,40,000	
	- Work-in-process	6,60,000	
	- Finished goods	10,50,000	25,50,000

Amount realized by selling of scrap and waste generated during manufacturing process – ₹ 48,000/-

From the above data you are requested to PREPARE Statement of Cost for RTA Ltd. for the year ended 31st December, 2020, showing (i) Prime cost, (ii) Factory cost, (iii) Cost of Production,

(iv) Cost of goods sold and (v) Cost of sales.

Solution:

Statement of Cost of RTA Ltd. for the year ended 31st December, 2020:

Sl. No.	Particulars	Amount (₹)	Amount (₹)
(i)	Material Consumed:		
	- Raw materials purchased	5,00,00,000	
	- Freight inward	9,20,600	
	Add: Opening stock of raw materials	10,00,000	
	Less: Closing stock of raw materials	(8,40,000)	5,10,80,600
(ii)	Direct employee (labour) cost:		
	- Wages paid to factory workers		25,20,000
(iii)	Direct expenses:		
	- Royalty paid for production	1,80,000	
	- Amount paid for power & fuel	3,50,000	
	- Job charges paid to job workers	3,10,000	8,40,000
	Prime Cost		5,44,40,600
(iv)	Works/ Factory overheads:		
	- Stores and spares consumed	1,10,000	
	- Repairs & Maintenance paid for plant & machinery	40,000	
	- Insurance premium paid for plant & machinery	28,200	
	- Insurance premium paid for factory building	18,800	
	- Expenses paid for pollution control and engineering & maintenance	36,000	2,33,000
	Gross factory cost		5,46,73,600
	Add: Opening value of W-I-P		8,60,000
	Less: Closing value of W-I-P		(6,60,000)
	Factory Cost		5,48,73,600
(v)	Quality control cost:		
	- Expenses paid for quality control check activities		18,000
(vi)	Research & development cost paid for improvement in production process		20,000
(vii)	Less: Realisable value on sale of scrap and waste		(48,000)
(viii)	Add: Primary packing cost		46,000
	Cost of Production		5,49,09,600
	Add: Opening stock of finished goods		12,00,000
	Less: Closing stock of finished goods		(10,50,000)
	Cost of Goods Sold		5,50,59,600
(ix)	Administrative overheads:		
	- Depreciation on office building	50,000	
	- Salary paid to General Manager	6,40,000	

	- Fee paid to independent directors	1,20,000	8,10,000
(x)	Selling overheads:		
	- Repairs & Maintenance paid for sales office building	20,000	
(xi)	- Salary paid to Manager- Sales & Marketing	5,60,000	
	- Performance bonus paid to sales staffs	1,20,000	7,00,000
	Distribution overheads:		
	- Packing cost paid for re-distribution of finished goods		80,000
	Cost of Sales		5,66,49,600

Question-3 (RTP Nov 20 – Q5)

The following details are available from the books of R Ltd. for the year ending 31st March 2020:

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 for the assessment year 2019-20	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 01-04-2019:	
- Raw Material	6,20,000
- W-I-P	7,84,000
- Finished goods	14,40,000
Position of inventories as on 31-03-2020:	
- Raw Material	4,60,000
- W-I-P	6,64,000
- Finished goods	9,80,000

From the above information PREPARE a cost sheet for the year ended 31st March 2020.

Solution:

Statement of Cost of R Ltd. for the year ended 31st March, 2020:

Sl. No.	Particulars	Amount (₹)	Amount (₹)
(i)	Material Consumed:		
	- Raw materials purchased	84,00,000	
	- 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
(ii)	Direct employee (labour) cost:		
	- Direct wages	60,00,000	
	- Employer's Contribution towards PF & ESIS	7,20,000	67,20,000
(iii)	Direct expenses:		
	- Consumable materials	4,80,000	
	- Cost of power & fuel	28,00,000	32,80,000
	Prime Cost		1,87,32,600
(iv)	Works/ Factory overheads:		
	- Wages to foreman and store keeper	8,40,000	
	- Other indirect wages to factorystaffs	1,35,000	9,75,000
	Gross factory cost		1,97,07,600
	Add: Opening value of W-I-P		7,84,000
	Less: Closing value of W-I-P		(6,64,000)
	Factory Cost		1,98,27,600
(v)	Research & development cost paid forimprovement in production process		9,60,000
(vi)	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
(vii)	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
(viii)	Selling overheads& Distribution overheads:		
	- Salary to delivery staffs		14,30,000
	Cost of Sales		2,58,57,600
	Profit (balancing figure)		24,02,400
	Sales		2,82,60,000

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

Question-4 (RTP May 20 – Q5)

From the following data of Arnav Metallic Ltd., CALCULATE Cost of production:

		Amount (₹)
(i)	Repair & maintenance paid for plant & machinery	9,80,500
(ii)	Insurance premium paid for plant & machinery	96,000
(iii)	Raw materials purchased	64,00,000
(iv)	Opening stock of raw materials	2,88,000
(v)	Closing stock of raw materials	4,46,000
(vi)	Wages paid	23,20,000
(vii)	Value of opening Work-in-process	4,06,000
(viii)	Value of closing Work-in-process	6,02,100
(ix)	Quality control cost for the products in manufacturing process	86,000
(x)	Research & development cost for improvement in productionprocess	92,600
(xi)	Administrative cost for:	
	- Factory & production	9,00,000
	- Others	11,60,000
(xii)	Amount realised by selling scrap generated during themanufacturing process	9,200
(xiii)	Packing cost necessary to preserve the goods for furtherprocessing	10,200
(xiv)	Salary paid to Director (Technical)	8,90,000

Solution:

Calculation of Cost of Production of Arnav Metallic Ltd. for the period…..

Particulars	Amount (₹)
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
Quality control cost	86,000
Research & development cost	92,600
Administrative overheads related with factory and production	9,00,000
	1,07,17,100
Add: Opening value of W-I-P	4,06,000
Less: Closing value of W-I-P	(6,02,100)
	1,05,21,000
Less: Amount realised by selling scrap	(9,200)
Add: Primary packing cost	10,200

Cost of Production	1,05,22,000

Notes:

(i) Other administrative overhead does not form part of cost of production.

(ii) Salary paid to Director (Technical) is an administrative cost.

Chapter 6: Cost Accounting System

Part-I: Non- integral System

A. QUESTION FROM STUDY MATERIAL

Question-1 (Study Material - illustration-1)

As on 31st March, 20X8, the following balances existed in a firm's Cost Ledger:

	Dr.	Cr.
	(₹)	(₹)
Stores Ledger Control A/c	3,01,435	
Work-in-Process Control A/c	1,22,365	
Finished Stock Ledger Control A/c	2,51,945	
Manufacturing Overhead Control A/c		10,525
Cost Ledger Control A/c		6,65,220
	6,75,745	6,75,745

During the next three months the following items arose:

	(₹)
Finished product (at cost)	2,10,835
Manufacturing overhead incurred	91,510
Raw materials purchased	1,23,000
Factory Wages	50,530
Indirect Labour	21,665
Cost of Sales	1,85,890
Material issued to production	1,27,315
Sales returned at Cost	5,380
Material returned to suppliers	2,900
Manufacturing overhead charged to production	77,200

You are required to PASS the Journal Entries; write up the accounts and schedule the balances, stating what each balance represents.

Hints: Cost of Sale = ₹1,80,510, CLC = ₹9,49,025

Question-2 (Study Material – illustration-2)

From the following details PREPARE the necessary accounts in the Cost Ledger

	Materials (₹)	Work-in-Process (₹)	Finished Stock (₹)
Opening balance	8,000	5,000	10,000
Closing balance	11,000	9,000	12,000

Transactions during the period:	(₹)
Materials purchased	25,000
Wages paid (including ₹ 2,000 indirect)	10,000
Overheads incurred	8,000
Overheads absorbed	9,000
Sales	50,000

Hints: Costing P/L (cr.) = ₹16,000, CLC (c/d) = ₹32,000

Question-3 (Study Material – illustration-3)

On 31st March, 20X8 the following balances were extracted from the books of the Supreme Manufacturing Company:

	Dr. (₹)	Cr. (₹)
Stores Ledger Control A/c	35,000	
Work-in-Process Control A/c	38,000	
Finished Goods Control A/c	25,000	
Cost Ledger Control A/c		98,000
	98,000	98,000

The following transactions took place in April 20X8:

	Dr. (₹)
Raw Materials:	
- Purchased	95,000
- Returned to suppliers	3,000
- Issued to production	98,000
- Returned to stores	3,000
Productive wages	40,000
Indirect wages	25,000
Factory overhead expenses incurred	50,000
Selling and Administrative expenses	40,000
Cost of finished goods transferred to warehouse	2,13,000
Cost of Goods sold	2,10,000
Sales	3,00,000

Factory overheads are applied to production at 150% of direct wages, any under/over absorbed overhead being carried forward for adjustment in the subsequent months. All administrative and selling expenses are treated as period costs and charged off to the Profit and Loss Account of the month in which they are incurred.

PREPARE the following Accounts:

(a) Cost Ledger Control A/c
(b) Stores Ledger Control A/c
(c) Work-in-Process Control A/c
(d) Finished Goods Stock Control A/c
(e) Factory Overhead Control A/c
(f) Costing Profit and Loss A/c
(g) Trial Balance as at 30th April, 20X3.

Hints: Costing P/L (cr.) = ₹50,000, CLC (c/d) = ₹95,000

Question-4 (Study Material – illustration-4)

Acme Manufacturing Co. Ltd. opens the costing records, with the balances as on 1st July, 20X8 as follows:

	(₹)	(₹)
Material Control A/c	1,24,000	
Work-in-Process Control A/c	62,500	
Finished Goods Control A/c	1,24,000	
Production Overhead Control A/c	8,400	
Administrative Overhead Control A/c		12,000
Selling & Distribution Overhead Control A/c	6,250	
Cost Ledger Control A/c		3,13,150
	3,25,150	**3,25,150**

The following are the transactions for the quarter ended 30th September 20X8:

	(₹)
Materials purchased	4,80,100
Materials issued to jobs	4,77,400
Materials to works maintenance	41,200
Materials to administration office	3,400
Materials to selling department	7,200
Wages direct	1,49,300
Wages indirect	65,000
Transportation for indirect materials	8,400
Production overheads	2,42,250
Absorbed production overheads	3,59,100
Administration overheads	74,000
Administration allocation to production	52,900
Administration allocation to sales	14,800
Sales overheads	64,200
Sales overheads absorbed	82,000
Finished goods produced	9,58,400
Finished goods sold	9,77,300
Sales	14,43,000

Make up the various accounts as you envisage in the Cost Ledger and PREPARE a Trial Balance as at 30th September, 20X8.

Hints: Costing P/L (cr.) = ₹368,900, CLC (c/d) = ₹3,22,300

Question-5 (Study Material – illustration-5)

A fire destroyed some accounting records of a company. You have been able to collect the following from the spoilt papers/records and as a result of consultation with accounting staff in respect of January, 20X8:

(i) Incomplete Ledger Entries:

Materials Control A/c

	(₹)		(₹)
To Balance b/d	32,000		

Work-in-Process Control A/c

	(₹)		(₹)
To Balance b/d	9,200	By Finished Goods Control A/c	1,51,000

Payables (Creditors) A/c

	(₹)		(₹)
		By Balance b/d	16,400
To Balance c/d	19,200		

Manufacturing Overheads Control A/c

	(₹)		(₹)
To Cost Ledger Control A/c (Amount spent)	29,600		

Finished Goods Control A/c

	(₹)		(₹)
To Balance b/d	24,000	By Balance c/d	30,000

(ii) Additional Information:

(1) The cash-book showed that ₹ 89,200 have been paid to creditors for raw-material.

(2) Ending inventory of work-in-process included material ₹ 5,000 on which 300 direct labour hours have been booked against wages and overheads.

(3) The job card showed that workers have worked for 7,000 hours. The wage rate is ₹ 10 per labour hour.

(4) Overhead recovery rate was ₹ 4 per direct labour hour.

You are required to COMPLETE the above accounts in the cost ledger of the company:

Hints: Cost of sale = ₹ 1,45,000, under-absorption = ₹30,000, Purchase = ₹92,000

TEST YOUR KNOWLEDGE

Question-1 (Study Material Q-1)

The following incomplete accounts are furnished to you for the month ended 31st October, 20x8.

Stores Ledger Control Account

1.10.20X8 To Balance ₹ 54,000

Work in Process Control Account

1.10. 20X8 To Balance ₹ 6,000

Finished Goods Control Account

1.10. 20X8 To Balance ₹ 75,000

Factory Overheads Control Account

Total debits for October, 20X8₹ 45,000

Factory Overheads Applied Account

Cost of Goods Sold Account

Creditors for Purchases Account

1.10. 20X8 By Balance ₹ 30,000

Additional information:

(i) The factory overheads are applied by using a budgeted rate based on direct labour hours. The budget for overheads for 20X8 is ₹ 6,75,000 and the budget of direct labour hours is 4,50,000.
(ii) The balance in the account of creditors for purchases on 31.10.20X8 is ₹ 15,000 and the payments made to creditors in October, 20X8 amount to ₹ 1,05,000.
(iii) The finished goods inventory as on 31st October, 20X8 is ₹ 66,000.
(iv) The cost of goods sold during the month was ₹ 1,95,000.
(v) On 31st October, 20X8 there was only one unfinished job in the factory. The cost records show that ₹ 3,000 (1,200 direct labour hours) of direct labour cost and ₹ 6,000 of direct material cost had been charged.
(vi) A total of 28,200 direct labour hours were worked in October, 20X8. All factory workers earn same rate of pay.
(vii) All actual factory overheads incurred in October, 20x8 have been posted.

You are required to FIND:

(a) Materials purchased during October, 20X8.
(b) Cost of goods completed in October, 20X8.
(c) Overheads applied to production in October, 20X8.
(d) Balance of Work-in-process Control A/c on 31st October, 20X8.
(e) Direct materials consumed during October, 20X8.
(f) Balance of Stores Ledger Control Account on 31st October, 20X8.
(g) Over absorbed or under absorbed overheads for October, 20X8.

Hints: (a) Purchase = ₹90,000, (b) Cost of goods completed = ₹1,86,000
(c) Overhead applied = ₹42,300, (d) WIP (bal) = 10,800,
(e) Material Consumed = ₹78,000, (f) SLC (cr.) = 66,000, (g) Under-absorption = ₹2,700

Question-2 (Study Material Q-2)

A company operates on historic job cost accounting system, which is integrated with the financial accounts. At the beginning of a month, opening balances in cost ledger were:

	₹ (in lakhs)
Stores Ledger Control Account	80
Work-in-Process Control Account	20
Finished Goods Control Account	430
Building Construction Account	10

Cost Ledger Control Account				540
During the month, the following transaction took place:				
Materials	-	Purchased	40	
		Issued to production	50	
		Issued to factory maintenance	6	
		Issued to building construction	4	
Wages	-	Gross wages paid	150	
		Indirect wages	40	
		For building construction	10	
Works Overheads	-	Actual amount incurred (excluding items shown above)	160	
		Absorbed in building construction		20
		Under absorbed	8	
Royalty paid		(related to production)	5	
Selling, distribution and administration overheads			25	
Sales				450

At the end of the month, the stock of raw material and work-in-Process was ₹ 55 lakhs and ₹ 25 lakhs respectively. The loss arising in the raw material accounts is treated as factory overheads. The building under construction was completed during the month. Company's gross profit margin is 20% on sales.

PREPARE the relevant control accounts to record the above transactions in the cost ledger of the company.

Hints: Under-absorption = 8, COS = 385, Costing P/L (cr.) = 57,
Trail Balance (Total) = 483

B. PAST YEAR EXAM QUESTIONS.

Nov-19. Q6(b) (5 marks)

Journalise the following transactions in cost book under Non- Integrated System of Accounting

(a)	Credit purchase of material	₹27,000
(b)	Manufacturing overhead charges to production	₹ 6,000
(c)	Selling and Distribution overhead recovered from Sales	₹ 4,000
(d)	Indirect wages incurred	₹ 8,000
(e)	Material return from production to stores	₹ 9,000

Solution:

Nov-18. Q4(a) (10 marks)

The following balances were extracted from a Company's ledger as on 30th June, 2018:

Particulars	Debit (₹)	Credit (₹)
Raw material control a/c	2,82,450	
Work-in-progress control a/c	2,38,300	
Finished stock control a/c	3,92,500	
General ledger adjustment a/c		9,13,250
Total	**9,13,250**	**9,13,250**

The following transactions took place during the quarter ended 30th September, 2018:

		₹
(i)	Factory overheads - allocated to work-in-progress	1,36,350
(ii)	Goods furnished - at cost	13,76,200
(iii)	Raw materials purchased	12,43,810
(iv)	Direct wages - allocated to work-in-progress	2,56,800
(v)	Cost of goods sold	14,56,500
(vi)	Raw materials - issued to production	13,60,430
(vii)	Raw materials - credited by suppliers	27,200
(viii)	Raw materials losses - inventory audit	6,000
(ix)	Work-in-progress rejected (with no scrap value)	12,300
(x)	Customer's returns (at cost) of finished goods	45,900

You are required to prepare:

(i) Raw material control a/c

(ii) Work-in-progress control a/c

(iii) Finished stock control a/c

(iv) General ledger adjustment a/c

Solution:

(i) Raw Material Control A/c

	(₹)		(₹)
To Balance b/d	2,82,450	By General Ledger Adjustment A/c	27,200
” General Ledger Adjustment A/c	12,43,810	” Work-in-progress Control A/c	13,60,430
		” Costing P&L A/c (Loss) (OR GLA)	6,000
		” Balance c/d	1,32,630
	15,26,260		15,26,260

(ii) Work-in-Progress Control A/c

	(₹)		(₹)
To Balance b/d	2,38,300		
” Raw Material Control A/c	13,60,430	” Finished Goods Control A/c	13,76,200
” Wages Control A/c	2,56,800	Costing P&L A/c (OR GLA)	12,300
” Factory OH Control A/c	1,36,350	” Balance c/d	6,03,380
	19,91,880		19,91,880

(iii) Finished Goods Control A/c

	(₹)		(₹)
To Balance b/d	3,92,500	By Cost of goods sold A/c (OR GLA)	14,56,500
General Ledger Adjustment A/c	45,900		
” Work-in-process Control A/c	13,76,200	” Balance c/d	3,58,100
	18,14,600		18,14,600

(iv) General Ledger Adjustment A/c

	(₹)		(₹)
To Costing P&L A/c (sales) (Balancing figure)	25,68,910	By Balance b/d	9,13,250

”	Raw Material Control A/c	27,200	”	Raw Material Control A/c	12,43,810
			”	Wages Control A/c	2,56,800
			”	Factory OH Control A/c	1,36,350
			”	Finished Goods Control A/c	45,900
		25,96,110			25,96,110

OR

General ledger adjustment account

		(₹)			(₹)
To	Raw Material Control A/c	27,200	By	Balance b/d	9,13,250
”	Raw Material control ccount(loss)	6,000	”	Raw Material Control A/c	12,43,810
‘’	WIP control Account (rejection)	12,300	”	Wages Control A/c	2,56,800
“	Finished stock Control Account	14,56,500	”	Factory OH Control A/c	1,36,350
“”	Balance c/d	10,94,110	”	Finished Goods Control A/c	45,900
		25,96,110			25,96,110

Working:

Factory Overhead Control A/c

		(₹)			(₹)
To	General Ledger Adjustment A/c	1,36,350	By	Work-in-progress A/c	1,36,350
		1,36,350			1,36,350

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

Pass journal entries in the cost books, maintained on non-integrated system, for the following:

(i) Issue of materials:	Direct ₹ 5,50,000; Indirect ₹ 1,50,000
(ii) Allocation of wages:	Direct ₹ 2,00,000; Indirect ₹ 40,000
(iii) Under/Over absorbed overheads:	Factory (over) ₹20,000; Administration (under) ₹10,000

Solution:

Journal Entries in Cost Books
Maintained on non-integrated system

		(₹)	(₹)
(i) Work-in-Progress Ledger	Dr.	5,50,000	
Control A/c Factory Overhead	Dr.	1,50,000	
Control A/c			7,00,000
To Stores Ledger Control A/c			
(Being issue of materials)			
(ii) Work-in Progress Ledger	Dr.	2,00,000	
Control A/c Factory Overhead	Dr.	40,000	
control A/c			2,40,000
To Wages Control A/c			
(Being allocation of wages and salaries)			
(i) Factory Overhead Control A/c	Dr.	20,000	
To Costing Profit & Loss A/c			20,000
(Being transfer of over absorption of overhead)			
Costing Profit & Loss A/c	Dr.	10,000	
To Administration Overhead Control A/c			10,000
(Being transfer of under absorption of overhead)			

Question-2

A Company operates separate cost accounting and financial accounting systems. The following is the list of opening balances as on 1.04.2013 in the Cost Ledger.

	Debit(₹)	Credit(₹)
Stores Ledger Control Account	53,375	--
WIP Control Account	1,04,595	--
Finished Goods Control Account	30,780	--
General Ledger Adjustment Account	--	1,88,750

Transactions for the quarter ended 30.06.2013 are as under:

	(₹)
Materials purchased	26,700
Materials issued to production	40,000
Materials issued to factory for repairs	900
Factory wages paid (including indirect wages ₹ 23,000)	77,500
Production overheads incurred	95,200
Production overheads under-absorbed and written-off	3,200
Sales	2,56,000

The Company's gross profit is 25% on Cost of Sales. At the end of the quarter, WIP stocks increased by ₹ 7,500.

Prepare the relevant Control Accounts, Costing Profit & Loss Account and General Ledger Adjustment Account to record the above transactions for the quarter ended 30.06.2013.

Solution:

General Ledger Adj. A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Sales	2,56,000	By Balance b/d	1,88,750
To Balance c/d	1,80,150	By Stores ledger control A/c (Materials purchased)	26,700
		By Wages control A/c (Factory wages paid)	77,500

		By Factory Overheads control A/c (Production overhead incurred)	95,200
		By Costing Profit & Loss A/c	48,000
	4,36,150		4,36,150

Stores Ledger Control A/c

Dr. Cr.

Particulars	**(₹)**	**Particulars**	**(₹)**
To Balance b/d	53,375	By WIP control A/c (Materials issued to production)	40,000
To General ledger adj. A/c (Materials purchased)	26,700	By Factory overhead control A/c (Materials issued for repairing)	900
		By Balance c/d	39,175
	80,075		80,075

WIP Control A/c

Dr. Cr.

Particulars	**(₹)**	**Particulars**	**(₹)**
To Balance b/d	1,04,595	By Finished goods control A/c (Balancing figure)	2,02,900
To Stores ledger control A/c	40,000	By Balance c/d	1,12,095
To Wages control A/c	54,500		
To Factory Overhead control A/c	1,15,900		
	3,14,995		3,14,995

Finished Goods Control A/c

Dr. Cr.

Particulars	**(₹)**	**Particulars**	**(₹)**
To Balance b/d	30,780	By Cost of sales A/c *(Refer to note)*	2,04,800
To WIP control A/c	2,02,900	By Balance c/d	28,880
	2,33,680		2,33,680

Note: Gross profit is 25% of Cost of Sales or 20% on sales.

Hence cost of sales = ₹ 2,56,000 – 20% of ₹ 2,56,000 = ₹ 2,04,800

Factory Overhead Control A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Stores ledger control A/c	900	By Costing Profit & Loss A/c (Under-absorption of overhead)	3,200
To Wages control A/c	23,000	By WIP control A/c	1,15,900
To General ledger adj. A/c	95,200		
	1,19,100		1,19,100

Cost of Sales A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Finished goods control A/c	2,04,800	By Costing Profit & Loss A/c	2,04,800

Sales A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Costing Profit & Loss A/c	2,56,000	By GLA A/c	2,56,000

Wages Control A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To General ledger adj. A/c	77,500	By Factory overhead control A/c (Wages paid for direct labour)	23,000
		By WIP control A/c (Wages paid for indirect labour)	54,500
	77,500		77,500

Costing Profit & Loss A/c

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Factory O/H Control A/c	3,200	By Sales A/c	2,56,000
To Cost of sales A/c	2,04,800		
To General ledger adj. A/c (Profit)	48,000		
	2,56,000		2,56,000

Trial Balance (as on 30.06.2013)

	Dr. (₹)	Cr. (₹)
Stores ledger control A/c	39,175	
WIP control A/c	1,12,095	
Finished goods control A/c	28,880	
To General ledger adjustment A/c		1,80,150
	1,80,150	1,80,150

Question-3

Following information have been extracted from the cost records of XYZ Pvt. Ltd Stores:

	(₹)
Opening balance	54,000
Purchases	2,88,000
Transfer from WIP	1,44,000
Issue to WIP	2,88,000
Issue for repairs	36,000
Deficiency found in stock	10,800
Work-in-progress:	**(₹)**
Opening balance Direct	1,08,000
wages applied Overheads	1,08,000
charged	4,32,000
Closing balance	72,000

Finished Production:	**(₹)**
Entire production is sold at a profit of 15% on cost of WIP	
Wages paid	1,26,000
Overheads incurred	4,50,000

Draw the Stores Ledger Control Account, Work-in-Progress Control Account, Overheads Control Account and Costing Profit and Loss Account.

Solution:

Stores Ledger Control A/c

Particulars	**(₹)**	**Particulars**	**(₹)**
To Balance b/d	54,000	By Work in Process A/c	2,88,000
To General Ledger Adjustment A/c	2,88,000	By Overhead Control A/c	36,000
To Work in Process A/c	1,44,000	By Overhead Control A/c (Deficiency)	10,800*
		By Balance c/d	1,51,200
	4,86,000		4,86,000

*Deficiency assumed as normal (alternatively can be treated as abnormal loss)

Work in Progress Control A/c

Particulars	**(₹)**	**Particulars**	**(₹)**
To Balance b/d	1,08,000	By Stores Ledger Control a/c	1,44,000
To Stores Ledger Control A/c	2,88,000	By Costing P/L A/c (Balancing figures being Cost of finished goods)	7,20,000
To Wages Control A/c	1,08,000	By Balance c/d	72,000
To Overheads Control a/c	4,32,000		
	9,36,000		9,36,000

Overheads Control A/c

Particulars	(₹)	Particulars	(₹)
To Stores Ledger Control A/c	36,000	By Work in Process A/c	4,32,000
To Stores Ledger Control A/c	10,800	By Balance c/d (Under absorption)	82,800
To Wages Control A/c (₹1,26,000- ₹1,08,000)	18,000		
To Gen. Ledger Adjust. A/c	4,50,000		
	5,14,800		5,14,800

Costing Profit & Loss A/c

Particulars	(₹)	Particulars	(₹)
To Work in progress	7,20,000	By Gen. ledger Adjust. A/c (Sales) (₹ 7,20,000 × 115%)	8,28,000
To Gen. Ledger Adjust. A/c (Profit)	1,08,000		
	8,28,000		8,28,000

Question-4 (RTP May 2020 Q6 New Course)

The following are the balances existed in the books of JPG Ltd. for the year ended, 31st March, 2019:

Particulars	Dr. (₹)	Cr. (₹)
Stores Ledger Control A/c	30,00,000	
WIP Control A/c	15,00,000	
Finished Goods Control A/c	25,00,000	
Manufacturing Overheads Control A/c		1,50,000
Cost Ledger Control A/c		68,50,000

During the year 2019-20, the following transactions took place:

Particulars	Amount (₹)
Finished product (at cost)	22,50,000
Manufacturing Overhead incurred	8,50,000
Raw material purchased	12,50,000
Factory wages	4,00,000
Indirect labour	2,00,000
Cost of sales	17,50,000
Materials issued to production	13,50,000
Sales returned (at cost)	90,000
Material returned to suppliers	1,30,000
Manufacturing overhead charged to production	8,50,000

Required:

PREPARE the following control accounts and Trial balance at the end of the year: Cost Ledger, Stores Ledger, Work-in-process, Finished Stock, Manufacturing Overhead, Wages and Cost of Sales.

Solution:

Cost Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To Stores Ledger control A/c	1,30,000	By Balance b/d	68,50,000
To Costing Profit & Loss A/c	17,10,000	By Stores Ledger control A/c	12,50,000
		By Wages Control A/c	6,00,000
To Balance c/d	77,10,000	By Manufacturing overhead control A/c	8,50,000
	95,50,000		95,50,000

Store Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	30,00,000	By WIP Control A/c	13,50,000
To Cost Ledger control A/c	12,50,000	By Cost Ledger control A/c (return)	1,30,000

		By Balance c/d	27,70,000
	42,50,000		42,50,000

WIP Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	15,00,000	By Finished Stock Control A/c	22,50,000
To Wages Control A/c	4,00,000		
To Stores Ledger control A/c	13,50,000		
To Manufacturing overhead control A/c	8,50,000	By Balance c/d	18,50,000
	41,00,000		41,00,000

Finished Stock Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	25,00,000	By Cost of Sales A/c	17,50,000
To WIP Control A/c	22,50,000		
To Cost of Sales A/c (sales return)	90,000	By Balance c/d	30,90,000
	48,40,000		48,40,000

Manufacturing Overhead Control Account

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	8,50,000	By Balance b/d	1,50,000
To Wages Control A/c	2,00,000	By WIP Control A/c	8,50,000
		By Costing P&L A/c (underrecovery)	50,000
	10,50,000		10,50,000

Wages Control Account

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	6,00,000	By WIP Control A/c	4,00,000
		By Manufacturing overhead control A/c	2,00,000
	6,00,000		6,00,000

Cost of Sales Account

Particulars	(₹)	Particulars	(₹)
To Finished Stock Control A/c	17,50,000	By Finished Stock Control A/c (sales return)	90,000
		By Costing Profit & Loss A/c	16,60,000
	17,50,000		17,50,000

Trial Balance

Particulars	Dr. (₹)	Cr. (₹)
Stores Ledger Control A/c	27,70,000	
WIP Control A/c	18,50,000	
Finished Goods Control A/c	30,90,000	
Cost Ledger Control A/c		77,10,000
	77,10,000	77,10,000

Working:

Costing P&L Account

Particulars	(₹)	Particulars	(₹)
To Cost of Sales A/c	16,60,000	By Cost Ledger control A/c	17,10,000
To Manufacturing overhead control A/c	50,000		
	17,10,000		17,10,000

Part-II: Integral System

A. QUESTION FROM STUDY MATERIAL

Question-6 (Study Material - illustration-6)

JOURNALISE the following transactions assuming that cost and financial transactions are integrated:

	(₹)
Raw materials purchased	2,00,000
Direct materials issued to production	1,50,000
Wages paid (30% indirect)	1,20,000
Wages charged to production	84,000
Manufacturing expenses incurred	84,000
Manufacturing overhead charged to production	92,000
Selling and distribution costs	20,000
Finished products (at cost)	2,00,000
Sales	2,90,000
Closing stock	Nil
Receipts from debtors	69,000
Payments to creditors	1,10,000

Question-7 (Study Material - illustration-7)

Bangalore Petrochemicals Co. keeps books on integrated accounting system. The following balances appear in the books as on 1st January, 20X8.

	DR. (₹)	CR. (₹)
Stores Ledger control A/c	18,000	
Work-in-Process Control A/c	17,000	
Finished Goods Control A/c	13,000	
Bank A/c	10,000	

Creditors A/c		8,000
Fixed assets A/c	55,000	
Debtors A/c	12,000	
Share capital A/c		80,000
Provision for depreciation A/c		5,000
Profit and loss A/c		32,000
	1,25,000	**1,25,000**

Transaction for the year ended 31st Dec., 20X8 were as given below:

	(₹)	(₹)
Wages-direct	87,000	
Wages-indirect	5,000	92,000
Purchase of materials (on credit)		1,00,000
Materials issued to production		1,10,000
Materials for repairs		2,000
Goods finished during the year (at cost)		2,15,000
Sales (credit)		3,00,000
Cost of goods sold		2,20,000
Production overhead absorbed		48,000
Production overhead incurred		40,000
Administration overhead incurred (production)		12,000
Selling overhead incurred		14,000
Payments of creditors		1,01,000
Payments of debtors		2,90,000
Depreciation on machinery		1,300
Prepaid rent (included in factory overheads)		300

PREPARE accounts in the integrated ledger.

Hints: Costing P/L (Cr.) = ₹ 66,000, Bank (Dr.) = ₹ 41,000, Purchase = ₹ 1,00,000

Question-8 (Study Material - illustration-8)

In the absence of the Chief Accountant, you have been asked to prepare a month's cost accounts for a company which operates a batch costing system fully integrated with the

financial accounts. The following relevant information is provided to you:

	(₹)	(₹)
Balances at the beginning of the month:		
Stores Ledger Control Account		25,000
Work-in-Process Control Account		20,000
Finished Goods Control Account		35,000
Prepaid Production Overheads brought forward from previous month		3,000
Transactions during the month:		
Materials Purchased		75,000
Materials Issued:		
To production	30,000	
To factory maintenance	4,000	34,000
Materials transferred between batches		5,000
Total wages paid:		
To direct workers	25,000	
To indirect workers	5,000	30,000
Direct wages charged to batches		20,000
Recorded non-productive time of direct workers		5,000
Selling and Distribution Overheads Incurred		6,000
Other Production Overheads Incurred		12,000
Sales		1,00,000
Cost of Finished Goods Sold		80,000
Cost of Goods completed and transferred into finished goods during the month		65,000
Physical value of work-in-Process at the end of the month		40,000

The production overhead absorption rate is 150% of direct wages charged to work- in-Process.

Required:

PREPARE the following accounts for the month:

(a) Stores Ledger Control Account.
(b) Work-in-Process Control Account.
(c) Finished Goods Control Account.
(d) Production Overhead Control Account.
(e) Costing Profit and Loss Account.

Hints: Over-absorption = ₹1,000, Costing P/L (cr.) = 20,000, Purchase = ₹75,000

TEST YOUR KNOWLEDGE

Question-3 (Study Material Q-3)

Dutta Enterprises operates an integral system of accounting. You are required to PASS the Journal Entries for the following transactions that took place for the year ended 30th June, 20X8.

(Narrations are not required.)

	(₹)
Raw materials purchased (50% on Credit)	6,00,000
Materials issued to production	4,00,000
Wages paid (50% Direct)	2,00,000
Wages charged to production	1,00,000
Factory overheads incurred	80,000
Factory overheads charged to production	1,00,000
Selling and distribution overheads incurred	40,000
Finished goods at cost	5,00,000
Sales (50% Credit)	7,50,000
Closing stock	NIL
Receipts from debtors	2,00,000
Payments to creditors	2,00,000

B. PAST YEAR EXAM QUESTIONS

May-22. Q4 (c) (5 marks)

Journalize the following transactions assuming the cost and financial accounts are integrated:

Particulars	Amount (₹)
Direct Materials issued to production	₹ 5,88,000
Allocation of Wages (Indirect)	₹ 7,50,000
Factory Overheads (Over absorbed)	₹ 2,25,000
Administrative Overheads (Under absorbed)	₹ 1,55,000
Deficiency found in stock of Raw material (Normal)	₹ 2,00,000

Solution:

Particulars		(₹)	(₹)
(i) Work-in-Progress Ledger Control A/c	Dr.	5,88,000	
To Stores Ledger Control A/c			5,88,000
(Being issue of direct materials to production)			
(ii) Factory Overhead control A/c	Dr.	7,50,000	
To Wages Control A/c			7,50,000
(Being allocation of Indirect wages)			
(iii) Factory Overhead Control A/c	Dr.	2,25,000	
To Costing Profit & Loss A/c			2,25,000
(Being transfer of over absorption of Factory overhead)			
(iv) Costing Profit & Loss A/c	Dr.	1,55,000	
To Administration Overhead Control A/c			1,55,000
(Being transfer of under absorption of Administration overhead)			
(v) Factory Overhead Control A/c	Dr.	2,00,000	
To Stores Ledger Control A/c			2,00,000
(Being transfer of deficiency in stock of raw material)			

(Note: Costing P/&/L = P/&/L and SLC = MLC)

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

Journalise the following transactions assuming cost and financial accounts are integrated :

		(₹)
(i)	Materials issued :	
	Direct	3,25,000
	Indirect	1,15,000
(ii)	Allocation of wages (25% indirect)	6,50,000
(iii)	Under/Over absorbed overheads:	
	Factory (Over)	2,50,000
	Administration (Under)	1,75,000
(iv)	Payment to Sundry Creditors	1,50,000
(v)	Collection from Sundry Debtors	2,00,000

Solution:

Journal Entries under Integrated system of accounting

Particulars		(₹)	(₹)
(i) Work-in-Progress Ledger Control A/c	Dr.	3,25,000	
Factory Overhead Control A/c	Dr.	1,15,000	
To Stores Ledger Control A/c			4,40,000
(Being issue of Direct and Indirect materials)			
(ii) Work-in Progress Ledger Control A/c	Dr.	4,87,500	
Factory Overhead control A/c	Dr.	1,62,500	
To Wages Control A/c			6,50,000
(Being allocation of Direct and Indirect wages)			

(iii) Factory Overhead Control A/c To Costing Profit & Loss A/c *(Being transfer of over absorption of Factory overhead)*	Dr.	2,50,000	2,50,000
Costing Profit & Loss A/c To Administration Overhead Control A/c *(Being transfer of under absorption of Administration overhead)*	Dr.	1,75,000	1,75,000
(iv) Sundry Creditors A/c To Cash/ Bank A/c *(Being payment made to creditors)*	Dr.	1,50,000	1,50,000
(v) Cash/ Bank A/c To Sundry Debtors A/c *(Being payment received from debtors)*	Dr.	2,00,000	2,00,000

Question-2

BPR Limited keeps books on integrated accounting system. The following balances appear in the books as on April 1, 2013.

	Dr. (₹)	Cr. (₹)
Stores Control A/c	40,950	–
Work-in-progress A/c	38,675	–
Finished Goods A/c	52,325	–
Bank A/c	–	22,750
Trade Payables A/c	–	18,200
Non-Current Assets A/c	1,47,875	–
Trade Receivables A/c	27,300	–
Share Capital A/c	–	1,82,000
Provision for Depreciation A/c	–	11,375
Provision for Doubtful Debts A/c	–	3,725
Factory Overheads Outstanding A/c	–	6,250
Pre-Paid Administration Overheads A/c	9,975	–
Profit & Loss A/c*	–	72,800
(*Reserve & Surplus)	3,17,100	3,17,100

The transactions for the year ended March 31, 2014, were as given below:

	(₹)	(₹)
Direct Wages	1,97,925	–
Indirect Wages	11,375	2,09,300
Purchase of materials (on credit)		2,27,500
Materials issued to production		2,50,250
Material issued for repairs		4,550
Goods finished during the year (at cost)		4,89,125
Credit Sales		6,82,500
Cost of Goods sold		5,00,500
Production overheads absorbed		1,09,200
Production overheads paid during the year		91,000
Production overheads outstanding at the end of year		7,775
Administration overheads paid during the year		27,300
Selling overheads incurred		31,850
Payment to Trade Payables		2,29,775
Payment received from Trade Receivables		6,59,750
Depreciation of Machinery		14,789
Administration overheads outstanding at the end of year		2,225
Provision for doubtful debts at the end of the year		4,590

Required:

Write up accounts in the integrated ledger of BPR Limited and prepare a Trial balance.

Solution:

Stores Control A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	40,950	By WIP A/c	2,50,250
To Trade Payables A/c	2,27,500	By Production overheads	4,550
		A/c By Balance c/d	13,650
	2,68,450		2,68,450

Wages Control A/c

Dr. Cr.

	(₹)		(₹)
To Bank (Direct wages)	1,97,925	By Work-in-Progress A/c	1,97,925
To Bank (Indirect wages)	11,375	By Production overheads A/c	11,375
	2,09,300		2,09,300

Work-in-Progress A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	38,675	By Finish goods A/c	4,89,125
To Wages control A/c To Stores control A/c To Production overheads A/c	1,97,925 2,50,250 1,09,200	By Balance c/d	1,06,925
	5,96,050		5,96,050

Production Overheads A/c

Dr. Cr.

	(₹)		(₹)
To Wages control A/c	11,375	By WIP A/c	1,09,200
To Stores control A/c	4,550	By Profit & Loss A/c	14,039
To Bank (₹ 91,000 – ₹ 6,250)	84,750	(Under-absorbed overheads Written off)	
To Production overheads outstanding	7,775		
To Provision for depreciation	14,789		
	1,23,239		1,23,239

Production overhead incurred = Payment made + Closing Outstanding + Prov. for Depreciation – Opening Outstanding

Finished Goods A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	52,325	By Cost of sales A/c	5,00,500
To Work-in-progress A/c	4,89,125	By Balance c/d	80,450
To Admin. overheads A/c	39,500		
	5,80,950		5,80,950

Administration Overheads A/c

Dr. Cr.

	(₹)		(₹)
To Pre-paid admin. overheads A/c	9,975	By Finished goods A/c	39,500
To Bank	27,300		
To Admin. overheads outstanding	2,225		
	39,500		39,500

Cost of Sales A/c

Dr. **Cr.**

	(₹)		(₹)
To Finished goods A/c	5,00,500	To Sales A/c	5,32,350
To Selling overheads	31,850		
	5,32,350		5,32,350

Sales A/c

Dr. Cr.

	(₹)		(₹)
To Cost of sales A/c	5,32,350	By Trade Receivables A/c	6,82,500
To Profit & Loss A/c	1,50,150		
	6,82,500		6,82,500

Factory Overheads / Production Overheads Outstanding A/c

Dr. Cr.

	(₹)		(₹)
To Bank	6,250	By Balance b/d	6,250
To Balance c/d	7,775	By Production overheads	7,775
	14,025		14,025

Prepaid Administration Overheads A/c

Dr. **Cr.**

	(₹)		(₹)
To Balance b/d	9,975	By Admin. overheads A/c	9,975
	9,975		9,975

Provision for Depreciation A/c

Dr. Cr.

	(₹)		(₹)
To Balance c/d	26,164	By Balance b/d	11,375
		By Production overheads A/c	14,789
	26,164		26,164

Provision for Doubtful Debts A/c

Dr. Cr.

	(₹)		(₹)
To Balance c/d	4,590	By Balance b/d	3,725
		By Profit & Loss A/c	865
	4,590		4,590

Profit & Loss A/c

Dr. Cr.

	(₹)		(₹)
To Provision for doubtful debts	865	By Balance b/d	72,800
To Production overheads	14,039	By Sales A/c	1,50,150
To Balance c/d*	2,08,046		
	2,22,950		2,22,950

* Profit is transferred to Reserve & Surplus.

Trade Receivables A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	27,300	By Bank A/c	6,59,750
To Sales A/c	6,82,500	By Balance c/d	50,050
	7,09,800		7,09,800

Trade Payables A/c

Dr. Cr.

	(₹)		(₹)

To Bank	2,29,775	By Balance b/d	18,200
To Balance c/d	15,925	By Stores control/Ac	2,27,500
	2,45,700		2,45,700

Non-Current Assets A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	1,47,875	By balance c/d	1,47,875

Bank A/c

Dr. Cr.

	(₹)		(₹)
To Trade Receivables	6,59,750	By Balance b/d By	22,750
		Direct wages By	1,97,925
		Indirect wages	11,375
		By Production overheads (₹ 84,750 + ₹6,250)	91,000
		By Admn. Overheads A/c	27,300
		By Selling overheads A/c	31,850
		By Trade Payables A/c	2,29,775
		By Balance c/d	47,775
	6,59,750		6,59,750

Trial Balance
As on March 31, 2014

	Dr. (₹)	Cr. (₹)
Stores control A/c	13,650	
Work in Progress A/c	1,06,925	
Finished goods A/c	80,450	
Bank A/c	47,775	
Trade Payables A/c		15,925
Non- current Assets A/c	1,47,875	
Trade Receivables A/c	50,050	
Share capital A/c		1,82,000
Provision for depreciation A/c		26,164
Reserve & Surplus (Profit & Loss A/c)		2,08,046
Production overheads outstanding A/c		7,775
Outstanding administrative overheads A/c		2,225
Provision for doubtful debt		4,590
	4,46,725	4,46,725

Part-III: Reconciliation of Cost and Financial Accounts

A. QUESTION FROM STUDY MATERIAL

Question-9 (Study Material - illustration-9)

The following figures are available from the financial records of ABC Manufacturing Co. Ltd. for the year ended 31-3-20X8.

	(₹)
Sales (20,000 units)	25,00,000
Materials	10,00,000
Wages	5,00,000
Factory Overheads	4,50,000
Office and administrative Overhead (production related)	2,60,000
Selling and distribution Overheads	1,80,000
Finished goods (1,230 units)	1,50,000

	(₹)	(₹)
Work-in-Process:		
Materials	30,000	
Labour	20,000	
Factory overheads	20,000	70,000
Goodwill written off		2,00,000
Interest on capital		20,000

In the Costing records, factory overhead is charged at 100% of wages, administration overhead 10% of factory cost and selling and distribution overhead at the rate of ₹ 10 per unit sold.

PREPARE a statement reconciling the profit as per cost records with the profit as per financial records.

Hints:

Particulars	Profit (₹)
Financial Accounts	1,10,000
Cost Accounts	3,00,000

Question-10 (Study Material - illustration-10)

Following are the figures extracted from the Cost Ledger of a manufacturing unit.

	(₹)
Stores:	
Opening balance	15,000
Purchases	80,000
Transfer from WIP	40,000
Issue to WIP	80,000
Issue to repairs and maintenance	10,000
Sold as a special case at cost	5,000
Shortage in the year	3,000
Work-in-Process:	
Opening inventory	30,000
Direct labour cost charged	30,000
Overhead cost charged	1,20,000
Closing Balance	20,000
Finished Products:	
Entire output is sold at 10% profit on actual cost from work-in-process.	
Others:	
Wages for the period	35,000
Overhead Expenses	1,25,000

ASCERTAIN the profit or loss as per financial account and cost accounts and reconcile them.

Hints:

Particulars	Profit (₹)
Financial Accounts	(3,000)
Cost Accounts	20,000

Question-11 (Study Material - illustration-11)

The following figures have been extracted from the Financial Accounts of a manufacturing firm for the first year of its operation:

	(₹)
Direct Material Consumption	50,00,000
Direct Wages	30,00,000
Factory Overhead	16,00,000
Administration Overheads (production related)	7,00,000
Selling and Distribution Overheads	9,60,000
Bad Debts	80,000
Preliminary Expenses written off	40,000
Legal Charges	10,000
Dividends Received	1,00,000
Interest Received on Deposits	20,000
Sales (1,20,000 units)	1,20,00,000
Closing Stock:	
Finished Goods (4,000 units)	3,20,000
Work-in-Process	2,40,000

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

Prepare the Profit and Loss Accounts both as per financial records and as per cost records. Reconcile the profits as per the two records.

Hints:

Particulars	Profit (₹)
Financial Accounts	12,90,000
Cost Accounts	5,65,160

TEST YOUR KNOWLEDGE

Question-5 (Study Material Q-5)

The following information is available from the financial books of a company having a normal production capacity of 60,000 units for the year ended 31st March, 20X8:

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

You are required to:

1. Find out profit as per financial books for the year ended 31st March, 20x8;
2. PREPARE the cost sheet and ascertain the profit as per cost accounts for the year ended 31st March, 20X8 assuming that the indirect expenses are absorbed on the basis of normal production capacity; and
3. PREPARE a statement reconciling profits shown by financial and cost books.

Hints:

Particulars	Profit (₹)
Financial Records	40,000
Cost Records	49,500

Question-6 (Study Material Q-6)

M/s. H.K. Piano Company showed a net loss of ₹ 4,16,000 as per their financial accounts for the year ended 31st March, 20X8. The cost accounts, however, disclosed a net loss of ₹ 3,28,000 for the same period. The following information was revealed as a result of scrutiny of the figures of both the sets of books:

		(₹)
(i)	Factory overheads under-recovered	6,000
(ii)	Administration overheads over-recovered	4,000
(iii)	Depreciation charged in financial accounts	1,20,000
(iv)	Depreciation recovered in costs	1,30,000
(v)	Interest on investment not included in costs	20,000

(vi)	Income-tax provided	1,20,000
(vii)	Transfer fees (credit in financial books)	2,000
(viii)	Stores adjustment (credit in financial books)	2,000

PREPARE a Memorandum reconciliation account.

B. PAST YEAR EXAM QUESTIONS

May-23. Q5 (b) (5 marks)

The following information has been obtained from financial accounting and cost accounting records.

	Financial Accounting	Cost Accounting
	₹	₹
(i) Factory Overhead	94,750	90,000
(ii) Administrative Overhead	60,000	57,000
(iii) Selling Overhead	55,000	61,000
(iv) Opening Stock	17,500	22,500
(v) Closing Stock	12,500	15,000

Required:

Indicate under-recovery and over-recovery and their effects on cost accounting profit. [Note: You are not required to prepare reconciliation statement.]

Solution:

	Financial Accounting	Cost Accounting	Difference	Under/Over-recovery	Effect on Cost Accounting Profit	Net Effect* on Cost Accounting Profit
	₹	₹	₹			
(i) Factory Overhead	94,750	90,000	4,750	Under-recovery	Increased	To be reduced/ deducted
(ii) Administrative Overhead	60,000	57,000	3,000	Under-recovery	Increased	To be reduced/ deducted
(iii) Selling Overhead	55,000	61,500	-6,500	Over-recovery	Decreased	To be added
(iv) Opening Stock	17,500	22,500	-5,000	Over valuation	Decreased	To be added

(v) Closing Stock	12,500	15,000	-2,500	Over valuation	Increased	To be reduced/ deducted

*Taking Cost Accounting Profit as base

(Under recovery and over recovery with effect are answered by the candidate, or if under recovery and over recovery with treatment (net effect) are answered, due credit shall be given in both cases)

Nov-22. Q5 (b) (5 marks)

X Ltd. follows Non-Integrated Accounting System. Financial Accounts of the company show a Net Profit of ₹ 5,50,000 for the year ended 31st March, 2022. The chief accountant of the company has provided following information from the Financial Accounts and Cost Accounts:

Sr. No	Particulars	(₹)
(i)	Legal Chargers Provided in Financial accounts	15,250
(ii)	Interim Dividend received credited in financial accounts	4,50,000
(iii)	Preliminary Expenses written off in financial accounts	25,750
(iv)	Over recovery of selling overheads in cost accounts	11,380
(v)	Profit on sale of capital asset credited in financial accounts	30,000
(vi)	Under valuation of closing stock in cost accounts	25,000
(vii)	Over recovery of production overheads in cost accounts	10,200
(viii)	Interest paid on Debentures shown in financial accounts	50,000

Required:

Find out the Profit (Loss) as per Cost Accounts by preparing a Reconciliation Statement.

Solution:

Reconciliation Statement

(Reconciliation the profit as per financial records with the profit as per costing records)

	Particulars	(₹)	Total (₹)
	Profit as per Financial Accounts		5,50,000
Add:	Legal Charges	15,250	
	Preliminary expenses written off	25,750	
	Interest paid	50,000	91,000

			6,41,000
Less:	Under-valuation of closing stock in cost book	25,000	
	Interim Dividend Received	4,50,000	
	Over recovery of selling overheads in cost accounts	11,380	
	Over recovery of production overhead in cost accounts	10,200	5,26,580
	Profit on sale of Assets	30,000	
	Profit as per Cost Accounts		1,14,420

Dec-21. Q4 (b) (5 marks)

R Ltd. showed a Net Profit of ₹ 3,60,740 as per their cost accounts for the year ended 31st March, 2021.

The following information was revealed as a result of scrutiny of the figures from the both sets of accounts:

Sr. No.	Particulars	(₹)
i.	Over recovery of selling overheads in cost accounts	10,250
ii.	Over valuation of closing stock in cost accounts	7,300
iii.	Rent received credited in financial accounts	5,450
iv.	Bad debts provided in financial accounts	3,250
v.	Income tax provided in financial accounts	15,900
vi.	Loss on sale of capital asset debited in financial accounts	5,800
vii.	Under recovery of administration overheads in cost accounts	3,600

Required:

Prepare a reconciliation statement showing the profit as per financial records.

Solution:

Statement of Reconciliation

(Reconciling the profit as per costing records with the profit as per financial records)

	(₹)	(₹)
Net Profit as per Cost Accounts		3,60,740
Add:		
Over recovery of selling overheads in cost accounts	10,250	
Rent received credited in financial accounts	5,450	15,700
		376,440

Less:		
Over valuation of closing stock in cost accounts	7,300	
Bad debts provided in financial accounts	3,250	
Income tax provided in financial accounts	15,900	
Loss on sale of capital asset debited in financial accounts	5,800	
Under recovery of administration overheads in cost accounts	3,600	35,850
Profit as per Financial Accounts		3,40,590

May-19. Q1 (d) (5 marks)

M/s Abid Private Limited disclosed a net profit of ₹ 48,408 as per cost books for the year ending 31st March 2019. However, financial accounts disclosed net loss of ₹ 15,000 for the same period. On scrutinizing both the set of books of accounts, the following information was revealed:

Works Overheads under-recovered in Cost Books	48,600
Office Overheads over-recovered in Cost Books	11,500
Dividend received on Shares	17,475
Interest on Fixed Deposits	21,650
Provision for doubtful debts	17,800
Obsolescence loss not charged in Cost Accounts	17,200
Stores adjustments (debited in Financial Accounts)	35,433
Depreciation charged in financial accounts	30,000
Depreciation recovered in Cost Books	35,000

Prepare a Memorandum Reconciliation Account.

Solution:

Memorandum Reconciliation Account

Dr. Cr.

Particulars	(₹)	Particulars	(₹)
To Works overheads under recovered in Cost Accounts	48,600	By Net profit as per Costing books	48,408
To Provision for doubtful debts	17,800	By Office overheads over recovered in cost accounts	11,500

To Obsolescence loss	17,200	By Dividend received on shares	17,475
To Store adjustment (Debit)	35,433	By Interest on fixed deposit	21,650
		By Depreciation over-charged	5,000
		By Net loss as per financial accounts	15,000
	1,19,033		1,19,033

[**Note:** This question may also be solved by taking net loss as per financial accounts as basis.]

May-18. Q1 (d) (5 marks)

GK Ltd. showed net loss of ₹ 2,43,300 as per their financial accounts for the year ended 31st March, 2018. However, cost accounts disclosed net loss of ₹ 2,48,300 for the same period. On scrutinizing both the set of books of accounts, the following information were revealed:

		₹
(i)	Works overheads over recovered 30,400	30,000
(ii)	Selling overheads under recovered	20,300
(iii)	Administrative overheads under recovered	27,700
(iv)	Depreciation over charged in cost accounts	35,100
(v)	Bad debts w/off in financial accounts	15,000
(vi)	Preliminary Exp. w/off in financial accounts	5,000
(vii)	Interest credited during the year in financial accounts	7,500

Prepare a reconciliation statement reconciling losses shown by financial and cost accounts by taking costing net loss as base.

Solution:

Reconciliation Statement

	Particulars	₹	₹
	Loss as per Cost Accounts		(2,48,300)
Add:	Works overheads over recovered	30,400	
	Depreciation over charged in cost accounts	35,100	

	Interest credited during the year in financial accounts	7,500	73,000
Less:	Selling overheads under recovered	20,300	
	Administrative overheads under recovered	27,700	
	Bad debts w/off in financial accounts	15,000	
	Preliminary Exp. w/off in financial accounts	5,000	(68,000)
	Loss as per Financial Accounts		(2,43,300)

July-21. Q3 (a) (10 marks)

The Profit and Loss account of ABC Ltd. for the year ended 31st March, 2021 is given below:

Profit and Loss account

(for the year ended 31st March, 2021)

To Direct Material	6,50,000	By Sales (15000 units)	15,00,000
To Direct Wages	3,50,000	By Dividend received	9,000
To Factory overheads	2,60,000		
To Administrative overheads	1,05,000		
To Selling overheads	85,000		
To Loss on sale of investments	2,000		
To Net Profit	57,000		
	15,09,000		15,09,000

- Factory overheads are 50% fixed and 50% variable.
- Administrative overheads are 100% fixed.
- Selling overheads are completely variable.
- Normal production capacity of ABC Ltd. is 20,000 units.
- Indirect Expenses are absorbed in the cost accounts on the basis of normal production capacity.
- Notional rent of own premises charged in Cost Accounts is amounting to ₹ 12,000. You are required to:

(i) Prepare a Cost Sheet and ascertain the Profit as per Cost Records for the year ended 31st March, 2021.

(ii) Reconcile the Profit as per Financial Records with Profit as per Cost Records.

Solution:

(i) Cost Sheet
(for the year ended 31st March, 2021)

	(₹)	(₹)
Direct material		6,50,000
Direct wages		3,50,000
Prime cost		**10,00,000**
Factory Overheads:		
Variable (50% of ₹ 2,60,000)	1,30,000	
Fixed (₹ 1,30,000 × 15,000/20,000)	97,500	2,27,500
Works cost		**12,27,500**
Administrative Overheads (₹ 1,05,000 × 15,000/20,000)		78,750
Notional Rent		12,000
Cost of production		**13,18,250**
Selling Overheads		85,000
Cost of Sales		**14,03,250**
Profit (Balancing figure)		96,750
Sales revenue		**15,00,000**

(ii) Statement of Reconciliation
(Reconciling profit shown by Financial and Cost Accounts)

	(₹)	(₹)
Profit as per Cost Account		96,750
Add: Dividend received	9,000	
Add: Notional Rent	12,000	21,000
Less: Factory Overheads under-charged in Cost Accounts(₹ 2,60,000 – ₹2,27,500)	32,500	
Less: Administrative expenses under-charged in Cost Accounts (₹ 1,05,000 – ₹ 78,750)	26,250	
Less: Loss on sale of Investments	2,000	(60,750)

Profit as per Financial Accounts		57,000

(Note: Solution can be done considering base profit as per Financial Accounts)

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

A manufacturing company has disclosed net loss of ₹ 48,700 as per their cost accounting records for the year ended 31st March, 2014. However their financial accounting records disclosed net profit of ₹ 35,400 for the same period. A scrutiny of data of both the sets of books of accounts revealed the following information:

			(₹)
(i)		Factory overheads under absorbed	30,500
(ii)		Administrative overheads over absorbed	65,000
(iii)		Depreciation charged in financial accounts	2,25,000
(iv)		Depreciation charged in cost accounts	2,70,000
(v)		Income-tax provision	52,400
(vi)		Transfer fee (credited in financial accounts)	10,200
(vii)		Obsolescence loss charged in financial accounts	20,700
(viii)		Notional rent of own premises charged in cost accounts	54,000
(ix)		Value of opening stock:	
	(a)	in cost accounts	1,38,000
	(b)	in financial accounts	1,15,000
(x)		Value of closing stock:	
	(a)	in cost accounts	1,22,000
	(b)	in financial accounts	1,12,500

Prepare a Memorandum Reconciliation Account by taking costing loss as base.

Solution:

Memorandum Reconciliation Accounts

Dr. Cr.

Particulars		Amount (₹)	Particulars		Amount (₹)
To	Net Loss as per Cost Accounts	48,700	By	Administration overheads over recovered in Cost Accounts	65,000
To	Factory overheads under absorbed in Cost Accounts	30,500	By	Depreciation overcharged in Cost Accounts (₹ 2,70,000 – ₹ 2,25,000)	45,000
To	Provision for Income tax	52,400	By	Transfer fees in Financial Accounts	10,200
To	Obsolescence loss	20,700	By	Notional Rent of own premises	54,000
To	Overvaluation of closing stock in Cost Account**	9,500	By	Overvaluation of Opening stock in Cost Accounts*	23,000
To	Net Profit (as per Financial Accounts)	35,400			
		1,97,200			1,97,200

* Overvaluation of Opening Stock as per Cost Accounts

= Value in Cost Accounts – Value in Financial Accounts

= ₹ 1,38,000 – ₹ 1,15,000 = ₹ 23,000.

** Overvaluation of Closing Stock as per Cost Accounts

= Value in Cost Accounts – Value in Financial Accounts

= ₹ 1,22,000 – ₹ 1,12,500 = ₹ 9,500.

Question-2

R Limited showed a net loss of ₹ 35,400 as per their cost accounts for the year ended 31st March, 2014. However, the financial accounts disclosed a net profit of ₹ 67,800 for the same period. The following information were revealed as a result of scrutiny of the figures of cost accounts and financial accounts:

	(₹)
(i) Administrative overhead under recovered	25,500
(ii) Factory overhead over recovered	1,35,000
(iii) Depreciation under charged in Cost Accounts	26,000
(iv) Dividend received	20,000
(v) Loss due to obsolescence charged in Financial Accounts	16,800
(vi) Income tax provided	43,600

(vii) Bank interest credited in Financial Accounts	13,600
(viii) Value of opening stock:	
In Cost Accounts	1,65,000
In Financial Accounts	1,45,000
(ix) Value of closing stock:	
In Cost Accounts	1,25,500
In Financial Accounts	1,32,000
(x) Goodwill written-off in Financial Accounts	25,000
(xi) Notional rent of own premises charged in Cost Accounts	60,000
(xii) Provision for doubtful debts in Financial Accounts	15,000

Prepare a reconciliation statement by taking costing net loss as base.

Solution:

Statement of Reconciliation

Sl. No.	Particulars	Amount (₹)	Amount (₹)
	Net loss as per Cost Accounts		(35,400)
	Additions		
1.	Factory O/H over recovered	1,35,000	
2.	Dividend Received	20,000	
3.	Bank Interest received	13,600	
4.	Difference in Value of Opening Stock (1,65,000 – 1,45,000)	20,000	
5.	Difference in Value of Closing Stock (1,32,000 – 1,25,500)	6,500	
6.	Notional Rent of own Premises	60,000	2,55,100
	Deductions		
1.	Administration O/H under recovered	25,500	
2.	Depreciation under charged	26,000	
3.	Loss due to obsolescence	16,800	
4.	Income tax Provided	43,600	
5.	Goodwill written-off	25,000	
6.			

	Provision for doubtful debts	15,000	(1,51,900)
	Net Profit as per Financial A/c.		
			67,800

Question-3

You are given the following information of the cost department of a manufacturing company:

	(₹)
Stores:	
Opening Balance	12,60,000
Purchases	67,20,000
Transfer from work-in-progress	33,60,000
Issue to work-in-progress	67,20,000
Issue to repairs and maintenance	8,40,000
Shortage found in stock taking	2,52,000
Work-in-progress:	
Opening Balance	25,20,000
Direct wages applied	25,20,000
Overhead applied	90,08,000
Closing Balance	15,20,000

Finished products:

Entire output is sold at a profit of 12% on actual cost from work-in-progress.

Other information:

	(₹)
Wages incurred	29,40,000
Overhead incurred	95,50,000
Income from Investment	4,00,000

Loss on sale of fixed assets	8,40,000

Shortage in stock taking is treated as normal loss.
You are require to prepare:
(i) Stores control account;
(ii) Work-in-progress control account;
(iii) Costing Profit and Loss account;
(iv) Profit and Loss account and
(v) Reconciliation statement

Solution:

Stores Leger Control Account

Dr. Cr.

	(₹)		(₹)
To Balance b/d	12,60,000	By Work-in-progress control A/c	67,20,000
To General ledger adjustment A/c	67,20,000	By Overhead control A/c	8,40,000
To Work-in progress Control A/c	33,60,000	By Overhead control A/c (Shortage)	2,52,000
		By Balance c/d	35,28,000
	1,13,40,000		1,13,40,000

W.I.P Control A/c

Dr. Cr.

	(₹)		(₹)
To Balance b/d	25,20,000	By Stores ledger control A/c	33,60,000
To Stores ledger control A/c	67,20,000	By Costing P&L A/c (Cost of Sales) (Balancing figure)	1,58,88,000
To Direct wages Control A/c	25,20,000		
To Overhead control A/c	90,08,000	By Balance c/d	15,20,000
	2,07,68,000		2,07,68,000

Costing Profit and Loss A/c

Dr. Cr.

	(₹)			(₹)
To W.I.P Control A/c	1,58,88,000	By General Ledger Adj. A/c		
To General ledger Adj. A/c (Profit)	19,06,560	Cost of sales	1,58,88,000	
		Add 12%Profit	19,06,560	1,77,94,560
	1,77,94,560			1,77,94,560

Financial Profit and Loss A/c

Dr. Cr.

	(₹)	(₹)		(₹)	(₹)
To Opening stock : Stores	12,60,000		By Sales		1,77,94,560
W.I.P	25,20,000	37,80,000	By Income from investment		4,00,000
To Purchases		67,20,000	By Closing stock: Stores	35,28,000	
To Wages		29,40,000	W.I.P	15,20,000	50,48,000
To Overhead		95,50,000	By loss		5,87,440
To Loss on sale of fixed assets		8,40,000			
		2,38,30,000			2,38,30,000

Reconciliation Statement

Dr. Cr.

	(₹)	(₹)
Profit as per Cost Accounts		19,06,560
Add: Income from investments		4,00,000
		23,06,560

Less : Loss on sale of fixed assets	8,40,000	
Under absorption of overheads (Refer to Working Note)	20,54,000	28,94,000
Loss as per Financial Accounts		5,87,440

Working Notes:

Overhead Control Account

Dr. Cr.

	(₹)		(₹)
To General Ledger Adj. A/c	95,50,000	By W.I.P control A/c	90,08,000
To Stores Ledger Control A/c	2,52,000	By Balance c/d (under absorption of overheads)	20,54,000
To Stores ledger control A/c	8,40,000		
To Wages control A/c Indirect wages (₹ 29,40,000- ₹25,20,000)	4,20,000		
	1,10,62,000		1,10,62,000

Question-4

The following figures have been extracted from the cost records of a manufacturing unit:

	(₹)
Stores: Opening balance	32,000
Purchases of material	1,58,000
Transfer from work-in-progress	80,000
Issues to work-in-progress	1,60,000
Issues to repair and maintenance	20,000
Deficiencies found in stock taking	6,000
Work-in-progress: Opening balance	60,000
Direct wages applied	65,000
Overheads applied	2,40,000
Closing balance of W.I.P.	45,000

Finished products: Entire output is sold at a profit of 10% on actual cost from work-in-progress. Wages incurred ₹ 70,000, overhead incurred ₹ 2,50,000.

Items not included in cost records: Income from investment ₹ 10,000, Loss on sale of capital assets ₹ 20,000.
Draw up Store Control account, Work-in-progress Control account, Costing Profit and Loss account, Profit and Loss account and Reconciliation statement.

Solution:

(A) Costing books

Stores Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	32,000	By W.I.P. Control A/c	1,60,000
To General ledger adjustment A/c	1,58,000	By Work overhead control A/c	20,000
To Work in progress control A/c	80,000	By Costing Profit and Loss A/c	6,000
		By Balance c/d	84,000
	2,70,000		2,70,000

W.I.P. Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	60,000	By Stores control A/c	80,000
To Stores control A/c	1,60,000	By Costing profit and loss A/c (Cost of sales)	4,00,000
To Direct wages control A/c	65,000		
To Works overhead control A/c	2,40,000	By Balance c/d	45,000
	5,25,000		5,25,000

Works Overhead Control Account

Particulars	(₹)	Particulars	(₹)
To General ledger adjustment A/c	2,50,000	By W.I.P. Control A/c	2,40,000
To Store ledger control A/c	20,000	By Costing profit & loss A/c (under recovery)	30,000
	2,70,000		2,70,000

Costing Profit & Loss Account

Particulars	(₹)	Particulars		(₹)
To W.I.P. control A/c (Cost of sales)	4,00,000	By General ledger adjustment A/c		
To Works overhead control A/c	30,000	Cost of sales	4,00,000	
To Stores control A/c (shortage)	6,000	10% profit	40,000	4,40,000
To Profit	4,000			
	4,40,000			4,40,000

(B) Financial Books

Profit & Loss Account

Particulars		(₹)	Particulars		(₹)
To Opening stock			By Sales		4,40,000
			By Closing stock:		
Stores	32,000		Stores	84,000	
W.I.P.	60,000	92,000	W.I.P.	45,000	1,29,000
			By Income from investment		10,000
			By Loss		11,000
To Purchases		1,58,000			
To Wages incurred		70,000			
To Overheads incurred		2,50,000			
To Loss on sale of capital assets		20,000			
		5,90,000			5,90,000

Reconciliation statement

	(₹)	(₹)
Profit as per Cost Accounts		4,000
Add: Income from investment recorded in Financial accounts		10,000
		14,000
Less: Under absorption of wages in Cost accounts	5,000	
Loss on sales of capital asset only included in Financial accounts	20,000	25,000

Loss as per Financial accounts		11,000

Question-5

The following is the Trading and Profit & Loss Account of Omega Limited:

Dr. Cr.

Particulars	(₹)	Particulars		(₹)
To Materials consumed	23,01,000	By Sales (30,000 units)		48,75,000
To Direct wages	12,05,750	By Finished goods Stock (1,000 units)		1,30,000
To Production Overheads	6,92,250	By Work-in-progress:		
To Administration Overheads	3,10,375	Materials	55,250	
To Selling and Distribution Overheads	3,68,875	Wages	26,000	
To Preliminary Expenses written off	22,750	Production Overheads	16,250	97,500
To Goodwill written off	45,500			
To Fines	3,250	By Dividends received		3,90,000
To Interest on Mortgage	13,000	By Interest on bank deposits		65,000
To Loss on Sale of machine	16,250			
To Taxation	1,95,000			
To Net Profit for the year	3,83,500			
	55,57,500			55,57,500

Omega Limited manufactures a standard unit.

The Cost Accounting records of Omega Ltd. show the following:

(i) Production overheads have been charged to work-in-progress at 20% on Prime cost.

(ii) Administration Overheads have been recovered at ₹ 9.75 per finished Unit.

(iii) Selling & distribution Overheads have been recovered at ₹ 13 per Unit sold.

(iv) The Under- or Over-absorption of Overheads has not been transferred to costing P/L A/c.

Required:

(i) Prepare a proforma Costing Profit & Loss account, indicating net profit.
(ii) Prepare Control accounts for Production overheads, Administration Overheads and Selling & Distribution Overheads.
(iii) Prepare a statement reconciling the profit disclosed by the Cost records with that shown in Financial accounts.

Solution:

(i) **Costing Profit & Loss A/c**

		(₹)
	Materials	23,01,000
	Wages	12,05,750
	Prime Cost	35,06,750
	Production overheads (20% of Prime Cost)	7,01,350
		42,08,100
Less:	Work in Progress	97,500
Manufacturing cost incurred during the period		41,10,600
Add:	Administration Overheads (₹9.75 x 31,000 units)	3,02,250
	Cost of Production	44,12,850
Less:	Closing Finished goods stock (₹44,12,850 x 1,000/31,000)	1,42,350
	Cost of Goods Sold	42,70,500
Add	Selling & Distribution Overheads (₹13 × 30,000 units)	3,90,000
	Cost of Sales	46,60,500
	Profit (Balancing figure)	2,14,500
	Sales	48,75,000

Production OH A/c

	(₹)		(₹)
To Gen ledger Adj. A/c	6,92,250	By WIP A/c	7,01,350
To Overhead adj. A/c (Over-absorption)	9,100		
	7,01,350		7,01,350

(ii) **Administration Overheads A/c**

	(₹)		(₹)
To Gen Ledger Adj. A/c	3,10,375	By Finished goods A/c By Overhead adj. A/c (Under-absorption)	3,02,250 8,125
	3,10,375		3,10,375

Selling & Distribution Overheads A/c

	(₹)		(₹)
To Gen. Ledger Adj A/c	3,68,875	By Cost of Sales A/c	3,90,000
To Overhead Adj. A/c (Over-absorption)	21,125		
	3,90,000		3,90,000

(iii) **Reconciliation Statement**

		(₹)	(₹)
	Profits as per cost accounts Production		2,14,500
Add:	Overheads- over absorbed	9,100	
	Selling & Distribution Overheads- over absorbed	21,125	
	Dividend received	3,90,000	
	Interest on bank deposits	65,000	4,85,225
			6,99,725
Less:	Administration Overheads- under-absorbed	8,125	
	Preliminary exp. Written off	22,750	
	Goodwill written off	45,500	
	Fines	3,250	
	Interest on Mortgage	13,000	
	Loss on sale of machinery	16,250	
	Taxation	1,95,000	
	Write-down of Finished stock (₹1,42,350 – ₹1,30,000)	12,350	(3,16,225)
	Profit as per Financial Accounts		3,83,500

Question-6

The financial books of a company reveal the following data for the year ended 31st March, 2014:

	(₹)
Opening Stock:	
Finished goods 875 units	74,375
Work-in-process	32,000
01.04.2013 to 31.3.2014	
Raw materials consumed	7,80,000
Direct Labour	4,50,000
Factory overheads	3,00,000
Goodwill written off	1,00,000
Administration overheads	2,95,000
Dividend paid	85,000
Bad Debts	12,000
Selling and Distribution Overheads	61,000
Interest received	45,000
Rent received	18,000
Sales 14,500 units	20,80,000
Closing Stock: Finished goods 375 units	41,250
Work-in-process	38,667

The cost records provide as under:

- Factory overheads are absorbed at 60% of direct wages.
- Administration overheads are recovered at 20% of factory cost.
- Selling and distribution overheads are charged at ₹ 4 per unit sold.
- Opening Stock of finished goods is valued at ₹ 104 per unit.
- The company values work-in-process at factory cost for both Financial and Cost Profit Reporting.

Required:

(i) Prepare statements for the year ended 31st March, 2014 show
- the profit as per financial records
- the profit as per costing records.

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

Solution:

(i) Statement of Profit as per financial records
OR
Profit & Loss Account of the company
(for the year ended March 31, 2014)

	(₹)		(₹)
To Opening stock:		By Sales	20,80,000
Finished Goods	74,375	By Closing stock:	
Work-in-process	32,000	Finished Goods	41250
To Raw materials consumed	7,80,000	Work-in-Process	38,667
To Direct labour	4,50,000	By Rent received	18,000
To Factory overheads	3,00,000	By Interest received	45,000
To Goodwill written off	1,00,000		
To Administration overheads	2,95,000		
To Selling & distribution overheads	61,000		
To Dividend paid	85,000		
To Bad debts	12,000		
To Profit	33,542		
	22,22,917		22,22,917

Statement of Profit as per costing records
(for the year ended March 31,2014)

		(₹)	(₹)
Sales revenue (14,500 units)	(A)		20,80,000
Cost of Sales:			
Opening stock (875 units x ₹ 104)		91,000	
Add: Cost of production of 14,000 units (Refer to Working Note 1& 2)		17,92,000	
Less: Closing stock (₹17,95,000 x 375 units / 14,000 units)		(48,000)	
Production cost of goods sold (14,500 units)		18,35,000	
Selling & distribution overheads (14,500 units x ₹ 4)		58,000	

Cost of sales: (B)	18,93,000	18,93,000
Profit: {(A) – (B)}		1,87,000

(ii) Statement of Reconciliation
(Reconciling the profit as per costing records with the profit as per financial records)

	(₹)	(₹)
Profit as per Cost Accounts		1,87,000
Add: Admin. overheads over absorbed (₹ 2,98,667 – ₹ 2,95,000)	3,667	
Opening stock overvalued (₹ 91,000 – ₹ 74,375)	16,625	
Interest received	45,000	
Rent received	18,000	83,292
		2,70,292
Less: Factory overheads under recovery (₹ 2,98,667 – ₹ 2,95,000)	30,000	
Selling & distribution overheads under recovery (₹ 61,000 – ₹ 58,000)	3,000	
Closing stock overvalued (₹ 48,000 – ₹ 41,250)	6,750	
Goodwill written off	1,00,000	
Dividend	85,000	
Bad debts	12,000	2,36,750
Profit as per financial accounts		33,542

Working Notes:

1. Number of units produced

	Units
Sales	14,500
Add: Closing stock	375
Total	14,875
Less: Opening stock	875
Number of units produced	14,000

2. Cost Sheet

	(₹)	(₹)
Raw materials consumed		7,80,000
Direct labour		4,50,000
Prime cost		12,30,000
Factory overheads (60% of direct wages)		2,70,000
Factory cost		15,00,000
Add: Opening work-in-process		32,000
Less: Closing work-in-process		38,667
Factory cost of goods produced		14,93,333
Administration overheads (20% of factory cost)		2,98,667
Cost of production of 14,000 units		17,92,000

Cost of production per unit: = $\frac{\text{Total Cost of Production}}{\text{No. of units produced}} = \frac{₹\ 17,92,000}{14,000 \text{units}} = ₹128$

Question-7 (RTP Nov. 2020 Q6 New Course)

A manufacturing company disclosed a net loss of ₹6,94,000 as per their cost accounts for the year ended March 31,2020. The financial accounts however disclosed a net loss of ₹10,20,000 for the same period. The following information was revealed as a result of scrutiny of the figures of both the sets of accounts.

	(₹)
(i) Factory Overheads under-absorbed	**80,000**
(ii) Administration Overheads over-absorbed	**1,20,000**
(iii) Depreciation charged in Financial Accounts	**6,50,000**
(iv) Depreciation charged in Cost Accounts	**5,50,000**
(v) Interest on investments not included in Cost Accounts	**1,92,000**
(vi) Income-tax provided	**1,08,000**
(vii) Interest on loan funds in Financial Accounts	**4,90,000**
(viii) Transfer fees (credit in financial books)	**48,000**
(ix) Stores adjustment (credit in financial books)	**28,000**
(x) Dividend received	**64,000**

PREPARE a memorandum Reconciliation Account.

Solution:

Memorandum Reconciliation Accounts

Dr. **Cr.**

	(₹)		(₹)
To Net Loss as per Costingbooks	**6,94,000**	**By Administration overheads over recovered in cost accounts**	**1,20,000**
To Factory overheads underabsorbed in Cost Accounts	**80,000**	**By Interest on investmentnot included in Cost Accounts**	**1,92,000**
To Depreciation und ercharged in Cost Accounts	**1,00,000**	**By Transfer fees in Financial books**	**48,000**
To Income-Tax not providedin Cost Accounts	**1,08,000**	**By Stores adjustment (Credit in financial books)**	**28,000**
To Interest on Loan Funds inFinancial Accounts	**4,90,000**	**By Dividend received infinancial books**	**64,000**
		By Net loss as perFinancial books	**10,20,000**
	14,72,000		**14,72,000**

Chapter 7: Unit & Batch Costing

PART-A: UNIT COSTING

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 1:

The following data relate to the manufacture of a standard product during the 4-week ended 28th February 20X9:

Raw Materials Consumed	₹ 4,00,000
Direct Wages	₹ 2,40,000
Machine Hours Worked	3,200 hours
Machine Hour Rate	₹ 40
Office Overheads	10% of works cost
Selling Overheads	₹ 20 per unit
Units produced and sold	10,000 at ₹ 120 each

You are required to FIND OUT the cost per unit and profit for the 4- week ended 28th February 20X9.

Hints: Cost/unit = ₹104.48, Profit= ₹15.52

ILLUSTRATION 2

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

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

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

Hints: Selling price per unit = ₹35, Factory cost = ₹35,000

TEST YOUR KNOWLEDGE

Question-1

1. Wonder Ltd. has a capacity of 120,000 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: ₹ 20,00,000 per annum upto 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.

If the production programme of the factory is as indicated below and the management desires a profit of ₹20,00,000 for the year DETERMINE the average selling price at which each unit should be quoted.

First 3 months: 50% capacity

Remaining 9 months: 80% capacity

Ignore Administration, Selling and Distribution overheads.

Hints: Average selling price = ₹3,37.356 (i.e. Sales = ₹2,93,50,000, Units = 20,00,000).

B. PAST YEAR EXAM QUESTIONS

Nov-22. Q4(b)-10 marks

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

	₹
Direct Materials	12,50,000
Direct Wages	7,00,000
Production Overhead	4,00,000
Total	23,50,000

It is further ascertained that:

- Direct material cost per unit of Cloth Mask was twice as much of Direct material 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 of 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:

(i) Cost per unit and Total Cost.

(ii) Profit per unit and Total Profit.

Solution:

Preparation of Cost Sheet for Cloth Masks

No. of units produced = 50,000 units

No. of units sold = 45,000 units

Particulars	**Per unit (₹)**	**Total (₹)**
Direct materials (Working note- (i))	10.00	5,00,000
Direct wages (Working note- (ii))	5.00	2,50,000
Prime cost	15.00	7,50,000
Production overhead (Working note- (iii))	2.00	1,00,000
Factory Cost	17.00	8,50,000
Administration Overhead* (50% of Production Overhead)	1.00	50,000
Cost of production	18.00	9,00,000
Less: Closing stock (50,000 units – 45,000 units)	-	(90,000)
Cost of goods sold i.e. 45,000 units	18.00	8,10,000
Selling cost	2.00	90,000
Cost of sales/ Total cost	20.00	9,00,000
Profit	15.00	6,75,000
Sales value (₹ 35 × 45,000 units)	35.00	15,75,000

Working Notes:

(i) Direct material cost per unit of Disposable Mask = M Direct material cost per unit of Cloth Mask = 2M

Total Direct Material cost = 2M × 50,000 units + M × 1,50,000 units

Or, ₹ 12,50,000 = 1,00,000 M + 1,50,000 M

Or, M = $\frac{12,50,000}{2,50,000}$ = 5

Therefore, Direct material Cost per unit of Cloth Mask = 2 × ₹ 5 = ₹ 10

(ii) Direct wages per unit for Cloth Mask= W

Direct wages per unit for Disposable Mask= 0.6W
So, (W x 50,000) + (0.6W x 1,50,000) = ₹ 7,00,000
W = ₹5 per unit

Therefore, Direct material Cost per unit of Cloth Mask = ₹ 5

(iii) Production overhead per unit = $\frac{₹4,00,000}{(50,000+1,50,000)}$ = 2

Production overhead for Cloth Mask = ₹ 2 × 50,000 units = ₹ 1,00,000

* Administration overhead is related to production overhead in the question and hence to be considered in cost of production only.

PART-B: BATCH COSTING

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION: 3

Arnav Confectioners (AC) owns a bakery which is used to make bakery items like pastries, cakes and muffins. AC use to bake atleast 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.

Hints: S.P. = ₹1041.33 per batch.

ILLUSTRATION: 4

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 CALCULATE 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

Hints:

Particulars	Jan	Feb	Mar	April	May	June	July
Profit per unit	₹1.48	₹0.74	₹1.17	₹0.27	₹(0.15)	₹0.36	₹0.66

ILLUSTRATION: 5

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.

Hints: EBQ = 600 units

ILLUSTRATION: 6

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 the minimum inventory cost?

Hints: (i) EBQ = 5060 units, (ii) 36.5 days, (iii) ₹30,360

ILLUSTRATION: 7

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 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:

(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.

Hints: (i) EBQ = 7,000 liters, cost = ₹1,414 (ii) EBQ = ₹7071 liters

TEST YOUR KNOWLEDGE

Question-2

Rio Limited undertakes to supply 1000 units of a component per month for the months of January, February and March 20X3. Every month a batch order is opened against which materials and labour cost are booked at actual. Overheads are levied at a rate per labour hour. The selling price is contracted at ₹15 per unit.

From the following data, CALCULATE the profit per unit of each batch order and the overall position of the order for the 3,000 units.

Month	Batch Output (Numbers)	Material Cost (₹)	Labour Cost (₹)
January 20X3	1,250	6,250	2,500
February 20X3	1,500	9,000	3,000
March 20X3	1,000	5,000	2,000

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

Month	Overheads (₹)	Total Labour Hours
January 20X3	12,000	4,000
February 20X3	9,000	4,500
March 20X3	15,000	5,000

Hints:

Particulars	Jan	Feb	March
Cost p.u.	10	10	10
Profit p.u.	5	5	5

Question-3 (May 2023 Q1(a))

X Ltd. is committed to supply 24,000 bearings per annum to Y Ltd. on 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.

(a) COMPUTE what would be the optimum run size for bearing manufacture?

(b) Assuming that the company has a policy of manufacturing 6,000 bearings per run, CALACULATE how much extra costs the company would be incurring as compared to the optimum run suggested in (a) above?

(c) CALCULATE the minimum inventory holding cost?

Hints: (a) EBQ = 3,600 bearings

(b)

Size	3,600	6,000
Cost (₹)	4,320	4,896

(c) ₹2,160

Question-4

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%.

1. FIND the most economic production run.
2. CALCULATE the extra cost that company incur due to processing of 18,000 columns in a batch.

Hints: (i) EBQ = 1567 columns,

(ii)

Size (Columns)	1,567	18,000
Total Cost (₹)	1,73,185	9,97,500

B. PAST YEAR EXAM QUESTIONS

Jan-21. Q1(d)-05 marks

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:

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

(ii) What is the minimum inventory holding cost?

(iii) 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?

Solution:

(i) Computation of Optimum Run size of 'Stents' or Economic Batch Quantity (EBQ)

Economic Batch Quantity (EBQ) $= \sqrt{\frac{2DS}{C}}$

Where, D = Annual demand for the Stents
= 4,00,00,000 × 2.5% = 10,00,000 units

S = Set- up cost per run
= ₹ 225

C = Carrying cost per unit per annum
= ₹ 1.50 × 12 = ₹ 18

$$EBQ = \sqrt{\frac{2 \times 10,00,000 \times ₹\ 225}{₹\ 18}}$$

= 5,000 units of Stents

(ii) Minimum Inventory Cost = Average Inventory × Inventory Carrying Cost per unit per annum

= (5,000 ÷ 2) × ₹ 18

= ₹ 45,000

(iii) Calculation of the extra cost due to manufacturing policy

	When run size is 4,000 units	**When run size is 5,000 units i.e. at EBQ**

Total set up cost	= 10,00,000 x ₹ 225 4,000 = ₹ 56,250	10,00,000 x ₹ 225 5,000 = ₹ 45,000
Total Carrying cost	½ × 4,000 × ₹ 18 = ₹ 36,000	½ × 5,000 × ₹ 18 = ₹ 45,000
Total Cost	**₹ 92,250**	**₹ 90,000**

Extra cost = ₹ 92,250 - ₹ 90,000 = ₹ 2,250

Nov-18. Q3(a)-10 marks

XYZ Ltd. has obtained an order to supply 48000 bearings per year from a concern. On a steady basis, it is estimated that it costs ₹ 0.20 as inventory holding cost per bearing per month and the set-up cost per run of bearing manufacture is ₹ 384

You are required to:

- compute the optimum run size and number of runs for bearing manufacture.
- compute the interval between two consecutive runs.
- find out the extra costs to be incurred, if company adopts a policy to manufacture 8000 bearings per run as compared to optimum run Size.
- give your opinion regarding run size of bearing manufacture.

Assume 365 days in a year.

Solution:

(i) Optimum batch size or Economic Batch Quantity (EBQ):

$$EBQ = \sqrt{\frac{2D}{S}} = \sqrt{\frac{2\times 48{,}000\times}{384}} = 3919.18 \text{ or } 3{,}920 \text{ units}$$

Number of Optimum runs = 48,000 ÷ 3,920 = 12.245 or **13 run**

(ii) Interval between 2 runs (in days) = 365 days ÷ 13 = 28 days

Or 365÷12.24=29.82 days

(iii) If 8,000 bearings are manufactures in a run: Total cost = Set-up cost + Inventory holding cost

= ₹.384×(48,000÷8,000) + (8,000÷2)×₹.2.4

= **2304+9,600** = 11,904

Extra cost = ₹(11,904 – 9,406*) =₹ **2,498/- OR**

Extra cost = ₹ (11,904 – 9,696*) = ₹ **2,208/-**

* Minimum Inventory Cost = Average Inventory × Inventory Carrying Cost per unit per annum

Average Inventory = 3,920 units ÷ 2 = 1,960 units

Carrying Cost per unit per annum = ₹0.2 × 12 months = ₹2.4

Minimum Inventory Holding Costs = 1,960 units × ₹2.4 = ₹4,704

Total cost = Set-up cost + Inventory holding cost = (12.245×384) + 4704 = ₹ **9,406** (approx.)

OR

Total cost = Set-up cost + Inventory holding cost = (13×384) + 4704 = ₹ **9,696** (approx.)

(iv) To save cost the company should run at optimum batch size i.e. 3,920 Units. **It saves**

₹ 2,498 or 2208. Run size should match with the Economic production run of bearing manufacture. When managers of a manufacturing operation make decisions about the number of units to produce for each production run, they must consider the costs related to setting up the production process and the costs of holding inventory

Alternative presentation to part 3(a) (iii)

Statement showing Total Cost at Production Run size of 3,600 and 8,000 bearings

A.	Annual requirement	48,000	48,000
B.	Run Size	3,920	8,000
C.	No. of runs (A/B)	12.245	6
D.	Set up cost per run	₹ 384	₹ 384
E.	Total set up cost (CxD)	₹ 4,702	₹ 2,304
F.	Average inventory (B/2)	1,960	4,000
G.	Carrying cost per unit p.a.	2.40	2.40
H.	Total Carrying cost (FxG)	4,704	9,600
I.	Total cost (E+H)	9,406	11,904

Extra cost incurred, if run size is of 8,000= ₹11,904-9,406= **₹ 2,498**

Chapter. 8: Job Costing

A. QUESTION FROM STUDY MATERIAL

ILLUSTRATION 1:

The manufacturing cost of a work order is ₹ 1,00,000; 8% of the production against that order spoiled and the rejection is estimated to have a realizable value of ₹ 2,000 only. The normal rate of spoilage is 2%. RECORD this in the costing journal.

Hints: Costing P/L Account = ₹4,500

ILLUSTRATION 2

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

	Per unit (₹)
Materials	70
Direct wages 18 hours @ ₹ 2.50 (Deptt. X 8 hours; Deptt. Y 6 hours; Deptt. Z 4 hours)	45
Chargeable expenses	5
	120
Add : 33-1/3 % for expenses cost	40
	160

Analysis of the Profit/Loss Account (for the year 20X9)

		(₹)		(₹)
Materials used		1,50,000	Sales less returns	2,50,000
Direct wages:				
Deptt. X	10,000			
Deptt. Y	12,000			
Deptt. Z	8,000	30,000		
Special stores items		4,000		
Overheads:				
Deptt. X	5,000			

Deptt. Y	9,000			
Deptt. Z	2,000	16,000		
Works cost		2,00,000		
Gross profit c/d		50,000		
		2,50,000		2,50,000
Selling expenses		20,000	Gross profit b/d	50,000
Net profit		30,000		
		50,000		50,000

It is also noted that average hourly rates for the three Departments X, Y and Z are similar.

You are required to:

(i) PREPARE a job cost sheet.

(ii) CALCULATE the entire revised cost using 20X9 actual figures as basis.

(iii) Add 20% to total cost to DETERMINE selling price.

Hints: Selling Price = ₹189.76

TEST YOUR KNOWLEDGE

Question-1

In a factory following the Job Costing Method, an abstract from the work- in-progress as on 30th September was prepared as under.

Job No.	Material (₹)	Direct Hrs.	Labour (₹)	Factory Overheads applied (₹)
115	1325	400 hrs	800	640
118	810	250 hrs.	500	400
120	765	300 hrs.	475	1420
	2,900		1,775	1,420

Material used in October were as follows:

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

A summary for labour hours deployed during October is as under:

Job No.	Number of Hours	
	Shop A	Shop B
115	25	25
118	90	30
120	75	10
121	65	--
124	25	10
	275	**75**
Indirect Labour: Waiting of material	20	10
Machine breakdown	10	5
Idle time	5	6
Overtime Premium	6	5
	316	**101**

A shop credit slip was issued in October that material issued under Requisition No. 54 was returned back to stores as bring not suitable. A material transfer note issued in October indicated that material issued under Requisition No. 55 for job 118 was directed to job 124.

The hourly rate in shop A per labour hour is ₹3 per hour while at shop B, it is ₹2 per hour. The factory overhead is applied at the same rate as in September. Job 115, 118 and 120 were completed in October.

You are asked to COMPUTE the factory cost of the completed job. It is the practice of the management to put a 10% on factory cost to cover admin. Cost and selling overheads and invoice the job to the customer on a total cost plus 20% basis. Determine the invoice price of these three job ?

Hints:

Job	115	118	120
Total Cost	₹3,289	₹3,100.90	₹2,998,.60
Invoice Price	₹3,946.80	₹3,721.08	₹3,598.32

B. PAST YEAR EXAM QUESTIONS

Nov-19 Q1(b)

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

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

Analysis of Profit and Loss account for the year ended 31st March, 2019

Particulars	₹	₹	Particulars	₹	₹
Material		2,00,000	Sales		4,30,000
Direct Wages					
Dept. A	12,000				
Dept. B	8,000				
Dept. C	10,000				
Dept. D	20,000	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 noticed that average hourly rate for all the four departments are similar.

Required:

1. Prepare a Job Cost Sheet.
2. Calculate the entire revised cost using the above figures as the base.
3. Add 20% profit on selling price to determine the selling price.

Solution:

JOB COST SHEET

Particulars	Amount in (₹)
Direct Material	120
Direct Labour A (4 x 4) = 16 B (7 x 4) = 28 C (2 x 4) = 8 D (2 x 4) = 8	60
Chargeable expenses	20
Prime Cost	**200**
Add: Overheads Dept. A = (12,000/12,000) x 100 = 100% x 16 Dept. B = (6,000/ 8,000) x 28 Dept. C = (9,000/10,000) x 8 Dept. D = (17,000/20,000) x 8	 16 21 7.2 6.8
Work Cost	251
Add: Selling Expenses (90,000/3,00,000) x 251	75.3
Total Cost (80%)	**326.3**
Add: Profit (20%)	**81.575**
Selling Price	**407.875**

Note:

1. Overhead recovered on the basis of Direct Labour.
2. Selling expense recovered on the basis of work cost

May-22 Q2(a) (10 marks)

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.

	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:

(i) Compute the percentage recovery rates of factory overheads and administrative overheads.

(ii) Calculate the amount of factory overheads, administrative overheads and profit for each of the two jobs.

(iii) 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%

Solution:

(i) Computation of percentage recovery rates of factory overheads and administrative overheads.

Let the factory overhead recovery rate as percentage of direct wages be F and administrative overheads recovery rate as percentage of factory cost be A.

Factory Cost of Jobs:

Direct materials + Direct wages + Factory overhead

For Job 1 = ₹ 1,08,000 +₹ 84,000 + ₹ 84,000F

For Job 2 = ₹ 75,000 +₹ 60,000 + ₹ 60,000F

Total Cost of Jobs:

Factory cost + Administrative overhead

For Job 1 = (₹ 1,92,000 + ₹ 84,000F) + (₹ 1,92,000 + ₹ 84,000F) A = ₹ 2,97,600*

For Job-2 = (₹ 1,35,000 + ₹ 60,000F) + (₹1,35,000+ ₹ 60,000F) A = ₹ 2,10,000**

The value of F & A can be found using following equations

1,92,000 + 84,000F + 1,92,000A + 84,000AF = ₹ 2,97,600 ……eqn (i)

1,35,000 + 60,000F + 1,35,000A + 60,000AF = ₹ 2,10,000 ……eqn (ii)

Multiply equation (i) by 5 and equation (ii) by 7

9,60,000 + 4,20,000F + 9,60,000A + 4,20,000AF = ₹14,88,000 ...eqn (iii)

9,45,000 + 4,20,000F + 9,45,000A + 4,20,000AF = ₹ 14,70,000 ...eqn (iv)

\- - - - -

15,000 + 15,000A = ₹18,000

15,000 A = 18,000 – 15,000
A = 0.20
Now putting the value of A in equation (i) to find the value of F
1,92,000 + 84,000F + (1,92,000 × 0.20) + (84,000 F × 0.20)= ₹ 2,97,600
Or
1,92,000 + 84,000F+38,400+16,800 F = ₹2,97,600
1,00,800 F = 67,200
F = 0.667
On solving the above relations: F = 0.667 and A = 0.20
Hence, percentage recovery rates of:
Factory overheads = 66.7% or 2/3rd of wages and
Administrative overheads = 20% of factory cost.

Working note:

$$\text{Total Cost} = \frac{\text{Selling price}}{(100\% + \text{Percentage of profit})}$$

$$\text{*For Job 1} = \frac{₹\ 3,33,312}{(100\% + 12\%)} = ₹\ 2,97,600$$

$$\text{*For Job 2} = \frac{₹\ 2,52,000}{(100\% + 20\%)} = ₹\ 2,10,000$$

(ii) Statement of jobs, showing amount of factory overheads, administrative overheads and profit:

	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		
2/3rd of direct wages	**56,000**	**40,000**
Factory cost	2,48,000	1,75,000
Administrative overheads		
20% of factory cost	**49,600**	**35,000**
Total cost	**2,97,600**	**2,10,000**
Profit (12% & 20% respectively)	**35,712**	**42,000**
Selling price	3,33,312	2,52,000

(iii) Selling price of Job 3

	(₹)
Direct materials	68,750
Direct wages	22,500
Prime cost	91,250
Factory overheads (2/3rd of Direct Wages)	15,000
Factory cost	1,06,250
Administrative overheads (20% of factory cost)	21,250
Total cost	1,27,500
Profit margin (balancing figure)	22,500
Selling price Total Cost / 85%	1,50,000

C. ADDITIONAL QUESTIONS FOR PRACTICE(PAST YEAR EXAM)

Question-1

A factory incurred the following expenditure during the year 2013:

	(₹)	(₹)
Direct material consumed		12,00,000
Manufacturing Wages		7,00,000
Manufacturing overhead:		
Fixed Variable	3,60,000	
	2,50,000	6,10,000
		25,10,000

In the year 2014, following changes are expected in production and cost of production.

(i) Production will increase due to recruitment of 60% more workers in the factory.
(ii) Overall efficiency will decline by 10% on account of recruitment of new workers.
(iii) There will be an increase of 20% in Fixed overhead and 60% in Variable overhead.
(iv) The cost of direct material will be decreased by 6%.
(v) The company desire to earn a profit of 10% on selling price.

Ascertain the cost of production and selling price.

Solution:

Budgeted cost sheet for the year 2014

Particulars			**(Amount ₹)**
Direct material consumed		12,00,000	
Add: 44% due to increased output		5,28,000	
		17,28,000	
Less: 6% for decline in price		1,03,680	16,24,320
Direct wages (manufacturing)		7,00,000	
Add: 60% increase		4,20,000	11,20,000
Prime cost			27,44,320
Manufactured Overhead:			
Fixed	3,60,000		
Add: 20% increase	72,000		
		4,32,000	
Variable	2,50,000		
Add: 60% increase	1,50,000		
		4,00,000	8,32,000
Cost of production			35,76,320
Add: 1/9 of Cost or 10% on selling price			3,97,369
Selling price			39,73,689

Production will increase by 60% but efficiency will decline by 10%. 160 – 10% of 160 = 144%. So increase by 44%.

Note:

If we consider that variable overhead once will change because of increase in production (From ₹ 2,50,000 to ₹ 4,00,000) then with efficiency declining by 10% it shall be ₹ 3,60,000 and then again as mentioned in point No. (iii) of this question it will increase by 60% then variable overhead shall be ₹3,60,000 □ 160% = ₹ 5,76,000. Hence, total costs shall be ₹37,52,320 and profit shall be 1/9th of ₹37,52,320 = ₹4,16,924. Thus, selling price shall be ₹ 41,69,244.

Question-2

Ares Plumbing and Fitting Ltd. (APFL) deals in plumbing materials and also provides plumbing services to its customers. On 12th August, 2014, APFL received a job order for a students' hostel to supply and fitting of plumbing materials. The work is to be done on the basis of specification provided by the hostel owner. Hostel will be inaugurated on 5th September, 2014 and the work is to be completed by 3rd September, 2014. Following are the details related with the job work:

Direct Materials

APFL uses a weighted average method for the pricing of materials issues. Opening stock of materials as on 12th August 2014:

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

On 16th August 2014:

- 20mm GI Pipe, 30 units of (15 feet size) @ ₹ 610 each
- 10 units of Valve @ ₹ 402 each On 18th August 2014:
- Other fitting materials, 150 units @ ₹ 28 each
- Stainless Steel Faucet, 15 units @ ₹ 209 each On 27th August 2014:
- 15mm GI Pipe, 35 units of (15 feet size) @ ₹ 628 each
- 20mm GI Pipe, 20 units of (15 feet size) @ ₹ 660 each
- Valve, 14 units @ ₹ 424 each Issues for the hostel job:

On 12th August 2014:

- 20mm GI Pipe, 2 units of (15 feet size)
- Other fitting materials, 18 units On 17th August 2014:
- 15mm GI Pipe, 8 units of (15 feet size)
- Other fitting materials, 30 units On 28th August 2014:
- 20mm GI Pipe, 2 units of (15 feet size)
- 15mm GI Pipe, 10 units of (15 feet size)
- Other fitting materials, 34 units
- Valve, 6 units On 30th August:
- Other fitting materials, 60 units
- Stainless Steel Faucet, 15 units

Direct Labour:

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

Overheads:

Overheads are applied @ ₹ 13 per labour hour.

Pricing policy:

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

You are required to

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

Solution:

(a) Calculation of Total Cost for the Hostel Job:

Particulars	Amount (₹)	Amount (₹)
Direct Material Cost:		
- 15mm GI Pipe (Working Note- 1)	11,051.28	
- 20mm GI Pipe (Working Note- 2)	2,588.28	
- Other fitting materials (Working Note- 3)	3,866.07	
- Stainless steel faucet		
15 units x $\frac{6x ₹204 + 15x ₹209}{21 units}$	3,113.57	
- Valve		
6 units × $\frac{8x ₹404 + 10x ₹402 + 14x ₹424}{32 units}$	2,472.75	23,091.95
Direct Labour:		
- Plumber [(180 hours × ₹ 50) + (12 hours × ₹ 25)]	9,300.00	
- Helper [(192 hours × ₹ 35) + (24 hours × ₹ 17.5)]	7,140.00	16,440.00
- Overheads [₹ 13 × (180 + 192) hours]		4,836.00
Total Cost		**44,367.95**

(b) Price to be charged for the job work:

	Amount (₹)
Total Cost incurred on the job	44,367.95
Add: 25% Profit on Job Price (44,367.95 / 75% x 25%)	14,789.32
	59,157.27

Working Note:

1. **Cost of 15mm GI Pipe**

Date		Amount (₹)
17-08-2014	8 units × ₹ 600	4,800.00
28-08-2014	10 units (4 x ₹600 + 35x ₹628)/39 units	6,251.28

		11,051.28

2. Cost of 20mm GI Pipe

Date		Amount (₹)
12-08-2014	2 units × ₹ 660	1,320.00
28-08-2014	2 units × (8 x ₹660 + 30 x ₹610 + 20 x ₹660)/ 58 units	1,268.28
		2,588.28

3. Cost of Other fitting materials

Date		Amount (₹)
12-08-2014	18 units × ₹ 26	468.00
17-08-2014	30 units × ₹ 26	780.00
28-08-2014	34 units × (12 x ₹26 + 150 x ₹ 28)/162 units	946.96
30-08-2014	60 units × (12 x ₹26 + 150 x ₹ 28)/162 units	1,671.11
		3,866.07

Chapter. 9: Process & Operation Costing

(I) Questions without application of valuation norms

A. QUESTION FROM STUDY MATERIAL

Question-1

From the following data, PREPARE process accounts indicating the cost of each process and the total cost. The total units that pass through each process were 240 for the period.

	Process I (₹)	Process II (₹)	Process III (₹)
Materials	1,50,000	50,000	20,000
Labour	80,000	2,00,000	60,000
Other expenses	26,000	72,000	25,000

Indirect expenses amounting to ₹ 85,000 may be apportioned on the basis of wages. There was no opening or closing stock.

Hints:

Transfer from	Units	₹
P-I	1,150	2,76,000
P-II	2,700	6,48,000
P-III	3,200	7,68,000

Question-2

A product passes through three processes. The output of each process is treated as the raw material of the next process to which it is transferred and output of the third process is transferred to finished stock.

	Process-I (₹)	Process-II (₹)	Process-III (₹)
Materials issued	40,000	20,000	10,000
Labour	6,000	4,000	1,000
Manufacturing overhead	10,000	10,000	15,000

10,000 units have been issued to the Process-I and after processing, the output of each process is as under:

Process	Output	Normal Loss
Process-I	9,750 units	2%
Process-II	9,400 units	5%
Process-III	8,000 units	10%

No stock of materials or of work-in-process was left at the end. CALCULATE the cost of the finished articles.

Hints:

Transfer from	Units	₹
P-I	9,750	55,714
P-II	9,400	91,051
P-III	8,000	1,10,687

Question-3 (Nov 22 Q3(b))

RST Limited processes Product Z through two distinct processes – Process- I and Process-II. On completion, it is transferred to finished stock. From the following information for the year 20X8-X9, PREPARE Process- I, Process- II and Finished Stock A/c:

Particulars	Process- I	Process- II
Raw materials used	7,500 units	--
Raw materials cost per unit	₹ 60	--
Transfer to next process/finished stock	7,050 units	6,525 units
Normal loss (on inputs)	5%	10%
Direct wages	₹ 1,35,750	₹ 1,29,250
Direct Expenses	60% of Direct wages	65% of Direct wages
Manufacturing overheads	20% of Direct wages	15% of Direct wages
Realisable value of scrap per unit	₹ 12.50	₹ 37.50

6,000 units of finished goods were sold at a profit of 15% on cost. Assume that there was no opening or closing stock of work-in-process.

Hints:

Transfer from	Units	₹
P-I	7,050	6,82,403
P-II	6,525	9,13,824
Finished Stock	6,000	8,40,298

Net Profit = ₹1,38,182

TEST YOUR KNOWLEDGE

Question-1

A company produces a component, which passes through two processes. During the month of April, 20X9, materials for 40,000 components were put into Process I of which 30,000 were completed and transferred to Process II. Those not transferred to Process II were 100% complete as to materials cost and 50% complete as to labour and overheads cost. The Process I costs incurred were as follows:

Direct material	₹15,000
Direct wages	₹18,000
Factory overheads	₹12,000

Of those transferred to Process II, 28,000 units were completed and transferred to finished goods stores. There was a normal loss with no salvage value of 200 units in Process II. There were 1,800 units, remained unfinished in the process with 100% complete as to materials and 25% complete as regard to wages and overheads.

No further process material costs occur after introduction at the first process until the end of the second process, when protective packing is applied to the completed components. The process and packing costs incurred at the end of the Process II were :

Packing materials	₹4,000
Direct wages	₹3,500
Factory overheads	₹4,500

Required:

1. PREPARE Statement of Equivalent Production, Cost per unit and Process I A/c.
2. PREPARE Statement of Equivalent Production, Cost per unit and Process II A/c.

Hints:

Process	Value of closing WIP	Cost/unit
P-I	₹8,035	0.375 + 0.514 + 0.343 = 1.232
P-II	₹2,358	1.240 + 0.123 + 0.158 = 1.521

Question-2

1. An English willow company who manufactures cricket bat buys wood as its direct material. The Forming department processes the cricket bats and the cricket bats are then transferred to the Finishing department where stickers are applied. The Forming department began manufacturing 10,000 initial bats during the month of December for the first time and their cost is as follows:

Direct material: ₹ 33,000
Conversion costs: ₹ 17,000
Total ₹ 50,000

A total of 8,000 cricket bats were completed and transferred to the Finishing department, the rest 2,000 were still in the Forming process at the end of the month. All of the forming departments direct material were placed, but, on average, only 25% of the conversion costs was applied to the ending work in progress inventory.

CALCULATE:

(i) Equivalent units of production for each cost.

(ii) The Conversion cost per Equivalent units.

(iii) Cost of closing work in process (WIP) and finished products.

Hints:

(i)

Input Details	Units	Output Particulars	Units	Equivalent Units			
				Material		Conversion cost	
				%	Units	%	Units
Unit Introduced	10,000	Finished output	8,000	100	8,000	100	8,000
Total		Closing W-I-P	2,000	100	2,000	25	500
	10,000	Total	10,000		10,000		8,500

(ii)

	Direct Material	Conversion costs
Cost per equivalent unit (₹)	3.30	2.00

(iii) 7,600 and 42,400

B. PAST YEAR EXAM QUESTIONS

Nov-19. Q4(b) (10 marks)

A product passes through two distinct processes before completion.

Following information are available in this respect:

	Process-I	Process-II
Raw material used	10000 units	-
Raw material cost (per unit)	₹75	-
Transfer to next process/Finished goods	9000 units	8200 units
Normal loss (on inputs)	5 %	10%
Direct wages	₹3,00,000	₹5,60,000

Direct Expenses	50% of direct wages	65% of direct wages
Manufacturing overheads	25% of direct wages	15% of direct wages
Realizable value of scrap (per unit)	₹13.50	₹145

8000 units of finished goods were sold at a profit of 15% on cost. There was no opening and closing stock of work-in-progess.

Prepare:

1. Process-I and Process-II Account
2. Finished goods account
3. Normal loss account
4. Abnormal loss account
5. Abnormal gain account.

Solution:

May-18. Q3(b) (10 marks)

Alpha Ltd. is engaged in the production of a product A which passes through 3 different process - Process P, Process Q and Process R. The following data relating to cost and output is obtained from the books of accounts for the month of April 2017:

Particulars	Process P	Process Q	Process R
Direct Material	38,000	42,500	42,880
Direct Labour	30,000	40,000	50,000

Production overheads of ₹ 90,000 were recovered as percentage of direct labour.

10,000 kg of raw material @ ₹ 5 per kg. was issued to Process P. There was no stock of materials or work in process. The entire output of each process passes directly to the next process and finally to warehouse. There is normal wastage, in processing, of 10 %. The scrap value of wastage is ₹ 1 per kg. The output of each process transferred to next process and finally to warehouse are as under:

Process P = 9,000 kg

Process Q = 8,200 kg

Process R = 7,300 kg

The company fixes selling price of the end product in such a way so as to yield a profit of 25% selling price.

Prepare Process P, Q and R accounts. Also calculate selling price per unit of end product.

Solution:

Process- P Account

Particulars	Kg.	Amount (₹)	Particulars	Kg.	Amount (₹)
To Input	10,000	50,000	By Normal wastage (1,000 kg. × ₹ 1)	1,000	1,000
To Direct Material	---	38,000	By Process- Q (9,000 kg. × ₹ 15.50)	9,000	1,39,500
To Direct Labour	---	30,000			
To Production OH (₹ 90,000 × 3/12)	---	22,500			
	10,000	1,40,500		10,000	1,40,500

Cost per unit = ₹1,40,500 - ₹1,000₹ = ₹15.50
10,000 kg – 1,000 kg

Process- Q Account

Particulars	Kg.	Amount (₹)	Particulars	Kg.	Amount (₹)
To Process-P A/c	9,000	1,39,500	By Normal wastage (900 kg. × ₹ 1)	900	900
To Direct Material	---	42,500	By Process- Q (8,200 kg. × ₹ 31)	8,200	2,54,200
To Direct Labour	---	40,000			
To Production OH (₹ 90,000 × 4/12)	---	30,000			
To Abnormal Gain (100 kg. × ₹ 31)	100	3,100			
	9,100	2,55,100		9,100	2,55,100

Cost per unit = ₹2,52,000 - ₹900 = ₹31
9,000 kg – 900 kg

Process- R Account

Particulars	Kg.	Amount (₹)	Particulars	Kg.	Amount (₹)

To Process-Q A/c	8,200	2,54,200	By Normal wastage (820 kg. × Re.1)	820	820
To Direct Material	---	42,880	By Abnormal loss (80 kg. × ₹ 52)	80	4,160
To Direct Labour	---	50,000	By Finished Goods (7,300 kg. × ₹52)	7,300	3,79,600
To Production OH (₹ 90,000 × 5/12)	---	37,500			
	8,200	3,84,580		8,200	3,84,580

Cost per unit = ₹3,84,580 - ₹820 = ₹52
8,200 kg – 820 kg

Calculation of Selling price per unit of end product:

Cost per unit	₹ 52.00
Add: Profit 25% on selling price i.e. 1/3rd of cost	₹ 17.33
Selling price per unit	₹ 69.33

July-21. Q4(a) (10 marks)

A Manufacturing unit manufactures a product 'XYZ' which passes through three distinct Processes - X, Y and Z. The following data is given:

	Process X	Process Y	Process Z
Material consumed (in ₹)	2,600	2,250	2,000
Direct wages (in ₹)	4,000	3,500	3,000

- The total Production Overhead of ₹ 15,750 was recovered @ 150% of Direct wages.
- 15,000 units at ₹ 2 each were introduced to Process 'X'.
- The output of each process passes to the next process and finally, 12,000 units were transferred to Finished Stock Account from Process 'Z'.
- No stock of materials or work in progress was left at the end. The following additional information is given:

Process	% of wastage to normal input	Value of Scrap per unit (₹)
X	6%	1.10
Y	?	2.00
Z	5%	1.00

You are required to:

(i) Find out the percentage of wastage in process 'Y', given that the output of

Process 'Y' is transferred to Process 'Z' at ₹ 4 per unit.

(ii) Prepare Process accounts for all the three processes X, Y and Z.

Solution:

Dr. Process-X Account Cr.

Particulars	Units	(₹)	Particulars	Units	(₹)
To Material introduced	15,000	30,000	By Normal Loss A/c [(6% of 15,000 units) x ₹1.1]	900	990
" Additional material	--	2,600	" Process-Y A/c (₹ 2.951* × 14,100 units)	14,100	41,610
" Direct wages	--	4,000			
" Production OH	--	6,000			
	15,000	42,600		15,000	42,600

*Cost per unit of completed units

= Total Cost - Realisable value from normal loss = ₹ 42,600 - ₹ 990 = 2.951
Inputs units - Normal loss units 15,000 units - 900 units

Dr. Process-Y Account Cr.

Particulars	Units	(₹)	Particulars	Units	(₹)
To Process-X A/c	14,100	41,610	By Normal Loss A/c [(#13.44% of 14,100 units) x ₹2]	1,895	3,790
" Additional material	--	2,250	" Process-Z A/c(₹ 4 × 12,205 units)	12,205	48,820
" Direct wages	--	3,500			
" Production OH	--	5,250			
	14,100	52,610		14,100	52,610

#Calculation for % of wastage in process 'Y':

Let's consider number of units lost under process 'Y' = A

Now, Total Cost - Realisable value from normal loss = 4
Inputs units - Normal loss units

₹ 52,610 - ₹ 2A = 4
14,100 units - A

₹ 52,610 - ₹ 2A = ₹ 56,400 - ₹ 4A
2A = ₹ 3,790 => A = 1,895 units

% of wastage = 1895 units = 13.44%
14,100 units

Dr. **Process-Z Account** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Process-Y A/c	12,205	48,820	By Normal Loss A/c[(5% of 12,205 units) x ₹1]	610	610
” Additional material	--	2,000	” Finished Stock A/c(₹ 4.9771$ × 12,000 units)	12,000	59,726
” Direct wages	--	3,000			
” Production OH	--	4,500			
” Abnormal gain (₹ 4.9771$ × 405 units)	405	2,016			
	12,610	60,336		12,610	60,336

$Cost per unit of completed units

= Total Cost - Realisable value from normal loss = ₹ 58,320 - ₹ 610 = 4.9771
Inputs units - Normal loss units 12,205 units - 610 units

Alternative Solution

Dr. **Process-X Account** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Material introduced	15,000	30,000	By Normal Loss A/c [(6% of 15,000 units) x ₹1.1]	900	990
” Additional material	--	2,600	” Process-Y A/c (₹ 2.951* × 14,100 units)	14,100	41,610
” Direct wages	--	4,000			
” Production OH	--	6,000			
	15,000	42,600		15,000	42,600

*Cost per unit of completed units

= Total Cost - Realisable value from normal loss = ₹ 42,600 - ₹ 990 = 2.951

Inputs units - Normal loss units 15,000 units - 900 units

Dr. **Process-Y Account** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Process-X A/c	14,100	41,610	By Normal Loss A/c [(#13.44% of 14,100 units) x ₹2]	1,895	3,790
” Additional material	--	2,250	” Process-Z A/c (₹4 × 12,631@ units)	12,631	50,524
” Direct wages	--	3,500			
” Production OH	--	5,250			
” Abnormal gain (₹4 × 426 units)	426	1,704			
	14,526	54,314		14,526	54,314

Working Notes:

@1. Units Transferred from Process Z Account to Finished Stock = 12,000 Units i.e 95% of Inputs.

So, Input of Z or Output of Y is 12,000 x 100/95 = 12,631 Units and Normal Loss (5%) is 631 units.

2. Let's consider number of units lost under process 'Y' as:
For Normal loss = A
For Abnormal loss = B
Now, A + B = 1,469 [i.e. 14,100 – 12,631] …(I)
(A x ₹ 2 per unit) + (B x ₹ 4 per unit) = [52,610 – 50,524]
2A + 4B = 2,086 …(II)
Now, putting the values of (I) in (II), we get, 2(1,469 – B) + 4B = 2,086
2938 – 2B + 4B = 2,086
2B = - 852 => B = - 426 units
Since, the figure of B is in negative, it is an abnormal gain of 426 units. Further, A (i.e. normal loss) = 1,469 + 426 = 1,895 units

#3. % of wastage in Process Y Account = 1895 units / 14,100 units = 13.44%

Dr. **Process-Z Account** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Process-Y A/c	12,631	50,524	By Normal Loss A/c [(5% of 12,631 units) x ₹1]	631	631
" Additional material	--	2,000			
" Direct wages	--	3,000			
" Production OH	--	4,500	" Finished Stock A/c (₹ 4.9494$ × 12,000 units)	12,000	59,393
	12,631	60,024		12,631	60,024

$Cost per unit of completed units

= Total Cost - Realisable value from normal loss / Inputs units - Normal loss units = ₹ 60,024 - ₹ 631 / 12,631 units - 631 units = 4.9494

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1 (May 2012)

A product passes through two processes A and B. During the year 2013, the input to process A of basic raw material was 8,000 units @ ₹ 9 per unit. Other information for the year is as follows:

	Process A	Process B
Output units	7,500	4,800
Normal loss (% to input)	5%	10%
Scrap value per unit (₹)	2	10
Direct wages (₹)	12,000	24,000
Direct expenses (₹)	6,000	5,000
Selling price per unit (₹)	15	25

Total overheads ₹ 17,400 were recovered as percentage of direct wages. Selling expenses were ₹ 5,000. These are not allocated to the processes. 2/3rd of the output of Process A was passed on to the next process and the balance was sold. The entire output of Process B was sold.

Prepare Process A and B Accounts.

Solution:

Process- A Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Input	8,000	72,000	By Normal Loss (5% of 8,000 units × ₹ 2)	400	800
To Direct Wages	--	12,000	By Abnormal loss (100 units × ₹ 12.50)	100	1,250
To Direct Exp.	--	6,000	By Process- B A/c (7,500 units× $\frac{2}{3}$ × ₹12.50)	5,000	62,500
To Overheads (₹17,400 × $\frac{1}{3}$)	--	5,800	By Profit and Loss A/c (7,500 units× $\frac{1}{3}$ × ₹12.50)	2,500	31,250
	8,000	95,800		8,000	95,800

Cost per unit = $\frac{₹95,800 - ₹800}{8,000\text{units} - 400\text{units}}$ - $\frac{₹95,000}{7,600\text{units}}$ = ₹12.50

Process- B Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process- A A/c	5,000	62,500	By Normal Loss (10% of 5,000 units × ₹10)	500	5,000
To Direct Wages	--	24,000	By Finished Stock A/c or Profit & loss A/c (4,800 units × ₹ 21.80)	4,800	1,04,640
To Direct Expenses	--	5,000			
To Overheads (₹17,400 × 2/3)	--	11,600			
To Abnormal gain	300	6,540			
	5,300	1,09,640		5,300	1,09,640

Cost per unit = ₹1,03,100 - ₹5,000 - ₹98,100 =₹ 21.80
5,000units - 500units 4,500units

Working:

Profit & Loss A/c

Particulars	Amount (₹)	Amount (₹)	Particulars	Amount (₹)	Amount (₹)
To Cost of Sales:			By Sales:		
Process A (2,500 units × ₹ 12.50)	31,250		Process A (2,500 units × ₹15)	37,500	
Process B (4,800 units × ₹ 21.80)	1,04,640	1,35,890	Process B (4,800 units × ₹ 25)	1,20,000	1,57,500
To Abnormal Loss:			By Abnormal gain:		
Process A [(100 units × ₹(12.50-2)]		1,050	Process B [(300 units × ₹ (21.80-10)]		3,540
To Selling expenses		5,000			
To Net Profit		19,100			

		1,61,040			1,61,040

Note:

1. As mentioned selling expenses are not allocable to process which is debited directly to the P/L A/c.
2. It is assumed that Process A and Process B are not responsibility centres and hence, Process A and Process B have not been credited to direct sales. P/L A/c is prepared to arriving at profit/loss.

Question-2 (Nov-2015)

The following information is furnished by ABC Company for Process - II of its manufacturing activity for the month of April 2015:

(i) Opening Work-in-Progress - Nil
(ii) Units transferred from Process I – 55,000 units at ₹ 3,27,800
(iii) Expenditure debited to Process – II:
Consumables ₹ 1,57,200
Labour ₹ 1,04,000
Overhead ₹ 52,000
(iv) Units transferred to Process III – 51,000 units
(v) Closing WIP – 2,000 units (Degree of completion):
Consumables 80%
Labour 60%
Overhead 60%
(vi) Units scrapped - 2,000 units, scrapped units were sold at ₹ 5 per unit
(vii) Normal loss – 4% of units introduced

You are required to:
(i) Prepare a Statement of Equivalent Production.
(ii) Determine the cost per unit
(iii) Determine the value of Work-in-Process and units transferred to Process – III

Solution:

1. Statement of Equivalent Production

Input Details	Units	Output Particulars	Units	Equivalent Production					
				Material- A*		Consumables		Labour & Overheads	
				%	Units	%	Units	%	Units

Units transferred from Process-I	55,000	Units transferred to Process- III	51,000	100	51,000	100	51,000	100	51,000
		Normal loss (4% of 55,000)	2,200	-	-	-	-	-	-
		Closing W-I-P	2,000	100	2,000	80	1,600	60	1,200
		Abnormal Gain	(200)	100	(200)	100	(200)	100	(200)
	55,000		55,000		52,800		52,400		52,000

*Material A represent transferred-in units from process-I

2. Determination of Cost per Unit

Particulars	Amount (₹)	Units	Per Unit (₹)
(i) Direct Material (Consumables) :			
Value of units transferred from Process-I	3,27,800		
Less: Value of normal loss (2,200 units × ₹ 5)	(11,000)		
	3,16,800	52,800	6.00
(ii) Consumables added in Process-II	1,57,200	52,400	3.00
(iii) Labour	1,04,000	52,000	2.00
(iii) Overhead	52,000	52,000	1.00
Total Cost per equivalent unit			12.00

3. Determination of value of Work-in-Process and units transferred to Process-III

Particulars	Units	Rate (₹)	Amount (₹)
Value of Closing W-I-P:			
Material from Process-I	2,000	6.00	12,000
Consumables	1,600	3.00	4,800
Labour	1,200	2.00	2,400
Overhead	1,200	1.00	1,200
			20,400
Value of units transferred to Process-III	51,000	12.00	6,12,000

Question-3 (May 2014)

M J Pvt. Ltd. produces a product "SKY" which passes through two processes, viz. Process-A and Process-B. The details for the year ending 31st March, 2014 are as follows:

	Process A	Process - B
40,000 Units introduced at a cost	₹3,60,000	-
of Material Consumed	₹2,42,000	2,25,000
Direct Wages	₹2,58,000	1,90,000
Manufacturing Expenses	₹1,96,000	1,23,720
Output in Units	37,000	27,000
Normal Wastage of Input	5%	10%
Scrap Value (per unit)	₹15	20
Selling Price (per unit)	₹37	61

Additional Information:

(a) 80% of the output of Process-A, was passed on to the next process and the balance was sold. The entire output of Process- B was sold.

(b) Indirect expenses for the year was ₹ 4,48,080.

(c) It is assumed that Process-A and Process-B are not responsibility centre.

Required:

(i) Prepare Process-A and Process-B Account.

(ii) Prepare Profit & Loss Account showing the net profit I net loss for the year.

Solution:

1. Process- A Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Input	40,000	3,60,000	By Normal wastage (2,000 units × ₹ 15)	2,000	30,000
To Material	---	2,42,000	By Abnormal loss A/c (1,000 units × ₹ 27)	1,000	27,000
To Direct wages	---	2,58,000	By Process- B (29,600 units × ₹ 27)	29,600	7,99,200

To Manufacturing Exp.	---	1,96,000	By Profit & Loss A/c (7,400 units × ₹ 27)	7,400	1,99,800
	40,000	10,56,000		40,000	10,56,000

Cost per unit = ₹10,56,000 - ₹30,000 = ₹27 per unit
40,000units - 2,000units

Normal wastage = 40,000 units × 5% = 2,000 units

Abnormal loss = 40,000 units – (37,000 units + 2,000 units) = 1,000 units

Transfer to Process- B= 37,000 units × 80% = 29,600 units

Sale = 37,000 units × 20% = 7,400 units

Process – B Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process- A A/c	29,600	7,99,200	By Normal wastage (2,960 units × ₹ 20)	2,960	59,200
To Material	---	2,25,000	By Profit & Loss A/c (27,000 units × ₹ 48)	27,000	12,96,000
To Direct Wages	---	1,90,000			
To Manufacturing Exp.	---	1,23,720			
To Abnormal Gain A/c (360 units × ₹ 48)	360	17,280			
	29,960	13,55,200		29,960	13,55,200

Cost per unit = ₹13,37,920 - ₹59,200 = ₹48 per unit
29,600units - 2,960units

Normal wastage = 29,600 units × 10% = 2,960 units

Abnormal gain = (27,000 units + 2,960 units) – 29,600 units = 360 units

2. Profit & Loss Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Process- A A/c	1,99,800	By Sales:	
		- Process-A	
To Process- B A/c	12,96,000		2,73,800

		(7,400 units × ₹ 37)	
To Abnormal loss A/c	12,000	- Process- B	16,47,000
		(27,000 units × ₹ 61)	10,800
To Indirect Expenses	4,48,080	By Abnormal gain	25,000
		By Net loss	
	19,55,880		19,55,880

Working Notes:

Normal wastage (Loss) Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process- A A/c	2,000	30,000	By Abnormal Gain A/c (360 units × ₹ 20)	360	7,200
To Process- B A/c	2,960	59,200	By Bank (Sales)	4,600	82,000
	4,960	89,200		4,960	89,200

Abnormal Loss Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Process- A A/c	1,000	27,000	By Bank A/c (1,000 units × ₹ 15)	1,000	15,000
			By Profit & Loss A/c	---	12,000
	1,000	27,000		1,000	27,000

Abnormal Gain Account

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Normal loss A/c (360 units × ₹ 20)	360	7,200	By Process- B A/c	360	17,280
To Profit & Loss A/c		10,080			
	360	17,280		360	17,280

(II) Questions based on FIFO Method

A. QUESTION FROM STUDY MATERIAL

Question-4 (Also solved by Wgt. Avg. method as Q-5)

Opening work-in-process 1,000 units (60% complete); Cost ₹ 1,10,000. Units introduced during the period 10,000 units; Cost ₹ 19,30,000. Transferred to next process - 9,000 units.

Closing work-in-process - 800 units (75% complete). Normal loss is estimated at 10% of total input including units in process at the beginning. Scraps realise ₹ 10 per unit. Scraps are 100% complete.

Using FIFO method, COMPUTE equivalent production and cost per equivalent unit.

Also evaluate the output.

Hints: Cost/unit = ₹210.88, Normal Loss = 1,100 units, Abnormal loss = 100 units

Question-5

Refer to information provided in Illustration 4 above and solve this by Weighted Average Method:

Hints: Cost/unit = ₹209.18, Normal Loss = 1,100 units, Abnormal loss = 100 units

TEST YOUR KNOWLEDGE

Question-3

Hill manufacturing Ltd uses process costing to manufacture Water density sensors for hydro sector. The following information pertains to operations for the month of May.

Particulars	Units
Beginning WIP, May 1	16,000
Started in production during May	1,00,000
Completed production during May	92,000
Ending work in progress, May 31	24,000

The beginning work in progress was 60% complete for materials and 20% complete for conversion costs. The ending inventory was 90% complete for material and 40% complete for conversion costs.

Costs pertaining to the month of May are as follows:

Beginning inventory costs are material ₹27,670, direct labour ₹30,120 and factory overhead ₹ 12,720

Cost incurred during May are material used, ₹ 4,79,000, direct labour ₹1,82,880, factory overheads ₹ 3,91,160.

CALCULATE:

(i) Using the FIFO method, the equivalent units of production for material.

(ii) Cost per equivalent unit for conversion cost.

Hints:

(i)

Input Details	Units	Output Particulars	Units	Equivalent Units			
				Material		Conversion cost	
				%	Units	%	Units
Beginning WIP	16,000	From beginning WIP	16,000	40	6,400	80	12,800
Unit Introduced	1,00,000	Completed output	76,000	100	76,000	100	76,000
		Closing W-I-P	24,000	90	21,600	40	9,600
Total	1,16,000	Total	1,16,000		1,04,000		98,400

(ii) 5.83

B. PAST YEAR EXAM QUESTIONS

Jan-21. Q1 (c) (5 marks)

MNO Ltd has provided following details:

- Opening work in progress is 10,000 units at ₹ 50,000 (Material 100%, Labour and overheads 70% complete).
- Input of materials is 55,000 units at ₹ 2,20,000. Amount spent on Labour and Overheads is ₹ 26,500 and ₹ 61,500 respectively.
- 9,500 units were scrapped; degree of completion for material 100% and for labour & overheads 60%.
- Closing work in progress is 12,000 units; degree of completion for material 100% and for labour & overheads 90%.
- Finished units transferred to next process are 43,500 units.

Normal loss is 5% of total input including opening work in progress. Scrapped units would fetch ₹ 8.50 per unit.

You are required to prepare using FIFO method:

(i) Statement of Equivalent production

(ii) Abnormal Loss Account

Solution:

(i) Statement of Equivalent Production (Using FIFO method)

Particulars	Input Units	Particulars	Output Units	Equivalent Production			
				Material		Labour & O.H.	
				%	Units	%	Units
Opening WIP	10,000	Completed and transferred to Process-II					
Units introduced	55,000	- From opening WIP	10,000	-		30	3,000
		- From fresh inputs	33,500	100	33,500	100	33,500
			43,500		33,500		36,500
		Normal Loss {5% (10,000 + 55,000 units)}	3,250	-			-
		Abnormal loss (9,500 – 3,250)	6,250	100	6,250	60	3,750
		Closing WIP	12,000	100	12,000	90	10,800
	65,000		**65,000**		**51,750**		**51,050**

(ii) Abnormal Loss A/c

Particulars	Units	(₹)	Particulars	Units	(₹)
To Process-I A/c (Refer Working Note-2)	6,250	29,698	By Cost Ledger Control A/c (6,250 units × ₹ 8.5)	6,250	53,125
To Costing Profit & Loss A/c	-	23,427			
	6,250	**53,125**		**6,250**	**53,125**

Working Notes:

1. Computation of Cost per unit

Particulars	Materials (₹)	Labour (₹)	Overhead (₹)
Input costs	2,20,000	26,500	61,500
Less: Realisable value of normal scrap (3,250 units x ₹ 8.5)	(27,625)	--	--
Net cost	1,92,375	26,500	61,500
Equivalent Units	51,750	51,050	51,050
Cost Per Unit	**3.7174**	**0.5191**	**1.2047**

Total cost per unit = ₹ (3.7174 + 0.5191 + 1.2047) = ₹ 5.4412

2. Valuation of Abnormal Loss

	(₹)
Materials (6,250 units × ₹ 3.7174)	23,233.75
Labour (3,750 units × ₹ 0.5191)	1,946.63
Overheads (3,750 units × ₹ 1.2047)	4,517.62
	29,698

Nov-18. Q1 (c) (5 marks)

Following details have been provided by M/s AR Enterprises:

(i) Opening works-in-progress - 3000 units (70% complete)
(ii) Units introduced during the year - 17000 units
(iii) Cost of the process (for the period) - ₹ 33,12,720
(iv) Transferred to next process - 15000 units
(v) Closing works-in-progress - 2200 units (80% complete)
(vi) Normal loss is estimated at 12% of total input (including units in process in the beginning). Scraps realise ₹ 50 per unit. Scraps are 100% complete.

Using FIFO method, compute:

(i) Equivalent production
(ii) Cost per equivalent unit

Solution:

Statement of Equivalent Production Units (Under FIFO Method)

Particulars	Input units	Particulars	Output units	Equivalent Production	
				(%)	Equivalent units
Opening W-I-P	3,000	From opening W-I-P	3,000	30	900
Units introduced	17,000	From fresh inputs	12,000	100	12,000
		Units completed (Transferred to next process)	15,000		
		Normal Loss {12% (3,000 + 17,000 units)}	2,400	--	--
		Closing W-I-P	2,200	80	1760
		Abnormal loss (Balancing figure)	400	100	400
	20,000		11,000		15,060

Computation of cost per equivalent production unit :

Cost of the Process (for the period)	₹ 33,12,720
Less: Scrap value of normal loss (₹ 50 × 2,400 units)	(₹ 1,20,000)
Total process cost	₹ 31,92,720

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

From the following Information for the month ending October, 2013, prepare Process Cost accounts for Process III. Use First-in-fist-out (FIFO) method to value equivalent

production.

Direct materials added in Process III (Opening WIP)	2,000 units at ₹ 25,750
Transfer from Process II	53,000 units at ₹ 4,11,500
Transferred to Process IV	48,000 units
Closing stock of Process III	5,000 units
Units scrapped	2,000 units
Direct material added in Process III	₹
Direct wages	1,97,600
Production Overheads	₹ 97,600

Degree of completion:

	Opening Stock	Closing Stock	Scrap
Materials	80%	70%	100%
Labour	60%	50%	70%
Overheads	60%	50%	70%

The normal loss in the process was 5% of production and scrap was sold at ₹ 3 per unit.

Solution:

Process III

Process Cost Sheet (FIFO Method)

Opening Stock: 2,000 units; Introduced: 53,000 units

Statement of Equivalent Production

Input		Output		Equivalent production					
Item	Units	Item	Units	Mat- A	(%)	Mat- B	(%)	Labour & OHs.	(%)
Opening stock	2,000	Work on opening WIP	2,000	-	-	400	20	800	40
Process II transfer	53,000	Introduced & completed during the period (48,000 – 2000)	46,000	46,000	100	46,000	100	46,000	100
			48,000						

		Normal Loss (2,000+53,000 – 5,000) x 5%	2,500	-	-	-	-	-	-
		Closing WIP	5,000	5,000	100	3,500	70	2,500	50
			55,500	51,000		49,900		49,300	
		Abnormal Gain	500	500	100	500	100	500	100
	55,000		55,000	50,500		49,400		48,800	

Statement of Cost for each Element

Element of cost	Cost (₹)	Equivalent Production	Cost per unit (₹)
Material A:			
Transfer from Process-II	4,11,500		
Less: Scrap value of Normal Loss (2,500 × ₹ 3)	7,500		
	4,04,000		
	1,97,600	50,500	8
Material B Wages	97,600	49,400	4
Overheads	48,800	48,800	2
		48,800	1
	7,48,000		15

Process Cost Sheet

	(₹)
Opening WIP (for completion):	
Material- B (400 units × ₹4)	1,600
Wages (800 units × ₹2)	1,600
Overheads (800 units × ₹ 1)	800
	4,000
Introduced and completely processed during the period (46,000 units × ₹ 15)	6,90,000

Closing WIP:	
Material- A (5,000 units × ₹8)	40,000
Material- B (3,500 units × ₹4)	14,000
Wages (2,500 units × ₹ 2)	5,000
Overheads (2,500 units × ₹1)	2,500
	61,500
Abnormal Gain (500 units × ₹15)	7,500

Process III A/c

Particulars	Units	Amount	Particulars	Units	Amount
To Balance b/d	2,000	25,750	By Normal Loss	2,500	7,500
To Process II A/c	53,000	4,11,500	By Process IV A/c (₹6,90,000 + ₹ 4000 + ₹ 25,750)	48,000	7,19,750
To Direct Material		1,97,600	By Balance c/d	5,000	61,500
To Direct Wages		97,600			
To Production OH		48,800			
To Abnormal Gain	500	7,500			
	55,500	7,88,750		55,500	7,88,750

Question-2

Following information is available regarding Process A for the month of October 2013:

Production Record:

(i) Opening work-in progress 40,000 Units

(Material: 100% complete, 25% complete for labour & overheads)

(ii) Units Introduced 1,80,000 Units

(iii) Units Completed 1,50,000 Units

(iv) Units in-process on 31.10.2013 70,000 Units

(Material: 100% complete, 50% complete for labour & overheads)

Cost Record: (₹)

Opening Work-in-progress:

Material	1,00,000
Labour	25,000
Overheads	45,000

Cost incurred during the month:

Material	6,60,000
Labour	5,55,000
Overheads	9,25,000

Assure that FIFO method is used for W.I.P. inventory valuation.

Required:

(i) Statement of Equivalent Production

(ii) Statement showing Cost for each element

(iii) Statement of apportionment of Cost

(iv) Process- A Account

Solution:

Statement of Equivalent Production
(FIFO Method)

Input		Output		Equivalent Production			
Particulars	**Units**	**Particulars**	**Units**	**Material**		**Labour & Overheads**	
				(%)	**Units**	**(%)**	**Units**
Opening WIP	40,000	Transfer to Process II:					
		Opening WIP	40,000	--	--	75	30,000
	1,80,000	completed Introduced &	1,10,000	100	1,10,000	100	1,10,000
Introduced		completed Closing WIP	70,000	100	70,000	50	35,000
	2,20,000		2,20,000		1,80,000		1,75,000

Statement showing Cost for each element

Item of Cost	Equivalent Production	Cost Incurred (₹)	Cost per Unit (₹)
Material	1,80,000	6,60,000	3.66667
Labour & Overheads	1,75,000	14,80,000	8.45714
			12.12381

Statement of Apportionment of Cost

Transfer to Process II		
Opening WIP Completed		
Cost already Incurred ₹ (1,00,000 + 25,000 + 45,000)	1,70,000	
Cost Incurred during the Month		
Labour & Overheads (30,000 units × ₹8.45714)	2,53,714	4,23,714
Introduced & Completed (1,10,000 units × ₹ 12.12381)		13,33,619
		17,57,333
Closing WIP		
Material (70,000 units × ₹ 3.66667)	2,56,667	
Labour and Overheads (35,000 units × ₹ 8.45714)	2,96,000	5,52,667

Process- A A/c

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Opening WIP	40,000	1,70,000	By Process II A/c	1,50,000	17,57,333
To Materials	1,80,000	6,60,000	By Closing WIP	7,000	5,52,667
To Labour		5,55,000			
To Overheads		9,25,000			
	2,20,000	23,10,000		2,20,000	23,10,000

Question-3

Star Ltd. manufactures chemical solutions for the food processing industry. The manufacturing takes place in a number of processes and the company uses a FIFO process costing system to value work-in-process and finished goods. At the end of the last month, a fire occurred in the factory and destroyed some of the paper files containing records of the process operations for the month.

Star Ltd. needs your help to prepare the process accounts for the month during which the fire occurred. You have been able to gather some information about the month's operating activities but some of the information could not be retrieved due to the damage. The following information was salvaged:

- Opening work-in-process at the beginning of the month was 800 litres, 70% complete for labour and 60% complete for overheads. Opening work-in-process was valued at ₹

26,640.

- Closing work-in-process at the end of the month was 160 litres, 30% complete for labour and 20% complete for overheads.
- Normal loss is 10% of input and total losses during the month were 1,800 litres partly due to the fire damage.
- Output sent to finished goods warehouse was 4,200 litres.
- Losses have a scrap value of ₹15 per litre.
- All raw materials are added at the commencement of the process.
- The cost per equivalent unit (litre) is ₹39 for the month made up as follows:

	(₹)
Raw Material	23
Labour	7
Overheads	9
	39

Required:

A. Calculate the quantity (in litres) of raw material inputs during the month.

B. Calculate the quantity (in litres) of normal loss expected from the process and the quantity (in litres) of abnormal loss / gain experienced in the month.

C. Calculate the values of raw material, labour and overheads added to the process during the month.

D. Prepare the process account for the month.

Solution:

A. Calculation of Raw Material inputs during the month:

Quantities Entering Process	Litres	Quantities Leaving Process	Litres
Opening WIP	800	Transfer to Finished Goods	4,200
Raw material input (balancing figure)	5,360	Process Losses	1,800
		Closing WIP	160
	6,160		6,160

B. Calculation of Normal Loss and Abnormal Loss/Gain

	Litres
Total process losses for month	1,800
Normal Loss (10% input)	536
Abnormal Loss (balancing figure)	1,264

C. Calculation of values of Raw Material, Labour and Overheads added to the process:

	Material	Labour	Overheads
Cost per equivalent unit	₹ 23.00	₹7.00	₹9.00
Equivalent units (litre) (refer the working note)	4,824	4,952	5,016
Cost of equivalent units	₹1,10,952	₹34,664	₹45,144
Add: Scrap value of normal loss (536 units × ₹ 15)	₹8,040	--	--
Total value added	₹1,18,992	₹34,664	₹45,144

Workings:

Statement of Equivalent Units (litre):

Input Details	Units	Output details	Units	Equivalent Production					
				Material		Labour		Overheads	
				Units	(%)	Units	(%)	Units	(%)
Opening WIP	800	Units completed:							
Units introduced	5,360	- Opening WIP	800	--	--	240	30	320	40
		- Fresh inputs	3,400	3,400	100	3,400	100	3,400	100
		Normal loss	536	--	--	--	--	--	--
		Abnormal loss	1,264	1,264	100	1,264	100	1,264	100
		Closing WIP	160	160	100	48	30	32	20
	6,160		6,160	4,824		4,952		5,016	

D. Process Account for Month

	Litres	Amount (₹)		Litres	Amount (₹)
To Opening WIP	800	26,640	By Finished goods	4,200	1,63,800
To Raw Materials	5,360	1,18,992	By Normal loss	536	8,040
To Wages	--	34,664	By Abnormal loss	1,264	49,296
To Overheads	--	45,144	By Closing WIP	160	4,304
	6,160	2,25,440		6,160	2,25,440

(III) Questions based on Weighted Average Method

A. QUESTION FROM STUDY MATERIAL

TEST YOUR KNOWLEDGE

Question-4

Following information is available regarding Process-I for the month of February, 20X9 :

Production Record:

Units in process as on 1.2.20X9 (All materials used, 25% complete for labour and overhead)		4,000
New units introduced		16,000
Units completed	14,000	
Units in process as on 28.2.20X9 (All materials used, 33-1/3% complete for labour and overhead)		6,000

Cost Records:

Work-in-process as on 1.2.20X9	(₹)
Materials	6,000
Labour	1,000
Overhead	1,000
	8,000
Cost during the month	
Materials	25,600
Labour	15,000
Overhead	15,000
	55,600

Presuming that average method of inventory is used, PREPARE:

(i) Statement of equivalent production.
(ii) Statement showing cost for each element.
(iii) Statement of apportionment of cost.
(iv) Process cost account for Process-I.

Hints:

Particulars	Material	Labour & Overhead
Equivalent Production	20,000	16,000
Cost/unit	1.58	2

Closing WIP ₹13,480

Question-5

Following details are related to the work done in Process-I by XYZ Company during the month of March, 20X9:

	(₹)
Opening work-in process (2,000 units)	
Materials	80,000
Labour	15,000
Overheads	45,000
Materials introduced in Process-I (38,000 units)	14,80,000
Direct Labour	3,59,000
Overheads	10,77,000

Units scrapped : 3,000 units

Degree of completion :

Materials	100%
Labour and overheads	80%

Closing work-in process : 2,000 units

Degree of completion :

Materials	100%
Labour and overheads	80%

Units finished and transferred to Process-II: 35,000 units

Normal Loss :

5% of total input including opening work-in-process.

Scrapped units fetch ₹20 per piece

You are required to prepare using weighted average method.

(i) Statement of equivalent production
(ii) Statement of cost
(iii) Statement of distribution cost, and
(iv) Process-I Account, Normal Loss Account and Abnormal Loss Account.

Hints:

Particulars	Material	Labour & Overhead
Equivalent Production	38,000	37,400
Cost/unit	40	40

Question-6

'Healthy Sweets' is engaged in the manufacturing of jaggery. Its process involve sugarcane crushing for juice extraction, then filtration and boiling of juice along with some chemicals and then letting it cool to cut solidified jaggery blocks.

The main process of juice extraction (Process – I) is done in conventional crusher, which is then filtered and boiled (Process – II) in iron pots. The solidified jaggery blocks are then cut, packed and dispatched. For manufacturing 10 kg of jaggery, 100 kg of sugarcane is required, which extracts only 45 litre of juice.

Following information regarding Process – I has been obtained from the manufacturing department of Healthy Sweets for the month of January:

Opening work-in process (4,500 litre)	
Sugarcane	50,000
Labour	15,000
Overheads	45,000
Sugarcane introduced for juice extraction (1,00,000 kg)	5,00,000
Direct Labour	2,00,000
Overheads	6,00,000

Abnormal Loss: 1,000 kg

Degree of completion:

Sugarcane	100%
Labour and overheads Closing	80%

work-in process: 9,000 litreDegree of completion:

Sugarcane	100%
Labour and overheads	80%

Extracted juice transferred for filtering and boiling: 39,500 litre (Consider mass of 1 litre of juice equivalent to 1 kg)

You are required to PREPARE using average method:

(i) Statement of equivalent production,

(ii) Statement of cost,

(iii) Statement of distribution cost, and

(iv) Process-I Account.

Hints:

(i)

Particulars	Input Units	Particulars	Output Units	Equivalent Production			
				Sugarcane		Labour & O.H.	
				%	Units	%	Units
Opening WIP	4,500	Completed and transferred to Process - II	39,500	100	39,500	100	39,500
Units introduced	1,00,000	Normal Loss (55%* of 1,00,000)	55,000	--	--	--	--
		Abnormal loss	1,000	100	1,000	80	800
		Closing WIP	9,000	100	9,000	80	7,200
	1,04,500		1,04,500		49,500		47,500

(ii)

Particulars	Sugarcane (₹)	Labour (₹)	Overhead (₹)	Total (₹)
Cost per equivalent unit: (C) = (A ÷ B)	11.111	4.526	13.579	29.216

(iii)

	Amount (₹)	Amount (₹)
1. Value of units completed and transferred (39,500 units × ₹ 29.216)		11,54,032
2. Value of Abnormal Loss:		
- Sugarcane (1,000 units × ₹ 11.111)	11,111	
- Labour (800 units × ₹ 4.526)	3,621	

- Overheads (800 units × ₹ 13.579)	10,863	25,595
3. Value of Closing W-I-P:		
- Sugarcane (9,000 units × ₹ 11.111)	99,999	
- Labour (7,200 units × ₹ 4.526)	32,587	
- Overheads (7,200 units × ₹ 13.579)	97,769	2,30,355

(iv) Process-I Account Total: 104,500 Units; ₹14,10,000

B. PAST YEAR EXAM QUESTIONS

Nov.-20 Q4 (a) (10 marks)

Following details are related to the work done in Process-I by ABC Ltd. during the month of May 2019:

	(₹)
Opening work in process (3,000 units) Materials	1,80,500
Labour	32,400
Overheads	90,000
Materials introduced in Process-I (42,000 units)	36,04,000
Labour	4,50,000
Overheads	15,18,000

Units Scrapped : 4,800 Units
Degree of completion
Materials : 100%
Labour & overhead : 70%
Closing Work-in-process : 4,200 Units
Degree of completion
Materials : 100%
Labour & overhead : 50%

Units finished and transferred to Process-II: 36,000 units
Normal loss: 4% of total input including opening work-in-process

Scrapped units fetch ₹ 62.50 per piece.

Prepare:

(i) Statement of equivalent production.
(ii) Statement of cost per equivalent unit.
(iii) Process-I A/c
(iv) Normal Loss Account and
(v) Abnormal Loss Account

Solution:

(i) Statement of Equivalent Production (Weighted Average method)

Particulars	Input Units	Particulars	Output Units	Equivalent Production			
				Material		Labour & O.H.	
				%	Units	%	Units
Opening WIP	3,000	Completed and transferred to Process-II	36,000	100	36,000	100	36,000
Units introduced	42,000	Normal Loss (4% of 45,000 units)	1,800	--	--	--	--
		Abnormal loss (Balancing figure)	3,000	100	3,000	70	2,100
		Closing WIP	4,200	100	4,200	50	2,100
	45,000		45,000		**43,200**		**40,200**

(ii) Statement showing cost for each element

Particulars	Materials (₹)	Labour (₹)	Overhead (₹)	Total (₹)
Cost of opening work-in-process	1,80,500	32,400	90,000	3,02,900
Cost incurred during the month	36,04,000	4,50,000	15,18,000	55,72,000
Less: Realisable Value of normal scrap (₹ 62.50 × 1,800 units)	(1,12,500)	--	--	(1,12,500)

Total cost: (A)	36,72,000	4,82,400	16,08,000	57,62,400
Equivalent units: (B)	43,200	40,200	40,200	
Cost per equivalent unit: (C) = (A ÷ B)	85.00	12.00	40.00	137.00

Statement of Distribution of cost

Particulars	Amount (₹)	Amount (₹)
1. Value of units completed and transferred:(36,000 units × ₹ 137)		49,32,000
2. Value of Abnormal Loss:		
- Materials (3,000 units × ₹ 85)	2,55,000	
- Labour (2,100 units × ₹ 12)	25,200	
- Overheads (2,100 units × ₹ 40)	84,000	3,64,200
3. Value of Closing W-I-P:		
- Materials (4,200 units × ₹ 85)	3,57,000	
- Labour (2,100 units × ₹ 12)	25,200	
- Overheads (2,100 units × ₹ 40)	84,000	4,66,200

(iii) Process-I A/c

Particulars	Units	(₹)	Particulars	Units	(₹)
To Opening W.I.P:					
– Materials	3,000	1,80,500	By Normal Loss(₹ 62.5 × 1,800 units)	1,800	1,12,500
– Labour	--	32,400			
– Overheads	--	90,000			
To Materials introduced	42,000	36,04,000	By Abnormal loss	3,000	**3,64,200**
To Labour		4,50,000	By Process-I A/c	36,000	49,32,000
To Overheads		15,18,000	By Closing WIP	4,200	**4,66,200**
	45,000	**58,74,900**		45,000	**58,74,900**

(iv) Normal Loss A/c

Particulars	Units	(₹)	Particulars	Units	(₹)
To Process-I A/c	1,800	1,12,500	By Cost Ledger Control A/c	1,800	1,12,500
	1,800	**1,12,500**		1,800	**1,12,500**

(v) Abnormal Loss A/c

Particulars	Units	(₹)	Particulars	Units	(₹)
To Process-I A/c	3,000	3,64,200	By Cost Ledger Control A/c (₹ 62.5 × 3,000 units)	3,000	**1,87,500**
			By Costing Profit & Loss A/c (Bal. Figure)		**1,76,700**
	3,000	**3,64,200**		3,000	**3,64,200**

May-22 Q4 (a) (10 marks)

STG Limited is a manufacturer of Chemical 'GK', which is required for industrial use. The complete production operation requires two processes. The raw material first passes through Process I, where Chemical 'G' is produced. Following data is furnished for the month April 2022:

Particulars	(in kgs.)
Opening work-in-progress quantity (Material 100% and conversion 50% complete)	9,500
Material input quantity	1,05,000
Work Completed quantity	83,000
Closing work-in-progress quantity (Material 100% and conversion 60% complete)	16,500

You are further provided that:

Particulars	(in ₹)
Opening work-in-progress cost	
Material cost	29,500
Processing cost	14,750
Material input cost	3,34,500
Processing cost	2,53,100

Normal process loss may be estimated to be 10% of material input. It has no realizable value. Any loss over and above normal loss is considered to be 100% complete in material and processing.

The Company transfers 60,000 kgs. of output (Chemical G) from Process I to Process II for producing Chemical 'GK'. Further materials are added in Process II which yield 1.20 kg. of Chemical 'GK' for every kg. of Chemical 'G' introduced. The chemicals transferred to Process II for further processing are then sold as Chemical 'GK' for ₹ 10 per kg. Any quantity of output completed in Process I, are sold as Chemical 'G' @ ₹ 9 per kg.

The monthly costs incurred in Process II (other than the cost of Chemical 'G') are: Input 60,000 kg. of Chemical 'G'

Materials Cost ₹ 85,000

Processing Costs ₹ 50,000

You are required:

(i) Prepare Statement of Equivalent production and determine the cost per kg. of Chemical 'G' in Process I using the weighted average cost method.

(ii) Prepare a statement showing cost of Chemical 'G' transferred to Process II, cost of abnormal loss and cost of closing work-in progress.

(iii) STG is considering the option to sell 60,000 kg. of Chemical 'G' of Process I without processing it further in Process-II. Will it be beneficial for the company over the current pattern of processing 60,000 kg in process-II?

(Note: You are not required to prepare Process Accounts)

Solution:

(i) Statement of Equivalent Production

Particulars	Input quantity	Particulars	Total	Material		Processing Cost	
				%	Units	%	Units
Opening WIP	9,500	Units completed	83,000	100%	83,000	100%	83,000

Material Input	1,05,000	Normal loss(10% of 1,05,000)	10,500	-	-	-	-
		Abnormal loss(Bal. fig.)	4,500	100%	4,500	100%	4,500
		Closing WIP	16,500	100%	16,500	60%	9,900
	1,14,500		1,14,500		1,04,000		97,400

Statement of Cost for each element

Particulars	**Material**	**Processing**	**Total cost**
	(₹)	**(₹)**	**(₹)**
Cost of opening WIP	29,500	14,750	44,250
Cost incurred during the month	3,34,500	2,53,100	5,87,600
Total cost (A)	3,64,000	2,67,850	6,31,850
Equivalent production (B)	1,04,000	97,400	
Cost per kg of Chemical 'G' (A/B)	**3.5**	**2.75**	6.25

Alternative Presentation

Statement showing cost per kg of each statement

	(₹)	**(₹)**
Material	$\frac{29,500 + 3,34,500}{1,04,000}$	3.5
Processing cost	$\frac{14,750 + 2,53,100}{97,400}$	2.75
Total Cost per kg		6.25

(ii) Statement showing cost of Chemical 'G' transferred to Process II, cost of abnormal loss and cost of closing work-in- progress

	(₹)
Units transferred (60,000 × 6.25)	3,75,000
Abnormal loss (4,500 × 6.25)	28,125
Closing work in progress:	

Material (16,500 × 3.5)	57,750
Processing cost (9,900 × 2.75)	27,225
	84,975

(iii) Calculation of Incremental Profit / Loss after further processing

Particulars	**(₹)**	**(₹)**
Sales if further processed (A) (60,000 x 1.20 x ₹ 10)	7,20,000	
Calculation of cost in Process II		
Chemical transferred from Process I	3,75,000	
Add: Material cost	85,000	
Add: Process cost	50,000	
Total cost of finished stock (B)	5,10,000	
Profit, if further processed (C = A – B)		2,10,000
If sold without further processing then,		
Sales (60,000 x ₹ 9)	5,40,000	
Less: Cost of input without further processing	3,75,000	
Profit without further processing (D)		1,65,000
Incremental Profit after further processing (C – D)		45,000
Additional net profit on further processing in Process II is 45,000. Therefore, it is advisable to process further chemical 'G'.		

Alternative Presentation

Calculation of Incremental Profit / Loss after further processing

	(₹)
If 60,000 units are sold @ ₹ 9	5,40,000
If 60,000 units are processed in process II (60,000 × 1.2 × ₹ 10)	7,20,000
Incremental Revenue (A)	**1,80,000**
Incremental Cost: (B)	
Material Cost	85,000
Processing Cost	50,000
	1,35,000
Incremental Profit (A-B)	45,000

Additional net profit on further processing in Process II is 45,000. Therefore, it is advisable to process further chemical 'G'.

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

A Chemical Company carries on production operation in two processes. The material first pass through Process I, where Product 'A' is produced.

Following data are given for the month just ended:

Material input quantity	2,00,000 kg
Opening work-in-progress quantity	
(Material 100% and conversion 50% complete)	40,000 kg
Work completed quantity	1,60,000 kg
Closing work-in-progress quantity	
(Material 100% and conversion two-third complete)	30,000 kg
Material input cost	₹75,000
Processing cost	₹1,02,000
Opening work-in-progress cost	
Material cost	₹20,000
Processing cost	₹12,000

Normal process loss in quantity may be assumed to be 20% of material input. It has no realisable value.

Any quantity of Product 'A' can be sold for ₹ 1.60 per kg.

Alternatively, it can be transferred to Process II for further processing and then sold as Product 'AX' for ₹ 2 per kg. Further materials are added in Process II, which yield two kg. of product 'AX' for every kg. of Product 'A' of Process I.

Of the 1,60,000 kg. per month of work completed in Process I, 40,000 kg. are sold as Product 'A' and 1,20,000 kg. are passed through Process II for sale as Product 'AX'. Process II has facilities to handle upto 1,60,000 kg. of Product 'A' per month, if required.

The monthly costs incurred in Process II (other than the cost of Product 'A') are:

	1,20,000 kg. of Product 'A' input (₹)	**1,60,000 kg. of Product 'A' input (₹)**
Materials Cost	1,32,000	1,76,000

Processing Costs	1,20,000	1,40,000

Required:

(i) Determine, using the weighted average cost method, the cost per kg. of Product 'A' in Process I and value of both work completed and closing work-in-progress for the month just ended.

(ii) Is it worthwhile processing 1,20,000 kg. of Product 'A' further?

(iii) Calculate the minimum acceptable selling price per kg., if a potential buyer could be found for additional output of Product 'AX' that could be produced with the remaining Product 'A' quantity.

Solution:

(i)

Process-I

Statement of Equivalent Production

Inputs		Output		Equivalent output			
				Material		Conversion	
Particulars	**Kg.**	**Particulars**	**Kg.**	**(%)**	**kg.**	**(%)**	**kg.**
Opening W.I.P.	40,000	Normal loss	40,000	--	--	--	--
New material introduced	2,00,000	Units introduced & completed	1,60,000	100	1,60,000	100	1,60,000
		Abnormal loss	10,000	100	10,000	100	10,000
		Closing WIP	30,000	100	30,000	2/3rd	20,000
	2,40,000		2,40,000		2,00,000		1,90,000

Process- I

Statement of Cost for each element

Elements of cost	Costs of opening WIP	Costs in process	Total cost	Equivalent units	Cost per Kg.
	(₹)	(₹)	(₹)	Kg.	(₹)
Material	20,000	75,000	95,000	2,00,000	0.475
Conversion cost	12,000	1,02,000	1,14,000	1,90,000	0.600
	32,000	1,77,000	2,09,000		1.075

Statement of Apportionment of Cost

Units completed	Elements	Equivalent units (Kg.)	Cost/unit (₹)	Cost (₹)	Total cost (₹)
Work completed	Material	1,60,000	0.475	76,000	
	Conversion	1,60,000	0.600	96,000	1,72,000
Closing WIP	Material	30,000	0.475	14,250	
	Conversion	20,000	0.600	12,000	26,250

(ii) Statement showing comparative data to decide whether 1,20,000 kg. of product 'A' should be processed further into 'AX'.

Alternative I – To sell product 'A' after Process – I	(₹)
Sales 1,20,000 kg. x ₹ 1.60	1,92,000
Less: Cost from Process- I 1,20,000 kg. x ₹ 1.075	1,29,000
Profit	63,000

Alternative II – Process further into 'AX'

Sales 2,40,000 kg. x ₹ 2.00		4,80,000
Less: Cost from Process- I 1,20,000 kg. x ₹ 1.075	= ₹ 1,29,000	
Material in Process- II	= ₹ 1,32,000	
Processing cost in Process- II	= ₹ 1,20,000	3,81,000
Profit		99,000

Hence company should process further

It will increase profit by ₹ 99,000 – ₹ 63,000 = ₹ 36,000

(i) Calculation of minimum selling price per kg.:

Cost of processing remaining 40,000 kg. further	(₹)
Material ₹ 1,76,000 - ₹ 1,32,000	44,000
Processing cost ₹ 1,40,000 – ₹ 1,20,000	20,000
Cost from process- I relating to 40,000 kg. 'A' (40,000 kg. × ₹1.075)	43,000
Benefit foregone if 40,000 kg. 'A' are further processed 40,000 kg. (₹ 1.60 – ₹ 1.075)	21,000
Total cost	1,28,000
Additional quantity of product 'AX' (40,000 kg. × ₹ 2)	80,000

∴ Minimum selling price = (₹1,28,000/80,000 kg) = ₹1.60

(IV) Inter process profit

A. QUESTION FROM STUDY MATERIAL

Question-6 (Study Material – illustration-6)

A Ltd. produces product 'AXE' which passes through two processes before it is completed and transferred to finished stock. The following data relate to October 20X8:

	Process- I (₹)	Process- II (₹)	Finished Stock (₹)
Opening stock	7,500	9,000	22,500
Direct materials	15,000	15,750	--
Direct wages	11,200	11,250	--
Factory overheads	10,500	4,500	--
Closing stock	3,700	4,500	11,250
Inter-process profit included in opening stock	--	1,500	8,250

Output of Process- I is transferred to Process- II at 25% profit on the transfer price. Output of Process- II is transferred to finished stock at 20% profit on the transfer price. Stock in process is valued at prime cost. Finished stock is valued at the price at which it is received from process II. Sales during the period are ₹ 1,40,000.

PREPARE Process cost accounts and finished goods account showing the profit element at each stage.

Hints:

Transfer from	Cost	Profit	Total
P-I	₹40,500	₹13,500	₹54,000
P-II	₹75,750	₹36,750	₹1,12,500
Finished Stock	₹84,425	₹57,575	₹1,40,000

B. PAST YEAR EXAM QUESTIONS

May-19. Q2 (b) (5 marks)

KT Ltd. produces a product EMM which passes through two processes before it is completed and transferred to finished stock. The following data relate to May 2019:

Particulars	Process		Finished stock
	A (₹)	B (₹)	(₹)
Opening Stock	5,000	5,500	10,000
Direct Materials	9,000	9,500	
Direct Wages	5,000	6,000	
Factory Overheads	4,600	2,030	
Closing Stock	2,000	2,490	5,000
Inter-process profit included in opening stock		1,000	4,000

Output of Process A is transferred to Process B at 25% profit on the transfer price and output of Process B is transferred to finished stock at 20% profit on the transfer price. Stock in process is valued at prime cost. Finished stock is valued at the price at which it is received from Process B. Sales during the period are ₹ 75,000.

Prepare the Process cost accounts and Finished stock account showing the profit element at each stage.

Solution:

Process-A A/c

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
Opening stock	5,000	5,000	_	Process B A/c	**28,800**	**21,600**	**7,200**
Direct materials	9,000	9,000	_				
Direct wages	5,000	5,000	_				
	19,000	19,000	_				
Less: Closing stock	(2,000)	(2,000)	_				
Prime Cost	17,000	17,000	_				
Overheads	4,600	4,600	_				
Process Cost	**21,600**	**21,600**	_				
Profit (33.33% of total cost)	**7,200**	-	**7,200**				
	28,800	**21,600**	**7,200**		28,800	21,600	7,200

Process-B A/c

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
Opening stock	5,500	4,500	1,000	Finished stock A/c	**61,675**	**41,550**	**20,125**
Process A A/c	28,800	21,600	7,200				
Direct materials	9,500	9,500	_				
Direct wages	6,000	6,000	_				
	49,800	41,600	8,200				
Less: Closing stock	**(2,490)**	**(2,080)**	**(410)**				
Prime Cost	**47,310**	**39,520**	7,790				
Overheads	2,030	2,030	_				
Process Cost	49,340	41,550	7,790				
Profit (25% of total cost)	**12,335**	-	**12,335**				
	61,675	41,550	20,125		61,675	41,550	20,125

Finished Stock A/c

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
Opening stock	10,000	6,000	4,000	Costing P&L A/c	**75,000**	**44,181**	**30,819**
Process B A/c	61,675	41,550	20,125				
	71,675	47,550	24,125				
Less: Closing stock	**(5,000)**	**(3,369)**	**(1,631)**				
COGS	66,675	44,181	22,494				
Profit	**8,325**	-	**8,325**				
	75,000	44,181	30,819		75,000	44,181	30,819

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1 (May 2017)

A product passes through three processes 'X', 'Y' and 'Z'. The output of process 'X' and 'Y' is transferred to next process at cost plus 20 per cent each on transfer price and the output of process 'Z' is transferred to finished stock at a profit of 25 per cent on transfer price. The following information are available in respect of the year ending 31st March, 2014:

	Process-X	Process-Y	Process-Z	Finished Stock
	(₹)	(₹)	(₹)	(₹)
Opening stock	15,000	27,000	40,000	45,000
Material Wages	80,000	65,000	50,000	--
Manufacturing Overheads	1,25,000	1,08,000	92,000	--
Closing stock	96,000	72,000	66,500	-- 50,000
Inter process profit included in	20,000	32,000	39,000	
Opening stock	NIL	4,000	10,000	20,000

Stock in processes is valued at prime cost. The finished stock is valued at the price at which it is received from process 'Z'. Sales of the finished stock during the period was ₹ 14,00,000.

You are required to prepare:

(i) Process accounts and finished stock account showing profit element at each stage.
(ii) Costing Profit and Loss account.
(iii) Show the relevant items in the Balance Sheet.

Solution:

(i) Process 'X' Account

Particulars	Cost (₹)	Profit (₹)	Total (₹)	Particulars	Cost (₹)	Profit (₹)	Total (₹)
To Opening Stock	15,000	-	15,000	By Process 'Y' A/c (Transfer)	2,96,000	74,000	3,70,000
To Material	80,000	-	80,000				
To Wages	1,25,000	-	1,25,000				
Total	2,20,000	-	2,20,000				
Less: Closing stock	20,000	-	20,000				
Prime Cost	2,00,000		2,00,000				
To Manufacturing	96,000	-	96,000				

Overheads	2,96,000		2,96,000				
Total cost		-	74,000				
To Costing Profit and Loss A/c (20% on transfer Price or 25% on cost)		74,000					
	2,96,000	74,000	3,70,000		2,96,000	74,000	3,70,000

Process 'Y' Account

Dr. **Cr.**

Particulars	**Cost (₹)**	**Profit (₹)**	**Total (₹)**	**Particulars**	**Cost (₹)**	**Profit (₹)**	**Total (₹)**
To Opening Stock	23,000	4,000	27,000	By Process 'Z' A/c (Transfer)	5,36,379	2,26,121	7,62,500
To Process 'X' A/c	2,96,000	74,000	3,70,000				
To Material	65,000	--	65,000				
To Wages	1,08,000	--	1,08,000				
Total	4,92,000	78,000	5,70,000				
Less: Closing stock	27,621	4,379	32,000				
Prime Cost	4,64,379	73,621	5,38,000				
To Manufacturing Overheads	72,000	--	72,000				
Total cost	5,36,379	73,621	6,10,000				
To Costing Profit and Loss A/c (20% on transfer Price or 25% on cost)	--	1,52,500	1,52,500				
	5,36,379	2,26,121	7,62,500		5,36,379	2,26,121	7,62,500

Process 'Z' Account

Dr. **Cr.**

Particulars	Cost (₹)	Profit (₹)	Total (₹)	Particulars	Cost (₹)	Profit (₹)	Total (₹)
To Opening Stock	30,000	10,000	40,000	By Finished Stock A/c (Transfer)	7,45,629	5,50,371	12,96,000
To Process 'Y' A/c	5,36,379	2,26,121	7,62,500				
To Material	50,000	--	50,000				
To Wages	92,000	--	92,000				
Total	7,08,379	2,36,121	9,44,500				
Less: Closing stock	29,250	9,750	39,000				
Prime Cost	6,79,129	2,26,371	9,05,500				
To Manufacturing Overheads	66,500	--	66,500				
Total cost	7,45,629	2,26,371	9,72,000				
To Costing Profit and Loss A/c (25% on transfer Price or 33 1/3% on cost)	--	3,24,000	3,24,000				
	7,45,629	5,50,371	12,96,000		7,45,629	5,50,371	12,96,000

Finished Stock Account

Dr. **Cr.**

Particulars	Cost (₹)	Profit (₹)	Total (₹)	Particulars	Cost (₹)	Profit (₹)	Total (₹)
To Opening Stock	25,000	20,000	45,000	By Costing P&L A/c A/c (Transfer)	7,41,862	6,58,138	14,00,000
To Process 'Z' A/c	7,45,629	5,50,371	12,96,000				

Total	7,70,629	5,70,371	13,41,000				
Less: Closing stock	28,767	21,233	50,000				
To Costing Profit and Loss A/c	7,41,862	5,49,138	12,91,000				
		1,09,000	1,09,000				
	7,41,862	6,58,138	14,00,000		7,41,862	6,58,138	14,00,000

Costing Profit & Loss Account
for the year ending 31st March, 2014

Dr. **Cr.**

Particulars	**Amount (₹)**	**Particulars**	**Amount (₹)**
To Provision for unrealized profit on closing stock (₹ 4,379 + ₹ 9,750 + ₹ 21,233)	35,362	By Provision for unrealized profit on opening stock (₹ 4,000 + ₹ 10,000 + ₹ 20,000)	34,000
To Net Profit	6,58,138	By Process X A/c By	74,000
		Process Y A/c By	1,52,500
		Process Z A/c	3,24,000
		By Finished Stock A/c	1,09,000
	6,93,500		6,93,500

Workings:

Calculation of amount of unrealized profit on closing stock:

Process 'X' = Nil

Process 'Y' = ₹78,000 / ₹5,70,000 x ₹32,000 = ₹4,379

Process 'Z' = ₹2,36,121 / ₹9,44,500 x ₹39,000 = ₹9,750

Finished Stock = ₹5,50,371 / ₹12,96,000 x ₹50,000 = ₹21,333

Balance Sheet as on 31st March, 2014 (Extract)

Liabilities	Amount (₹)	Assets	Amount (₹)
Net profit	6,58,138	Closing stock:	
		Process – X	20,000
		Process – Y	32,000
		Process – Z	39,000
		Finished stock	50,000
			1,41,000
		Less: Provision for unrealized profit	35,362
			1,05,638

Chapter. 10: Joint Product & By Product

Part-A: Joint Product

A. QUESTION FROM STUDY MATERIAL

Question-1

A coke manufacturing company produces the following products by using 5,000 tons of coal @ ₹1,100 per ton into a common process.

Coke	3,500	tons
Tar	1,200	tons
Sulphate of ammonia	52	tons
Benzol	48	tons

PREPARE a statement apportioning the joint cost amongst the products on the basis of the physical unit method.

Hints:

Product	Joint Cost
Coke	40,10,600
Tar	13,75,000
Sulphate	59,400
Benzol	55,000

Question-2

FIND OUT the cost of joint products A, B and C using average unit cost method from the following data:

(a) Pre-separation Joint Cost ₹ 60,000

(b) Production data:

Products	Units produced
A	500
B	200
C	300
	1,000

Hints: Average Cost p.u. = ₹60

Question-3

FIND OUT the cost of joint products A and B using contribution margin method from the following data :

Sales

A : 100 kg @ ₹ 60 per kg.

B : 120 kg @ ₹ 30 per kg.

Joint costs

Marginal cost ₹ 4,400 Fixed cost ₹ 3,900

Hints:

	A	B	Basis of Apportionment
Marginal Cost	2,000	2,400	Units
Fixed Cost	3,000	900	Contribution

Question-4

Inorganic Chemicals purchases salt and processes it into more refined products such as Caustic Soda, Chlorine and PVC. In the month of July, Inorganic Chemicals purchased Salt for ₹ 40,000. Conversion cost of ₹ 60,000 were incurred upto the split off point, at which time two sealable products were produced. Chlorine can be further processed into PVC.

The July production and sales information is as follows:

	Production (in ton)	**Sales Quantity (in ton)**	**Selling price per ton (₹)**
Caustic Soda	1,200	1,200	50
Chlorine	800	—	—
PVC	500	500	200

All 800 tons of Chlorine were further processed, at an incremental cost of ₹ 20,000 to yield 500 tons of PVC. There was no beginning or ending inventories of Caustic Soda, Chlorine or PVC in July.

There is active market for Chlorine. Inorganic Chemicals could have sold all its July production of Chlorine at ₹ 75 per ton.

Required :

(1) SHOW how joint cost of ₹1,00,000 would be apportioned between Caustic Soda and Chlorine under each of following methods:

(a) sales value at split- off point ;

(b) physical unit method, and

(c) estimated net realisable value.

(2) Lifetime Swimming Pool Products offers to purchase 800 tonnes of Chlorine in August at ₹75 per tonne. This sale of Chlorine would mean that no PVC would be produced in August. EXPLAIN how the acceptance of this offer for the month of August would affect operating income?

Hints:

Basis	Sale value at Split-off	Units	NRV
Caustic Soda	50,000	60,000	42,857
Chlorine	50,000	40,000	57,143

TEST YOUR KNOWLEDGE

Question-1

Sun-moon Ltd. produces and sells the following products:

Products	Units	Selling price at split off point (₹)	Selling price after further processing (₹)
A	2,00,000	17	25
B	30,000	13	17
C	25,000	8	12
D	20,000	10	-
E	75,000	14	20

Raw material costs ₹35,90,000 and other manufacturing expenses cost ₹ 5,47,000 in the manufacturing process which are absorbed on the products on the basis of their 'Net realisable value'. The further processing costs of A, B, C and E are ₹12,50,000; ₹1,50,000; ₹ 50,000 and ₹ 1,50,000 respectively. Fixed costs are ₹ 4,73,000.

You are required to PREPARE the following in respect of the coming year:

(a) Statement showing income forecast of the company assuming that none of its products are to be further processed.

(b) (b) Statement showing income forecast of the company assuming that products A, B, C and E are to be processed further.

Can you suggest any other production plan whereby the company can maximise its profits? If yes, then submit a statement showing income forecast arising out of adoption of that plan.

Hints:

Contribution	No further processing	Further processing
A	7,75,000	11,25,000
B	1,38,000	1,38,000
C	25,000	75,000
D	60,000	60,000
E	1,05,000	4,05,000
Total	**11,03,000**	**18,03,000**
Less: Fixed Cost	(4,73,000)	(4,73,000)
Profit	6,30,000	13,30,000

Question-2

Smile company produces two main products and a by-product out of a joint process. The ratio of output quantities to input quantities of direct material used in the joint process remains consistent on yearly basis. Company has employed the physical volume method to allocate joint production costs to the main products. The net realizable value of the by-product is used to reduce the joint production costs before the joint costs are allocated to the main products. Details of company's operation are given in the table below. During the month, company incurred joint production costs of ₹ 10,00,000/- The main products are not marketable at the split off point and thus have to be processed further.

Particulars	Product-A	Product-B	By product
Monthly output in kg.	60,000	1,20,000	50,000
Selling price per kg.	₹ 50	₹ 30	₹ 5
Process costs	₹ 2,00,000	₹ 3,00,000	

FIND OUT the amount of joint product cost that Smile company would allocate to the product-B by using the physical volume method to allocate joint production costs?

Hints: ₹5,00,000

Question-3

'Buttery Butter' is engaged in the production of Buttermilk, Butter and Ghee. It purchases processed cream and let it through the process of churning until it separates into buttermilk and butter. For the month of January, 'Buttery Butter' purchased 50 Kilolitre processed cream @ ₹ 100 per 1000 ml. Conversion cost of ₹ 1,00,000 were incurred up-to the split off point, where two saleable products were produced i.e. buttermilk and butter. Butter can be further processed into Ghee.

The January production and sales information is as follows:

Products	Production (in Kilolitre/tonne)	Sales Quantity (in Kilolitre/tonne)	Selling price per Litre/Kg (₹)
Buttermilk	28	28	30
Butter	20	—	—
Ghee	16	16	480

All 20 tonne of butter were further processed at an incremental cost of ₹ 1,20,000 to yield 16 Kilolitre of Ghee. There was no opening or closing inventories of buttermilk, butter or ghee in the month of January.

Required:

(i) SHOW how joint cost would be apportioned between Buttermilk and Butter under Estimated Net Realisable Value method.

(ii) 'Healthy Bones' offers to purchase 20 tonne of butter in February at

₹ 360 per kg. In case 'Buttery Butter' accepts this offer, no Ghee would be produced in February. SUGGEST whether 'Buttery Butter' shall accept the offer affecting its operating income or further process butter to make Ghee itself?

Hints:

(i) Apportionment of Joint Cost of ₹51,00,000 in ratio of 1:9

(ii) The operating income of 'Buttery Butter' will be reduced by ₹ 3,60,000 in February if it sells 20 tonne of Butter to 'Healthy Bones', instead of further processing of Butter into Ghee for sale. Thus, 'Buttery Butter' is advised not to accept the offer and further process butter to make Ghee itself.

Question-4

NN Manufacturing company uses joint production process that produces three products at the split off point. Joint productions costs during September were ₹ 8,40,000. Product information for September was as follows:

Particulars	Product A	Product B	Product C
Units produced	1,500	3,000	4,500
Units sold	2,000	6,000	7,500
Sales prices:			
At the split-off	₹ 100		
After further processing	₹ 150	₹ 175	₹ 50
Costs to process after split-off	₹ 1,50,000	₹ 1,50,000	₹ 1,50,000

Assume that product C is treated as a by-product and the company accounts for the by-product at net realizable value as a reduction of joint cost. Assume also that Product B&C must be processed further before they can be sold. FIND OUT the total cost of Product A in September if joint cost allocation is based on net realizable values?

Hints: Product A has no further processing costs, the total cost of Product A is equal to its allocated joint costs, which are 28.571% of the net joint costs of ₹ 7,65,000, or ₹ 2,18,568.

Question-5 (New Course Material)

RST Limited produces three joint products X, Y and Z. The products are processed further. Pre-separation costs are apportioned on the basis of weight of output of each joint product. The following data are provided for a particular month:

Cost incurred up to separation point: ₹ 10,000

	Product X	Product Y	Product Z
Output (in Litre)	100	70	80

	₹	₹	₹
Cost incurred after separation point	2,000	1,200	800
Selling Price per Litre:			
After further processing	50	80	60
At pre-separation point (estimated)	25	70	45

You are required to:

(i) Prepare a statement showing profit or loss made by each product after further processing using the presently adopted method of apportionment of pre-separation cost.

(ii) Advise the management whether, on purely financial consideration, the three products are to be processed further or not.

Hints:

(i)

	Product X (in ₹)	Product Y (in ₹)	Product Z (in ₹)
Sales value after further processing	5,000	5,600	4,800
Less: Further processing cost	2,000	1,200	800
Less: Joint Cost* (as apportioned)	4,000	2,800	3,200
Profit/(loss)	(1,000)	1,600	800

(ii) It is advisable to further process only product X and Z and to sale product Y at the point of separation.

Question-6 (New Course Material)

OPR Ltd. purchases crude vegetable oil. It does refining of the same. The refining process results in four products at the spilt-off point - S, P, N and A. Product 'A' is fully processed at the split-off point. Product S, P and N can be individually further refined into SK, PM, and NL respectively. The joint cost of purchasing the crude vegetable oil and processing it were ₹ 40,000 which is apportioned on the basis of Sales Value at split-off point. Other details are as follows:

Product	Further processing costs (₹)	Sales at split-off point (₹)	Sales after further processing (₹)
S	80,000	20,000	1,20,000
P	32,000	12,000	40,000
N	36,000	28,000	48,000

A	-	20,000	-

You are required to identify the products which can be further processed for maximizing profits and make suitable suggestions.

Hints: Suggested Product to be further processed for maximising profits:

On comparing the figures of "Profit if no further processing" and "Profits if further processing", one observes that OPR Ltd. is earning more after further processing of Product S only i.e. ₹ 20,000. Hence, for maximizing profits, only Product S should be further processed and Product P, N and A should be sold at split-off point.

B. PAST YEAR EXAM QUESTIONS

May-23. Q4(a) (10 marks)

ABC Company produces a Product 'X' that passes through three processes: R, S and T. Three types of raw materials, viz., J, K, and L are used in the ratio of 40:40:20 in process R. The output of each process is transferred to next process. Process loss is 10% of total input in each process. At the stage of output in process T, a by-product 'Z' is emerging and the ratio of the main product 'X' to the by-product 'Z' is 80:20. The selling price of product 'X' is ₹60 per kg.

The company produced 14,580 kgs of product 'X'

Material price : Material J @ ₹ 15 per kg; Material K @ ₹ 9 per kg.

Material L@ ₹ 7 per kg Process costs are as follows:

Process	Variable cost per kg (₹)	Fixed cost of Input (₹)
R	5.00	42,000
S	4.50	5,000
T	3.40	4,800

The by-product 'Z' cannot be processed further and can be sold at ₹ 30 per kg at the split- off stage. There is no realizable value of process losses at any stage.

Required:

Present a statement showing the apportionment of joint costs on the basis of the sales value of product 'X' and by-product 'Z' at the split- off point and the profitability of product 'X' and by-product 'Z.

Solution:

Working Notes:

1. Calculation of Input of Raw Material

Let assume total raw material in Process R be 100%

∴ Output of Process T will be equal to:

Input R 100%

- 10% Normal Loss	₹10
Input S	₹90%
- 10% Normal loss	₹ 9
Input T	81%
- 10% Normal loss	₹8.1
Output of T	72.9
Actual output of X	14,580 units
Which is 80% of the total output	

∴ Output of Process T

$= \frac{14580}{80\%} = 18,225$

∴ Input of Process R $= \frac{18225}{72.9\%} = 25,000$ kgs

Alternative presentation for Calculation of Input in Process R, S and T

Working notes:

Process T (Kg.)			
To Input (Transfer from process S)	20,250	By Normal loss	2,025
		By Output Product X	14,580
		By output of by-product Z	3,645
	20,250		20,250

Process S (kg.)			
To Input (Transfer from process S)	22,500	By Normal loss (10%)	2,250
		By Transfer to process T	20,250
	22,500		22,500

Process R (kg.)			
To Input	25,000	By Normal loss (10%)	2,500
		By Transfer to process S	22,500
	25,000		25,000

2. Calculation of Joint Cost

Process	Inputs	Variable cost per kg	Variable cost	Fixed Cost	Total Cost
		₹	₹	₹	₹
R	25,000	5	1,25,000	42,000	1,67,000

S	22,500	4.5	1,01,250	5,000	1,06,250
T	20,250	3.4	68,850	4,800	73,650
					3,46,900

Raw material	J	10000 x 15	₹ 1,50,000
	K	10000 x 9	₹ 90,000
	L	5000 x 7	₹ 35,000
			2,75,000
Add: Processing cost (as above)			₹ 3,46,900
Total Joint Cost			6,21,900

(i) Statement showing apportionment of Joint Cost

Particulars	**Product X**	**By-Product Z**	**Total**
Units	14,580	3,645	
Selling price (₹)	60	30	
Sales Value (₹)	8,74,800	1,09,350	9,84,150
(₹ 6,21,900 to apportioned in ratio of sales value at split off point)	5,52,800	69,100	6,21,900

(ii) Statement of Profitability

Particulars	**Product X**	**By-Product Z**	**Total**
Sales Value	8,74,800	1,09,350	9,84,150
Joint Cost (As apportioned above)	(5,52,800)	(69,100)	(6,21,900)
Profit	3,22,000	40,250	3,62,250

Jan-21. Q4(a) (10 marks)

Mayura Chemicals Ltd buys a particular raw material at ₹ 8 per litre. At the end of the processing in Department- I, this raw material splits-off into products X, Y and Z. Product X is sold at the split-off point, with no further processing. Products Y and Z require further processing before they can be sold. Product Y is processed in Department-2, and Product Z is processed in Department-3.

Following is a summary of the costs and other related data for the year 2019-20:

Particulars	**Department**		
	1	**2**	**3**
Cost of Raw Material	₹ 4,80,000	-	-
Direct Labour	₹ 70,000	₹ 4,50,000	₹ 6,50,000

Manufacturing Overhead	₹ 48,000	₹ 2,10,000	₹ 4,50,000
	Products		
	X	**Y**	**Z**
Sales (litres)	10,000	15,000	22,500
Closing inventory (litres)	5,000	-	7,500
Sale price per litre (₹)	30	64	50

There were no opening and closing inventories of basic raw materials at the beginning as well as at the end of the year. All finished goods inventory in litres was complete as to processing. The company uses the Net-realisable value method of allocating joint costs.

You are required to prepare:

(i) Schedule showing the allocation of joint costs.

(ii) Calculate the Cost of goods sold of each product and the cost of each item in Inventory.

(iii) A comparative statement of Gross profit.

Solution:

(i) Statement of Joint Cost allocation of inventories of X, Y and Z

	Products			**Total (₹)**
	X (₹)	**Y (₹)**	**Z (₹)**	
Final sales value of total production (Working Note 1)	4,50,000 (15,000 x ₹ 30)	9,60,000 (15,000 x ₹ 64)	15,00,000 (30,000 x ₹ 50)	29,10,000
Less: Additional cost	--	6,60,000	11,00,000	17,60,000
Net realisable value (at split-off point)	4,50,000	3,00,000	4,00,000	11,50,000
Joint cost allocated (Working Note 2)	2,34,000	1,56,000	2,08,000	5,98,000

(ii) Calculation of Cost of goods sold and Closing inventory

	Products			**Total (₹)**
	X (₹)	**Y (₹)**	**Z (₹)**	

Allocated joint cost	2,34,000	1,56,000	2,08,000	5,98,000
Add: Additional costs	--	6,60,000	11,00,000	17,60,000
Cost of goods sold (COGS)	2,34,000	8,16,000	13,08,000	23,58,000
Less: Cost of closing inventory (Working Note 1)	78,000 (COGS × 100/3%)	--	3,27,000 (COGS × 25%)	4,05,000
Cost of goods sold	1,56,000	8,16,000	9,81,000	19,53,000

(iii) Comparative Statement of Gross Profit

	Products			**Total (₹)**
	X (₹)	**Y (₹)**	**Z (₹)**	
Sales revenue	3,00,000 (10,000 x ₹ 30)	9,60,000 (15,000 x ₹ 64)	11,25,000 (22,500 x ₹ 50)	23,85,000
Less: Cost of goods sold	1,56,000	8,16,000	9,81,000	19,53,000
Gross Profit	**1,44,000**	**1,44,000**	**1,44,000**	4,32,000

Working Notes:

1. Total production of three products for the year 2019-2020

Products	**Quantity sold in litres**	**Quantity of closing inventory in litres**	**Total production**	**Closing inventory percentage (%)**
(1)	**(2)**	**(3)**	**(4) = [(2) + (3)}**	**(5) = (3)/ (4)**
X	10,000	5,000	15,000	100/3
Y	15,000	--	15,000	--
Z	22,500	7,500	30,000	25

2. Joint cost apportioned to each product:

= Total Joint cost x Net Realisable Value of each product

Total Net Realisable Value

Joint cost of product X = ₹5,98,000 / ₹11,50,000 x ₹4,50,000 = ₹2,34,000

Joint cost of product Y = ₹5,98,000 / ₹11,50,000 x ₹3,00,000 = ₹1,56,000

Joint cost of product Z = ₹5,98,000 / ₹11,50,000 x ₹4,00,000 = ₹2,08,000

Nov-20. Q1(c) (5 marks)

A company's plant processes 6,750 units of a raw material in a month to produce two products 'M' and 'N'.

The process yield is as under:

Product M 80%

Product N 12%

Process Loss 8%

The cost of raw material is ₹ 80 per unit.

Processing cost is ₹ 2,25,000 of which labour cost is accounted for 66%. Labour is chargeable to products 'M' and 'N' in the ratio of 100:80.

Prepare a Comprehensive Cost Statement for each product showing:

(i) Apportionment of joint cost among products 'M' and 'N' and

(ii) Total cost of the products 'M' and 'N'.

Solution:

Comprehensive Cost Statement

Particulars	**Total Cost (₹)**	**Product-M (₹)**	**Product-N (₹)**
No. of units produced *		5,400 units	810 units
Cost of raw material (₹ 80 × 6,750units)	5,40,000		
Processing cost:			
- Labour cost (₹ 2,25,000 × 66%)	1,48,500		
- Other costs (₹ 2,25,000 - 1,48,500)	76,500		
	7,65,000		

Total joint cost			
Apportionment of joint costs between the joint products	1,48,500	**82,500** (1,48,500 x 100) / 180	**66,000** (1,48,500 x 80) / 180
Labour cost in the ratio of 100:80			
Other joint costs (including material)in the ratio of output (5,400:810)	6,16,500	**5,36,087** (6,16,500 x 5,400) / 6,210	**80,413** (6,16,500 x 810) / 6,210
	7,65,000	**6,18,587**	**1,46,413**
(ii) Total product cost			

* No. of units produced of Product M = 6750 units x 80% = 5400 units
No. of units produced of Product N = 6750 units x 12% = 810 units

May-19. Q1(c) (5 marks)

A Factory is engaged in the production of chemical Bomex and in the course of its manufacture a by-product Cromex is produced which after further processing has a commercial value. For the month of April 2019 the following are the summarised cost data:

	Joint Expenses (₹)	Separate Expenses (₹)	
		Bomex	Cromex
Materials	1,00,000	6,000	4,000
Labour	50,000	20,000	18,000
Overheads	30,000	10,000	6,000
Selling Price per unit		100	40
Estimated profit per unit on sale of Cromex			5
Number of units produced		2,000 units	2,000 units

The factory uses net realisable value method for apportionment of joint cost to by-products.

You are required to prepare statements showing :

(i) Joint cost allocable to Cromex

(ii) Product wise and overall profitability of the factory for April 2019.

Solution:

(i) Statement Showing Joint Cost Allocation to 'Cromex'

Particulars	Cromex (₹)
Sales (₹ 40 × 2,000 units)	80,000

Less: Post Split Off Costs (4,000+18,000+6,000)	(28,000)
Less: Estimated Profit (₹ 5 × 2,000 units)	(10,000)
Joint cost allocable	**42,000**

(ii) Statement Showing Product Wise and Overall Profitability

Particulars	Bomex (₹)	Cromex (₹)	Total (₹)
Sales	2,00,000	80,000	2,80,000
Less: Share in Joint Expenses	**(1,38,000)***	(42,000)	(1,80,000)
Less: Post Split Off Costs	(36,000)	(28,000)	(64,000)
Profit	**26,000**	**10,000**	**36,000**

(*) 1,80,000 – 42,000

July-21. Q2(b) (5 marks)

OPR Ltd. purchases crude vegetable oil. It does refining of the same. The refining process results in four products at the spilt-off point - S, P, N and A. Product 'A' is fully processed at the split-off point. Product S, P and N can be individually further refined into SK, PM, and NL respectively. The joint cost of purchasing the crude vegetable oi l and processing it were ₹ 40,000. Other details are as follows:

Product	Further processing costs (₹)	Sales at split-off point (₹)	Sales after further processing (₹)
S	80,000	20,000	1,20,000
P	32,000	12,000	40,000
N	36,000	28,000	48,000
A	-	20,000	-

You are required to identify the products which can be further processed for maximizing profits and make suitable suggestions.

Solution:

Statement of Comparison of Profits before and after further processing

	S (₹)	P (₹)	N (₹)	A (₹)	Total (₹)
A. Sales at split off point	20,000	12,000	28,000	20,000	80,000
B. Apportioned Joint Costs (Refer Working Note)	**10,000**	**6,000**	**14,000**	**10,000**	40,000
C. **Profit at split-off point**	10,000	6,000	14,000	10,000	40,000
D. Sales after further processing	1,20,000	40,000	48,000	-	2,08,000
E. Further processing cost	80,000	32,000	36,000	-	1,48,000
F. Apportioned Joint Costs (Refer Working Note)	10,000	6,000	14,000	-	-
G. **Profit if further processing(D – E + F)**	**30000**	**2,000**	**(-) 2,000**	-	-
H. Increase/ decrease in profit after further processing (G- C)	20,000	- 4000	- 16,000	-	-

Suggested Product to be further processed for maximising profits:

On comparing the figures of "Profit if no further processing" and "Profits if further processing", one observes that OPR Ltd. is earning more after further processing of Product S only i.e. ₹ 20,000. Hence, for maximizing profits, only Product S should be further processed and Product P, N and A should be sold at split-off point.

Working Note:

Apportionment of joint costs on the basis of Sales Value at split -off point

$$\text{Apportioned joint cost} = \frac{\text{Total Joint Cost}}{\text{Total Sales value at split-off point}} \times \text{Sales value of each product}$$

Where,

Total Joint cost = ₹ 40,000

Total sales at split off point (S, P, N and A) = 20,000 + 12,000 + 28,000 + 20,000 = ₹ 80,000

$$\text{Share of S in joint cost} = \frac{₹40,000}{₹80,000} \times ₹20,000 = ₹10,000$$

$$\text{Share of P in joint cost} = \frac{₹40,000}{₹80,000} \times ₹12,000 = ₹6,000$$

$$\text{Share of N in joint cost} = \frac{₹40,000}{₹80,000} \times ₹28,000 = ₹14,000$$

Share of A in joint cost = ₹40,000 / ₹80,000 x ₹20,000 = ₹10,000

Alternative Solution

Decision for further processing of Product S, P and N

Products	S (₹)	P (₹)	N (₹)
Sales revenue after further processing	1,20,000	40,000	48,000
Less: sales value at split-off point	20,000	12,000	28,000
Incremental Sales Revenue	**1,00,000**	**28,000**	**20,000**
Less: Further Processing cost	80,000	32,000	36,000
Profit/ loss arising due to further processing	**20,000**	**(-)4,000**	**(-)16,000**

Suggested Product to be further processed for maximising profits:

On comparing the figures of "Profit if no further processing" and "Profits if further processing", one observes that OPR Ltd. is earning more after further processing of Product S only i.e. ₹ 20,000. Hence, for maximizing profits, only Product S should be further processed and Product P, N and A should be sold at split-off point.

May-22. Q5(c) (5 marks)

RST Limited produces three joint products X, Y and Z. The products are processed further. Pre-separation costs are apportioned on the basis of weight of output of each joint product. The following data are provided for the month of April, 2022.

Cost incurred up to separation point: ₹ 10,000

	Product X	Product Y	Product Z
Output (in Litre)	100	70	80
	₹	₹	₹
Cost incurred after separation point	2,000	1,200	800
Selling Price per Litre:			
After further processing	50	80	60
At pre-separation point (estimated)	25	70	45

You are required to:

(i) Prepare a statement showing profit or loss made by each product after further processing using the presently adopted method of apportionment of pre-separation cost.

(ii) Advise the management whether, on purely financial consideration, the three products are to be processed further or not.

Solution:

(i) Statement showing profit/loss by each product after further processing products

	Product X (in ₹)	Product Y (in ₹)	Product Z (in ₹)
Sales value after further processing	5,000	5,600	4,800
Less: Further processing cost	2,000	1,200	800
Less: Joint Cost* (as apportioned)	4,000	2,800	3,200
Profit/(loss)	(1,000)	1,600	800

* Statement showing apportionment of joint cost on the basis of physical units

	Product X (in ₹)	Product Y (in ₹)	Product Z (in ₹)	Total (₹)
Output (in litre)	100	70	80	250
Weight	0.4 (100/250)	0.28 (70/250)	0.32 (80/250)	
Joint cost apportioned	4,000	2,800	3,200	

(ii) Decision whether to process further or not

	Product X (in ₹)	Product Y (in ₹)	Product Z (in ₹)
Incremental Revenue	2,500 [(50-25) × 100]	700 [(80-70) × 70]	1,200 [(60-45) × 80]
Less: Further processing cost	2,000	1,200	800
Incremental profit /(loss)	**500**	**(500)**	**400**

	Product X (in ₹)	Product Y (in ₹)	Product Z (in ₹)	Total
Sales	2500	4900	3600	11000
Pre separation costs	4000	2800	3200	10000
Profit/(Loss)	(1500)	2100	400	1000

It is advisable to further process only product X and Z and to sale product Y at the point of separation.

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

In a chemical manufacturing company, three products A, B and C emerge at a single split off stage in department P. Product A is further processed in department Q, product B in department R and product C in department S. There is no loss in further Processing of any of the three products. The cost data for a month are as under:

Cost of raw materials introduced in department P ₹ 12,68,800

Direct Wages Department	(₹)
P	3,84,000
Q	96,000
R	64,000
S	36,000

Factory overheads of ₹ 4,64,000 are to be apportioned to the direct wage departments on basis.

During the month under reference, the company sold all three products after processing them further as under:

Products	A	B	C
Output sold (kg.)	44,000	40,000	20,000
Selling Price per kg. (₹)	32	24	16

There is no opening or closing stocks. If these products were sold at the split off stage, that is, without further processing, the selling prices would have been ₹ 20, ₹ 22 and ₹ 10 each per kg respectively for A, B and C.

Required:

(i) Prepare a statement showing the apportionment of joint costs to joint products.

(ii) Present a statement showing product-wise and total profit for the month under reference as per the company's current processing policy.

(iii) What processing decision should have been taken to improve the profitability of the company?

(iv) Calculate the product-wise and total profit arising from your recommendation in (iii) above.

Solution:

(i) Statement showing the apportionment of joint costs to joint products

	Products			
	A	B	C	Total
Output sold Kg.: (I)	44,000	40,000	20,000	
Selling price per kg. at split off (₹): (II)	20	22	10	
Sales value at split off (₹): (I) x (II)	8,80,000	8,80,000	2,00,000	19,60,000

Joint costs (costs incurred in department P (₹) (apportioned on the basis of sales value at the point of split off) i.e. (22:22:5) (Working Note 1)	8,80,000	8,80,000	2,00,000	19,60,000

(ii) Statement showing product-wise and total profit for the month under reference (as per the company's current processing policy)

	Products			
	A	**B**	**C**	**Total**
Output (kg.) : (a)	44,000	40,000	20,000	
Selling price per kg. after further processing (₹): (b)	32	24	16	
Sales value after further processing (₹).:(c) = {(a) x (b)}	14,08,000	9,60,000	3,20,000	26,88,000
Joint costs (₹): (d)	8,80,000	8,80,000	2,00,000	19,60,000
Further processing costs (₹): (e) (Working Note 2)	1,72,800	1,15,200	64,800	3,52,800
Total costs (₹): (f) = [(d) + (e)}	10,52,800	9,95,200	2,64,800	23,12,800
Profit/ (Loss) (₹): [(c))– (f)}	3,55,200	(35,200)	55,200	3,75,200

Alternatively:

Incremental sales revenue (₹)	5,28,000 (44,000 units x ₹ 12)	80,000 (40,000 units x ₹ 2)	1,20,000 (20,000 units x ₹ 6)
Less: Further processing costs (₹) [Refer to Working Note 2 (ii)]	1,72,800	1,15,200	64,800
Incremental net profit / (loss)	3,55,200	(35,200)	55,200

(iii) Processing decision to improve the profitability of the company.

44,000 units of product A and 20,000 units of product C should be further processed because the incremental sales revenue generated after further processing is more than the further processing costs incurred. 40,000 units of product B should be sold at the point of-split off because the incremental revenue generated after further processing is less than the further processing costs.

(iv) The product wise and total profit arising from the recommendation in (iii) above is as follows:

Product	**A**	**B**	**C**	**Total**
Profit (₹)	3,55,200	-	55,200	4,10,400

Working Notes:

1. Statement of department-wise costs

	P	Q	R	S
	(₹)	(₹)	(₹)	(₹)
Raw materials	12,68,800			
Wages	3,84,000	96,000	64,000	36,000
Overheads (Apportioned on the basis of departmental direct wages i.e. 96:24:16:9)	3,07,200	76,800	51,200	28,800
Total Cost	19,60,000	1,72,800	1,15,200	64,800

2. Joint costs and further processing costs

(i) Costs incurred in the department P are joint costs of products A, B and C and are equal to ₹ 19,60,000.

(ii) Costs incurred in the departments Q, R and S are further processing costs of products A, B and C respectively. Further processing costs of products A, B and C thus are ₹ 1,72,800; ₹ 1,15,200 and ₹ 64,800 respectively.

Question-2

A company's plant processes 1,50,000 kg. of raw material in a month to produce two products, viz, 'P' and 'Q'. The cost of raw material is ₹ 12 per kg. The processing costs per month are:

	(₹)
Direct Materials	90,000
Direct Wages	1,20,000
Variable Overheads	1,00,000
Fixed Overheads	1,00,000

The loss in process is 5% of input and the output ratio of P and Q which emerge simultaneously is 1:2. The selling prices of the two products at the point of split off are: P ₹ 12 per kg. and Q ₹ 20 per kg. A proposal is available to process P further by mixing it with other purchased materials. The entire current output of the plant can be so processed further to obtain a new product 'S'. The price per kg. of S is ₹ 15 and each kg of output of S will require one kilogram of input P. The cost of processing of P into S (including other materials) is ₹ 1,85,000 per month.

You are required to prepare a statement showing the monthly profitability based both on the existing manufacturing operations and on further processing.
Will you recommend further processing?

Solution:

Working Notes:

1.

	(Kg.)
Material input	1,50,000
Less: Loss of Material in process (5% of 1,50,000 kg.)	7,500
Total output	1,42,500

2. **Output of P and Q are in the ratio of 1 : 2 of the total output:**

$$P = \frac{1,42,500 \text{ kg}}{3} \times 1 = 47,500 \text{ kg}$$

$$Q = \frac{1,42,500 \text{ kg}}{3} \times 2 = 95,000 \text{ kg}$$

3. **Joint Costs:**

	(₹)
Material (input) (1,50,000 kg. × ₹ 12)	18,00,000
Direct materials	90,000
Direct Wages	1,20,000
Variable overheads	1,00,000
Fixed overheads	1,00,000
	22,10,000

4. Sales Revenue of P, Q and S

P = 47,500 Kg. × ₹ 12 = ₹ 5,70,000

Q = 95,000 Kg. × ₹ 20 = ₹ 19,00,000

S = 47,500 Kg. × ₹ 15 = ₹ 7,12,500.

5. Apportionment of joint costs viz. ₹ 22,10,000 over P and Q in proportion of their sales value i.e. ₹ 5,70,000 and ₹ 19,00,000, i.e., 3 : 10 is:

	Total	P	Q
	(₹)	(₹)	(₹)

Joint cost apportionment In the ratio of 3 : 10	22,10,000	5,10,000 (₹ 22,10,000 x 3 / 13)	17,00,000 (₹ 22,10,000 x10 / 13)

6. Total Cost of 47,500 kg. of S = Joint Cost of P + Cost of Processing P into S.
= ₹ 5,10,000 + ₹ 1,85,000 = ₹ 6,95,000.

Statement showing the Monthly Profitability

	Based on existing manufacturing operations			**Based on further processing of P into S**		
	Products			**Products**		
	P	**Q**	**Total**	**S**	**Q**	**Total**
Sales quantity (kg.)	47,500	95,000	1,42,500	47,500	95,000	1,42,500
	(₹)	**(₹)**	**(₹)**	**(₹)**	**(₹)**	**(₹)**
Sales Revenue (Working Note 4)	5,70,000	19,00,000	24,70,000	7,12,500	19,00,000	26,12,500
Less: Joint Costs (Working Note 5)	5,10,000	17,00,000	22,10,000	6,95,000*	17,00,000	23,95,000
Profit	60,000	2,00,000	2,60,000	17,500	2,00,000	2,17,500

*Working Note 6

Recommendation: Further processing of P is not recommended as it results in a lower profit of P.

Question-3

A company manufactures one main product (M_1) and two by-products B_1 and B_2. For the month of January 2013, following details are available:

Total Cost upto separation Point ₹ 2,12,400

	M1	**B1**	**B2**
Cost after separation	-	₹ 35,000	₹ 24,000
No. of units produced	4,000	1,800	3,000
Selling price per unit	₹ 100	₹ 40	₹ 30
Estimated net profit as percentage to sales value	-	20%	30%
Estimated selling expenses as percentage to sales value	20%	15%	15%

There are no beginning or closing inventories.

Prepare statement showing:

(i) Allocation of joint cost; and

(ii) Product-wise and overall profitability of the company for January 2013.

Solution:

1. Statement showing allocation of Joint Cost

Particulars	**B1**	**B2**
No. of units Produced	1,800	3,000
Selling Price Per unit (₹)	40	30
Sales Value (₹)	72,000	90,000
*Less:*Estimated Profit (B1 -20% & B2 -30%)	(14,400)	(27,000)
Cost of Sales	57,600	63,000
Less: Estimated Selling Expenses (B1 -15% & B2 -15%)	(10,800)	(13,500)
Cost of Production	46,800	49,500
*Less:*Cost after separation	(35,000)	(24,000)
Joint Cost allocated	11,800	25,500

2. Statement of Profitability

Particulars		**M1 (₹)**	**B1 (₹)**	**B2 (₹)**
Sales Value	(A)	4,00,000 (4,000 × ₹100)	72,000	90,000
Less:- Joint Cost		1,75,100 (2,12,400 -11,800 – 25,500)	11,800	25,500
- Cost after separation		-	35,000	24,000
- Selling Expenses (M1- 20%, B1-15% & B2-15%)		80,000	10,800	13,500
	(B)	2,55,100	57,600	63,000
Profit	(A –B)	1,44,900	14,400	27,000
Overall Profit = ₹1,44,900 + ₹14,400 + ₹ 27,000 = ₹ 1,86,300				

Part-B: By Product

A. PAST YEAR EXAM QUESTIONS

Nov-22. Q5(c) (5 marks)

ASR Ltd mainly produces Product 'L' and gets a by-Product 'M' out of a joint process. The net realizable value of the by-product is used to reduce the joint production costs before the joint costs are allocated to the main product. During the month of October 2022, company incurred joint production costs of ₹ 4,00,000. The main Product 'L' is not marketable at the split off point. Thus, it has to be processed further. Details of company's operation are as under:

Particulars	Product L	By- Product M
Production (units)	10,000	200
Selling price per kg	₹ 45	₹ 5
Further processing cost	₹ 1,01,000	-

You are required to find out:

(i) Profit earned from Product 'L'.

(ii) Selling price per kg of product 'L', if the company wishes to earn a profit of ₹ 1,00,000 from the above production.

Solution:

(i) Calculation of profit on product 'L'

Particular	₹
Sales	4,50,000
Less: Further processing cost	(1,01,000)
	3,49,000
Less: Joint Production Cost*	(3,99,000)
loss	(50,000)

*Joint Production Cost = [4,00,000 – (200 × 5)] = 3,99,000

(ii) Calculation of desired selling price of product 'L'

$$\text{Desired selling price} = \frac{\text{Desired Profit + Total Cost}}{\text{units measured}}$$

$$= \frac{1,00,000+1,01,000+3,99,000}{10,000} = ₹60 \text{ per kg.}$$

May-16. Q4(a) (8 marks)

A factory producing article A also produces a by-product B which is further processed into finished product. The joint cost of manufacture is given below:

Material	₹ 5,000
Labour	₹ 3,000
Overhead	₹ 2,000
	₹ 10,000

Subsequent cost in ₹ are given below:

	A	B
Material	3,000	1,500
Labour	1,400	1,000
Overhead	600	500
	5,000	3,000

Selling prices are A ₹ 16,000

B ₹ 8,000

Estimated profit on selling prices is 25% for A and 20% for B.

Assume that selling and distribution expenses are in proportion of sales prices. Show how you would apportion joint costs of manufacture and prepare a statement showing cost of production of A and B.

Solution:

Apportionment of Joint Costs

Particulars	A (₹)	B (₹)
Selling Price	16,000	8,000
Less: Estimated profit	4,000 (25% of ₹16,000)	1,600 (20% of ₹ 8,000)
Cost of sales	12,000	6,400
Less: Selling & Distribution exp. (Refer working note)	267 (₹ 400 × 2/3)	133 (₹ 400 × 1/3)
Less: Subsequent cost	5,000	3,000
Share of Joint cost	6,733	3,267

So, Joint cost of manufacture is to be distributed to A & B in the ratio of 6733 : 3267

Statement showing Cost of Production of A and B

Elements of cost	Joint Cost		Subsequent Cost		Total Cost	
	A	B	A	B	A	B
Material	3,367	1,633	3,000	1,500	6,367	3,133
Labour	2,020	980	1,400	1,000	3,420	1,980

Overheads	1,346	654	600	500	1,946	1,154
				Cost of production	11,733	6,267

Working Note:

Calculation of Selling and Distribution Expenses

Particulars	**(₹)**
Total Sales Revenue (₹ 16,000 + ₹ 8,000)	24,000
Less: Estimated Profit (₹ 4,000 + ₹ 1,600)	(5,600)
Cost of Sales	18,400
Less: Cost of production:	
- Joint Costs	(10,000)
- Subsequent costs (₹ 5,000 + ₹ 3,000)	(8,000)
Selling and Distribution expenses (Balancing figure)	400

Chapter. 11: Service Costing

Part-A: Transportation Service

A. QUESTION FROM STUDY MATERIAL

Question-1

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".

(MT = Metric Ton or Ton).

Hints: 5,600 MT-km, 5,760 MT-km

Question-2

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 20X9:

	Amount (₹)
Salary of Drivers, Cleaners and Conductors	24,000
Salary to Supervisor	10,000
Diesel and other Oil	40,000
Repairs and Maintenance	8,000
Tax and Insurance	16,000
Depreciation	26,000
Interest	20,000
	1,44,000

Actual passengers carried were 75% of the seating capacity. All the four buses run on all days for the month. Each bus made one round trip per day. CALCULATE cost per passenger – Kilometer.

Hints: Cost per passenger- km = ₹0.40, Passenger- km = 3,60,000

Question-3

ABC Transport Company has given a route 40 kilometers long to run bus.

(a) The bus costs the company a sum of ₹20,00,000

(b) It has been insured at 3% p.a. and

(c) The annual tax will amount to ₹20,000

(d) Garage rent is ₹20,000 per month.

(e) Annual repairs will be ₹2,04,000

(f) The bus is likely to last for 5 years

(g) The driver's salary will be ₹30,000 per month and the conductor's salary will be ₹25,000 per month in addition to 10% of takings as commission [To be shared by the driver and conductor equally].

(h) Cost of stationery will be ₹1,000 per month.

(i) Manager-cum-accountant's salary is ₹17,000 per month.

(j) Petrol and oil will be ₹500 per 100 kilometers.

(k) The bus will make 3 up and down trips carrying on an average 40 passengers on each trip.

(l) The bus will run on an average 25 days in a month.

Assuming 15% profit on takings, CALCULATE the bus fare to be charged from each passenger.

Hints: Fare per passenger = ₹0.9861, passenger- km = 28,80,000 (p.a.)

Question-4

SMC is a public school having five buses each plying in different directions for the transport of its school students. In view of a larger 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 after- noon the first trip takes the junior students and an hour later the second trip takes the senior students home.

The distance travelled by each bus one way is 8 km. 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 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)	
(one cleaner employed for all the five buses)	
License fee, taxes, etc.	₹ 8,600 per bus per annum
Insurance	₹ 10,000 per bus per annum
Repairs & maintenance	₹ 35,000 per bus per annum
Purchase price of the bus	₹ 15,00,000 each
Life of each bus	12 years
Scrap value of buses at the end of life	₹ 3,00,000
Diesel cost	₹ 45.00 per litre

Each bus gives an average mileage of 4 km. per litre of diesel. Seating capacity of each bus is 50 students.

The seating capacity is fully occupied during the whole year.

Students picked up and dropped within a range up to 4 km. 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:

(i) PREPARE a statement showing the expenses of operating a single bus and the fleet of five buses for a year.

(ii) WORK OUT the average cost per student per month in respect of –

(A) Students coming from a distance of upto 4 km. from the school and

(B) Students coming from a distance beyond 4 km. from the school.

Hints: (i) Cost per month = ₹31,500, ₹1,57,500, No. of Equivalent students = 1,50,750. (ii) (a) = ₹210, (b) = ₹420.

Question-5

Global Transport Ltd. charges ₹ 90 per ton for its 6-ton truck lorry load from city 'A' to city 'B'. The charges for the return journey are ₹ 84 per ton. No concession or reduction in these rates is made for any delivery of goods at intermediate station 'C'.

In January 20X8, the truck made 12 outward journeys for city 'B' with full load out of

which 2 tons were unloaded twice in the way at city 'C'. The truck carried a load of 8 tons in its return journey for 5 times but was once caught by police and ₹ 1,200 was paid as fine. For the remaining trips the truck carried full load out of which all the goods on load were unloaded once at city 'C', but it returned without any load once only from 'C' station to 'A' station. The distance from city 'A' to city 'C' and city 'B' are 140 km. and 300 km. respectively.

Annual fixed costs and maintenance charges are ₹ 60,000 and ₹ 12,000 respectively. Running charges spent during January 20X8 are ₹ 2,944.

You are required to FIND OUT the cost per absolute ton-kilometre and the profit for January, 20X8.

Hints: Monthly cost = ₹8,944, Absolute Ton-km = 44,720, Profit (Jan) = ₹3,224.

Question-6

GTC has a lorry of 6-ton carrying capacity. It operates lorry service from city A to city B for a particular vendor. 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 extra charges are billed for unloading goods in-between destination city and no concession in rates is given for reduced load after unloading at intermediate city. Distance between the city 'A' to 'B' is 300 km and distance from city 'A' to 'C' is 140 km.

In the month of January, the truck made 12 journeys between city 'A' and 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 the month of January are ₹ 2,94,400 (includes ₹ 12,400 paid as penalty for overloading).

You are required to:

(i) CALCULATE the cost as per (a) Commercial ton-kilometre. (b) Absolute ton-kilometre

(ii) CALCULATE Net Profit/ loss for the month of January.

Hints:

(ii) (a) ₹7.62 (b) ₹7.65

(ii) (1,200)

TEST YOUR KNOWLEDGE

Question-1

Mr. X owns a bus which runs according to the following schedule:

i) Delhi to Chandigarh and back, the same day.

Distance covered:	250 km. one way.
Number of days run each month :	8
Seating capacity occupied	90%.

ii) Delhi to Agra and back, the same day.

Distance covered:	210 km. one way
Number of days run each month :	10
Seating capacity occupied	85%

iii) Delhi to Jaipur and back, the same da /.

Distance covered:	270 km. one way
Number 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 km. per litre at	₹ 56 per litre
Road tax	₹ 15,915 p.a.
Lubricant oil	₹ 10 per 100 km.
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 is 20% of the total takings. CALCULATE the bus fare to be charged from each passenger to earn a profit of 30% on total takings. The fares are to be indicated per passenger for the journeys:

Delhi to Chandigarh (ii) Delhi to Agra and (iii) Delhi to Jaipur.

Hints:

Fare	₹
Delhi to Chandigarh	₹225
Delhi to Agra	₹189
Delhi to Jaipur	₹243

Question-2

A company is considering three alternative proposals for conveyance facilities for its sales personnel who has to do considerable traveling, approximately 20,000 kilometres every year. The proposals are as follows:

(i) Purchase and maintain its own fleet of cars. The average cost of a car is ₹ 6,00,000.

(ii) Allow the Executive 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:

Petrol ₹6 per km.	Repairs and maintenance ₹0.20 per km.
Tyre ₹0.12 per km.	Insurance ₹ 1,200 per car per annum
Taxes ₹ 800 per car per annum	Life of the car: 5 years with annual mileage of 20,000 km.

Resale value: ₹ 80,000 at the end of the fifth year.

Work out the relative costs of three proposals and rank them.

Hints:

Proposal	I	II	III
Cost/20,0000 km	2,32,400	2,01,200	3,03,200

B. PAST YEAR EXAM QUESTIONS

Dec-21. Q3(a)-10 marks

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 kms. 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:

Particulars	
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 kms per litre)	*₹80 per litre*
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 kms)	*₹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 kms away from the office are charged double the fare which is charged from employees coming from a distance of up-to 15 kms. away from the office. 50% of employees travelling in each trip are coming from a distance beyond 15 kms. from the office. The charges are to be based on average cost.

You are required to:

(i) Prepare a statement showing expenses of operating a single mini bus for a year,

(ii) Calculate the average cost per employee per month in respect of:

a. Employees coming from a distance upto 15 kms. from the office.

b. Employees coming from a distance beyond 15 kms. from the office.

Solution:

(i) Statement of Expenses of operating a mini bus in a year

Particulars		Rate (₹)	Per Bus per annum (₹)
(A)	**Standing Charges:**		
	Driver's salary	20,000 p.m	2,40,000
	Lady attendant's salary	10,000 p.m	1,20,000
	Average Cleaner's salary (50%)	15,000 p.m	90,000
	Insurance charge	30,000 p.a.	30,000
	License fee, taxes etc.	5,080 p.m.	60,960
	Average Garage Rent	24,000 p.m	36,000
	Depreciation {(15,00,000 – 3,00,000) ÷ 8}	1,50,000 p.a.	1,50,000
(B)	**Maintenance Charges:**		
	Repairs & maintenance including engine oil and lubricants (Working Note 1)	28,560 p.a.	
(C)	**Operating Charges:**		
	Diesel (Working Note 2)		5,76,000
	Total Cost (A + B + C)		13,31,520
	Cost per month		1,10,960

(ii) Average cost per employee per month:

A. Employee coming from distance of upto 15 km

$$= \frac{\text{Total cost per month}}{\text{Total no.of equivalent employee}}$$

$$= \frac{1,10,960}{72\ *} = ₹\ 1,541.11$$

B. Employee coming from a distance beyond 15 km

= 1541.11 × 2 = ₹ 3,082.22

*** Considering half fare employees as a base**

Full fare employees (12 × 2)	24 employees
Add: Half fare employees (Working Note 3)	12 employees
Total Equivalent number of employees per month	36 employees

Total Equivalent number of employees per month (morning + afternoon shift of company)	72 employees

Working Notes:

1. Calculation of Repairs and maintenance cost of a bus :
   Distance travelled in a year:
   (4 trip × 2 shifts × 30 km. × 20 days × 12 months) Distance travelled p.a.: 57,600 km.
   Repairs and maintenance cost per Bus per annum:
   = $\frac{57,600 \text{ km.}}{5,760 \text{ km}}$ x ₹ 2,856 per bus
   = ₹ 28,560 per annum

2. Calculation of diesel cost per bus per annum: Distance travelled in a year = 57,600 km
   Diesel cost per Bus per annum:
   = $\frac{57,600 \text{ km.}}{8 \text{ km}}$ x ₹ 80
   = 5,76,000

3. Calculation of equivalent number of employees per bus:

Seating capacity of a bus	30 employees
Occupancy (80% of capacity)	24 employees
Half fare employees (50% of 24 employees)	12 employees
Full fare employees (50% of 24 employees)	12 employee

[Note: Total Equivalent number of employees per month (morning + afternoon shift of company can also be calculated considering full fare employees as a base. In that case the number will be 36. Then fare for employees coming from distance beyond 15km will be 1,10,960 / 36 = ₹ 3,082.22 and employees coming from distance upto 15 km will be 3,082.22 / 2 = ₹ 1,541.11]

Nov-20. Q5(a)-10 marks

SEZ Ltd. built a 120 km. long highway and now operates a toll road 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 persons 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 kilometre.

(2) Calculate the toll rate per vehicle.

Solution:

Statement of Cost

Particulars		**(₹)**
A. Apportionment of capital cost	$\left[\frac{₹\ 900 \text{crore}}{10 \text{years}} \times \frac{1}{12 \text{months}}\right]$	**7,50,00,000**
B. Other Costs		
Salary to Collection Personnel	(3 Shifts × 5 persons per shift × 30 days × ₹ 200 per day)	**90,000**
Salary to Supervisor	(3 Shifts × 2 persons per shift × 30 days × ₹ 350 per day)	**63,000**
Salary to Security Personnel	(2 Shifts × 2 persons per shift × 30 days × ₹ 200 per day)	**24,000**
Salary to Toll Booth Manager	(3 Shifts × 1 person per shift × 30 days × ₹ 500 per day)	**45,000**
Electricity		1,50,000
Telephone		1,00,000
		4,72,000
C. Maintenance cost		50,00,000
Total (A + B + C)		**8,04,72,000**

(1) Calculation of cost per kilometre:

$= \frac{\text{Total Cost}}{\text{Total km.}} = \frac{₹\ 8,04,72,000}{120 \text{km.}}$

= ₹ 6,70,600

(2) Calculation of toll rate per vehicle:

$= \frac{\text{Total Cost + 25\% profit}}{\text{Vehicles per month}} = \frac{₹\ 8,04,72,000 + ₹\ 2,41,41,600}{1,00,00,000 \text{ vehicles}} = ₹\ 10.46$

Working:

Vehicles per month = $\frac{\text{Total estimated vehicles}}{\text{10 years}} \times \frac{\text{1 month}}{\text{12 months}}$

$= \frac{120\text{crore}}{10\text{years}} \times \frac{\text{1 month}}{\text{12months}} = 1$ Crore vehicles

May-19. Q4(a)-10 marks

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 tyres)	₹ 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 Overhead Cost	₹ 41,600 per annum

The lorry operates on a 5 day 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)

Solution:

Working Notes:

Particulars	For 4 weeks	For 1 week (by dividing by 4)
Total distance travelled (40 k.m × 2 × 2 trips × 5 days × 4 weeks)	3,200 km	800 km
Total tonne km (40 k.m × 10 tonnes × 2 × 5 days × 4 weeks)	16,000 tonne km	4,000 tonne km

(i) Statement showing Operating Cost **(Amount in ₹)**

	Particulars	For 4 weeks	For 1 week (by dividing by 4)
A.	**Fixed Charges:**		
	Drivers' wages (₹2,500 □ 4 weeks)	10,000	2,500
	Garage rent (₹800 × 4 weeks)	3,200	800
	Insurance {(₹18,200 ÷ 52 weeks) × 4 weeks}	1,400	350
	Vehicle license {(₹7,800 ÷ 52 weeks) × 4 weeks}	600	150
	Other overheads cost {(₹41,600 ÷ 52 weeks) × 4 weeks}	3,200	800
	Total (A)	**18,400**	**4,600**
B.	**Running Cost:**		
	Cost of diesel {(3,200 ÷ 8 kms) × ₹60}	24,000	6,000
	Engine Oil (₹200 × 4 weeks)*	800	200
	Repairs (₹600 × 4 weeks)*	2,400	600
	Depreciation on vehicle ₹9,50,000 - ₹1,50,000 x 3200 km / 1,60,000km	16,000	4,000
	Depreciation on tyres ₹52,500 x 3,200 km / 25,000 km	6,720	1,680
	Total (B)	**49,920**	**12,480**
C.	**Total Cost (A + B)**	**68,320**	**17,080**

*Cost of engine oil & repairs may also be treated as fixed cost, as the question relates these with time i.e. in weeks instead of running of vehicle.

(ii) Calculation of vehicle operating cost:

Operating cost per k.m. = ₹ 68,320 / 3,200 kms **or** ₹ 17,080 / 800 Kms = **₹ 21.35**

Operating cost per Tonne-k.m. = ₹ 68,320 / 16,000 or ₹ 17,080 / 4,000 = **₹ 4.27**

Nov-18. Q4(b)-10 marks

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 @3% premium per annum 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 the takings as commission (to be shared by the driver and the conductor equally). Office and administration overheads will be ₹ 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 considering that the bus will run on an average 25 days in a month, you are required to:

(i) prepare operating cost sheet (for the month).
(ii) calculate fare to be charged per passenger km.

Solution:

1. **Statement showing the Operating Cost per Passenger-km.**

	Yearly (₹)	Monthly (₹)
(A) Standing Charges:		
Insurance Charge ₹. 20,00,000 × 3%	60,000	5,000
Road Tax	36,000	3,000
Depreciation (20,00,000/5)	4,00,000	33,333.33
Total	4,96,000	41,333.33
(B) Maintenance Charges:		
Annual Repairs	50,000	4166.67
Office and administration overheads	3,18,000	26,500
Total	3,68,000	30666.67
(C) Running Cost/Charges:		
Driver's Salary	2,40,000	20,000
Conductor's Salary	1,80,000	15,000
Diesel & Oil $60,000 \times \frac{1,500}{100}$	9,00,000	75,000
Total	13,20,000	41,333.33
Total (A+B+C) Cost before commission and profit	21,84,000	1,82,000
Commission (33,60,000 × 10%) (working note 2)	3,36,000	28,000
Profit (33,60,000 × 25%) (working note 2)	8,40,000	70,000
Takings (working note 1)	33,60,000	2,80,000

2. Fare per Passenger-km. $= \frac{\text{Total Collection/Takings}}{\text{Total Passenger-km (Working note 3)}}$

$= \frac{33,60,000}{24,00,000} = ₹1.40$

OR

Fare per Passenger-km. (monthly) $= \frac{2,80,000}{2,00,000} = ₹1.40$

May-22. Q1(d)-5 marks

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'.

Solution:

Statement showing the cost per tonne-kilometre of carrying mineral from each mine

	Mine X (₹)	Mine Y (₹)
Fixed cost per trip: (Refer to working note 1)		
(Driver's wages, depreciation, insurance andtaxes)		
X: 1 hour 30 minutes @ ₹ 12 per hour	18.00	
Y: 1 hour 40 minutes @ ₹ 12 per hour		20.00
Running and maintenance cost:		
(Fuel, oil, tyres, repairs and maintenance)		
X: 30 km. ₹ 1.60 per km.	48.00	
Y: 40 km. ₹ 1.60 per km.		64.00
Total cost per trip (₹)	66.00	84.00
Cost per tonne – km (Refer to working note 2)	1.1 ₹ 66 / 60 tonne - km	1.05 ₹ 84 / 80 tonne - km

Working notes:

	Mine- X	Mine- Y

(1) Total operated time taken pertrip		
Running time to & fro	**45 minutes** 30 km.× 60 minutes / 40 km.	**60 minutes** 40 km. x 60 minutes / 40 km.
Un-loading time	15 minutes	15 minutes
Loading time	30 minutes	25 minutes
Total operated time	**90 minutes or** 1 hour 30 minutes	**100 minutes or** 1 hour 40 minutes
(2) Effective tones – km.	60 (4 tonnes × 15 km.)	80 (4 tonnes × 20 km.)

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

A transport company has a fleet of three trucks of 10 tonnes capacity each plying in different directions for transport of customer's goods. The trucks run loaded with goods and return empty. The distance travelled, number of trips made and the load carried per day by each truck are as under:

Truck No.	One way Distance Km	No. of trips per day	Load carried per trip / day tonnes
1	16	4	6
2	40	2	9
3	30	3	8

The analysis of maintenance cost and the total distance travelled during the last two years is as under

Year	Total distance travelled	Maintenance Cost ₹
1	1,60,200	46,050
2	1,56,700	45,175

The following are the details of expenses for the year under review:

Diesel	₹ 10 per litre. Each litre gives 4 km per litre of diesel on an average.
Driver's salary	₹ 2,000 per month
Licence and taxes	₹ 5,000 per annum per truck
Insurance	₹ 5,000 per annum for all the three vehicles

Purchase Price per truck	₹ 3,00,000, Life 10 years. Scrap value at the end of life is
	₹ 10,000.
Oil and sundries	₹ 25 per 100 km run.
General Overhead	₹ 11,084 per annum

The vehicles operate 24 days per month on an average.
Required

(i) Prepare an Annual Cost Statement covering the fleet of three vehicles.

(ii) Calculate the cost per km. run.

(iii) Determine the freight rate per tonne km. to yield a profit of 10% on freight.

Solution:

1. Annual Cost Statement of three vehicles

	(₹)
Diesel {(1,34,784 km. ÷ 4 km) × ₹ 10) (Refer to Working Note 1)	3,36,960
Oil & sundries {(1,34,784 km. ÷ 100 km.) × ₹ 25}	33,696
Maintenance {(1,34,784 km. × ₹ 0.25) + ₹ 6,000} (Refer to Working Note 2)	39,696
Drivers' salary {(₹ 2,000 × 12 months) × 3 trucks}	72,000
Licence and taxes (₹ 5,000 × 3 trucks)	15,000
Insurance	5,000
Depreciation {(₹ 2,90,000 ÷ 10 years) × 3 trucks}	87,000
General overhead	11,084
Total annual cost	6,00,436

2. Cost per km. run

$$\text{Cost per kilometer run} = \frac{\text{Total annual cost of vehicles (refer to working note 1)}}{\text{Total kilometre travelled annually}}$$

$$= \frac{₹6,00,436}{1,34,784 \text{ kms}} = ₹4.4548$$

3. Freight rate per tonne km (to yield a profit of 10% on freight)

$$\text{Cost per tonne km.} = \frac{\text{Total annual cos t of three vehicles (refer working note 1)}}{\text{Total effective tonnes kms. Per annum}}$$

$$= \frac{₹6,00,436}{5,25,312 \text{ kms}} = ₹1.143$$

Freight rate per tonne km. = (₹1.143/0.9) / 1 = ₹1.27

Working notes:

1. Total kilometre travelled and tonnes kilometre (load carried) by three trucks in one year

Truck number	One way distance in kms	No. of trips	Total distance covered in km per day	Load carried per trip / day in tonnes	Total effective tonnes km
1	16	4	128	6	384
2	40	2	160	9	720
3	30	3	180	8	720
Total			468		1,824

Total kilometre travelled by three trucks in one year (468 km. × 24 days × 12 months) = 1,34,784

Total effective tonnes kilometre of load carried by three trucks during one year (1,824 tonnes km. × 24 days × 12 months) = 5,25,312

Fixed and variable component of maintenance cost:

$$\text{Variable maintenance cost per km} = \frac{\text{Difference in maintenance cost}}{\text{Difference in distance travelled}}$$

$$= \frac{₹46,050 - ₹45,175}{1,60,200 \text{ kms} - 1,56,700 \text{ kms}}$$

$$= ₹0.25$$

Fixed maintenance cost = Total maintenance cost–Variable maintenance cost
= ₹ 46,050 – 1,60,200 kms × ₹ 0.25 = ₹ 6,000

Question-2

A transport company has been given a 40 kilometre long route to run 5 buses. The cost of each bus is ₹ 6,50,000. The buses will make 3 round trips per day carrying on an average 80 percent passengers of their seating capacity. The seating capacity of each bus is 40 passengers. The buses will run on an average 25 days in a month. The other information for the year 2013-14 are given below:

Garage rent	₹ 4,000 per month
Annual repairs and maintenance	₹ 22,500each bus

Salaries of 5 drivers	₹ 3,000 each per month
Wages of 5 conductors	₹ 1,200 each per month
Manager's salary	₹ 7,500 per month
Road tax, permit fee, etc.	₹ 5,000 for a quarter
Office expenses	₹ 2,000 per month
Cost of diesel per litre	₹ 33
Kilometre run per litre for each but	6 kilometres
Annual depreciation	15% of cost
Annual Insurance	3% of cost

You are required to calculate the bus fare to be charged from each passenger per kilometre, if the company wants to earn profits of $33\frac{1}{3}$ percent on taking (total receipts from passengers).

Solution:

Operating Cost Sheet for the year 2013- 14

	Particulars	**Total Cost (₹)**
A.	Fixed Charges:	
	Garage rent (₹4,000 × 12 months)	48,000
	Salary of drivers (₹3,000 × 5 drivers ×12 months)	1,80,000
	Wages of Conductors (₹1,200 × 5 conductors × 12 months)	72,000
	Manager's salary (₹ 7,500 × 12 months)	90,000
	Road Tax, Permit fee, etc. (₹ 5,000 × 4 quarters)	20,000
	Office expenses (₹ 2,000 × 12 months)	24,000
	Insurance (₹ 6,50,000 × 5 buses × 3%)	97,500
	Total (A)	5,31,500
B.	Variable Charges:	
	Repairs and Maintenance (₹ 22,500 × 5 buses)	1,12,500
	Depreciation (₹ 6,50,000 × 5 buses × 15%)	4,87,500
	Diesel {(3,60,000 km. ÷ 6 km.) × ₹33}	19,80,000
	Total (B)	25,80,000
	Total Cost (A+B)	31,11,500
	Add: $33\frac{1}{3}$ % Profit on takings or 50% on cost	15,55,750
	Total Takings (Total bus fare collection)	46,67,250
	Total Passenger-km. (Working Note 2)	1,15,20,000
	Bus fare to be charged from each passenger per km.	0.405

Working Notes:

1. Total Kilometres to be run during the year 2013-14

= 40 km.× 2 sides × 3 trips × 25 days × 12 months × 5 buses
= 3, 60,000 Kilometres

2. Total passenger Kilometres
= 3,60,000 km. × 40 passengers × 80% = 1,15,20,000 Passenger- km.

Question-3

The following information relates to a bus operator:

Cost of the bus	₹	18,00,000
Insurance charges		3% p.a.
Manager-cum accountant's salary	₹	8,000 p.m.
Annual Tax	₹	50,000
Garage Rent	₹	2,500 p.m.
Annual repair & maintenance	₹	1,50,000
Expected life of the bus		15 years
Scrap value at the end of 15 years	₹	1,20,000
Driver's salary	₹	15,000 p.m.
Conductor's salary	₹	12,000 p.m.
Stationery	₹	500 p.m.
Engine oil, lubricants (for 1200 km.)	₹	2,500
Diesel and oil (for 10 km.)	₹	52
Commission to driver and conductor (shared equally)		10% of collections
Route distance		20 km long

The bus will make 3 round trips for carrying on the average 40 passengers in each trip. Assume 15% profit on collections. The bus will work on the average 25 days in a month.

Calculate fare for passenger-km

Solution:

Working Notes:

1. Calculation of Depreciation of Bus (Per month)

$$= \frac{\text{Cost of the bus – Scrap value at the end of the15 years}}{\text{Expected life of the bus}}$$

$$= \frac{₹\ 18,00,000 - ₹1,20,000}{15 \text{ years}}$$

= ₹1,12,000 p.a.

Depreciation per month = ₹1,12,000 = ₹9,333.33
12 months

2. Calculation of total distance travelled and Passenger-km. per month
Total distance = 3 trips × 2 × 20 k.m. × 25 days = 3,000 k.m.

Total Passenger-km. = 3 trips × 2 × 20 k.m. × 25 days × 40 passengers
= 1,20,000 Passenger-k.m.

3. Cost of Engine oil, Lubricants and Diesel & oil (Per month)
Engine oil & lubricants = Total distance travelled x ₹2,500
1,200 km

= 3,000 km x ₹2,500 = ₹6,250
1,200 km

Diesel and oil = Total distance travelled x ₹52
10 km
= 3,000 km x ₹52 = ₹15,600
10 km

Statement showing the Operating Cost per Passenger-km.

		(₹)	(₹)
(i)	Standing Charges:		
	Depreciation {Working Note- (i)}	9,333.33	
	Insurance Charge (₹18,00,000/12) × 3%	4,500	
	Manager-cum-accountant's salary	8,000	
	Annual Tax (p.m.) (₹50,000/ 12)	4,166.67	
	Garage Rent	2,500	28,500
(ii)	Maintenance Charges:		12,500
	Repair & Maintenance per month (₹1,50,000/12)		
(iii)	Running Cost:		
	Driver's Salary	15,000	
	Conductor's Salary	12,000	
	Stationery	500	
	Engine oil & Lubricants {Working Note-	6,250	
	(iii)} Diesel and oil {Working Note- (iii)}	15,600	
	Total running cost before deducting commission to driver and conductor	49,350	49,350
	Total cost excluding commission to driver and conductor		90,350

Driver's commission on collection*		6,023.34
Conductor's commission on collection*		6,023.33
Total Cost (i) +(ii) + (iii)		1,02,396.67
Add: Profit **		18,070
Total collection		1,20,466.67

Working Note:

Total costs before commission on collection and net profit is ₹ 90,350.

Commission on collection to driver and conductor is 10% of collection and Profit is 15% of collection means

100% - (10% + 15%) i.e. 75% = ₹ 90,350

So, Total collection = ₹90,350 / 75 *100 = ₹1,20,466.67

*Total Commission on collection = 10% × ₹ 1,20,466.67 = ₹ 12,046.67

Driver's share = 50% × ₹ 12,046.67 = 6,023.34

Conductor's share = 50% × ₹ 12,046.67 = 6,023.33

** Profit on collection = ₹ 1,20,466.67 × 15% = ₹ 18,070

Fare per Passenger-km. = Total collection / Total passengers – km (working note (ii))

= ₹1,20,466.67 / 1,20,000

= ₹1.004 (approx.)

Question – 4

A mini-bus, having a capacity of 32 passengers, operates between two places - 'A' and 'B'. The distance between the place 'A' and place 'B' is 30 km. The bus makes 10 round trips in a day for 25 days in a month. On an average, the occupancy ratio is 70% and is expected throughout the year.

The details of other expenses are as under:

	Amount (₹)	
Insurance	15,600	Per annum
Garage Rent	2,400	Per quarter
Road Tax	5,000	Per annum
Repairs	4,800	Per quarter
Salary of operating staff	7,200	Per month
Tyres and Tubes	3,600	Per quarter
Diesel: (one litre is consumed for every 5 km)	13	Per litre
Oil and Sundries	22	Per 100 km run
Depreciation	68,000	Per annum

Passenger tax @ 22% on total taking is to be levied and bus operator requires a profit of 25% on total taking.

Prepare operating cost statement on the annual basis and find out the cost per passenger kilometer and one way fare per passenger.

Solution:

Operating Cost Statement

	Particulars	Total Cost Per annum (₹)
A.	Fixed Charges:	
	Insurance	15,600
	Garage rent (₹ 2,400 × 4 quarters)	9,600
	Road Tax	5,000
	Salary of operating staff (₹ 7,200 × 12 months)	86,400
	Depreciation	68,000
	Total (A)	1,84,600
B.	Variable Charges:	
	Repairs (₹ 4,800 × 4 quarters)	19,200
	Tyres and Tubes (₹ 3,600 × 4 quarters)	14,400
	Diesel {(1,80,000 km. ÷ 5 km.) × ₹13}	4,68,000
	Oil and Sundries {(1,80,000 km. ÷ 100 km.) × ₹22}	39,600
	Total (B)	5,41,200
	Total Operating Cost (A+B)	7,25,800
	Add: Passenger tax (Refer to WN-1)	3,01,275
	Add: Profit (Refer to WN-1)	3,42,359
	Total takings	13,69,434

Calculation of Cost per passenger kilometre and one way fare per passenger:

$$\text{Cost per Passenger-Km.} = \frac{\text{Total operating cost}}{\text{Total passengers – km}}$$

$$= \frac{₹7,25,800}{40,32,000 \text{ passeners - km}} = ₹0.18$$

One way fare per passenger = $\frac{\text{Total takings}}{\text{Total passengers –km}} \times 30\text{km.}$

$$= \frac{₹13,69,434}{40,32,000 \text{ passengers – km}} \times 30 \text{ km} = ₹10.20$$

Working Notes:

1. Let total taking be X then Passenger tax and profit will be as follows:

   X = ₹ 7,25,800 + 0.22 X + 0.25X

   X – 0.47 X = ₹ 7,25,800
   X = ₹7,25,800/0.53 = ₹13,69,434

   Passenger tax = ₹ 13,69,434 × 0.22 = ₹

   3,01,275 Profit = ₹ 13,69,434 × 0.25 = ₹

   3,42,359

2. Total Kilometres to be run during the year

   = 30 km.× 2 sides × 10 trips × 25 days × 12 months = 1,80,000 Kilometres

3. Total passenger Kilometres

   = 1,80,000 km. × 32 passengers × 70% = 40,32,000 Passenger- km.

Part-B: Hotel and Lodges Services

A. QUESTION FROM STUDY MATERIAL

Question-7

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 rooms and triple rooms.

Following information is given:

Type of suite	Number	Occupancy percentage
Single room	100	100%
Double rooms	50	80%
Triple rooms	30	60%

The rent of double rooms suite is to be fixed at 2.5 times of the single room suite and that of triple rooms suite as twice of the double rooms suite.

The other expenses for the year 20X8 are as follows:

	(₹)
Staff salaries	14,25,000
Room attendants' wages	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,500
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000

Provide profit @ 20% on total taking and assume 360 days in a year.
You are required to CALCULATE the rent to be charged for each type of suite.
Hints: Single room = ₹33.73, Double Room = ₹84.33, Triple room = ₹168.65

Question-8

A lodging home is being run in a small hill station with 100 single rooms. The home offers concessional rates during six off- season months in a year. During this period, half of the full room rent is charged. The management's profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending on 31st March 20X7. [Assume a month to be of 30 days].

(i) Occupancy during the season is 80% while in the off- season it is 40% only.

(ii) Total investment in the home is ₹200 lakhs of which 80% relate to buildings and balance for furniture and equipment.

(iii) Expenses:

o Staff salary [Excluding room attendants]	:	₹ 5,50,000
o Repairs to building	:	₹ 2,61,000
o Laundry charges	:	₹ 80, 000
o Interior	:	₹ 1,75,000
o Miscellaneous expenses	:	₹ 1,90,800

(iv) Annual depreciation is to be provided for buildings @ 5% and on furniture and equipment @ 15% on straight-line basis.

(v) Room attendants are paid ₹ 10 per room day on the basis of occupancy of the rooms in a month.

(vi) 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.

Hints: Rent during season = ₹204.50,

Rent during off season = ₹102.25, Total rent = ₹36,81,000.

Part-C: Hospital

Question-9

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.

Hints: (a) ₹55,34,000, (b) 3741 patient days

B. PAST YEAR EXAM QUESTIONS

Jan-21. Q5(a)-10 marks

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:

	₹
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:

(i) 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.

(ii) 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.

Solution:

Workings:

Calculation of number of Patient days

100 Beds × 120 days	=	12000
40 Beds × 80 days	=	3,200
Extra beds	=	400
Total	=	15,600

(i) Statement of Profitability

Particulars	Amount (₹)	Amount (₹)
Income for the year (₹ 200 per patient per day × 15,600 patient days)		31,20,000
Variable Costs:		
Doctor Fees (₹ 30,000 per month × 12)	3,60,000	
Food to Patients (Variable)	4,40,000	
Caretaker Other services to patients (Variable)	1,25,000	
Laundry charges (Variable)	1,40,000	
Medicines (Variable)	2,80,000	
Bed Hire Charges (₹ 50 × 400 Beds)	20,000	
Total Variable costs		(13,65,000)
Contribution		17,55,000
Fixed Costs:		
Rent (₹ 50,000 per month × 12)	6,00,000	
Supervisor (2 persons × ₹ 5,000 × 12)	1,20,000	
Nurses (4 persons × ₹ 3,000 × 12)	1,44,000	

Ward Boys (2 persons x ₹ 1500 x12)	36,000	
Repairs (Fixed)	28,000	
Cost of Oxygen	75,000	
Administration expenses allocated	71,000	
Total Fixed Costs		(10,74,000)
Profit		**6,81,000**

Calculation of Contribution and profit per Patient day

Total Contribution = ₹ 17,55,000
Total Patient days = 15,600 days
Contribution per Patient day = ₹ 17,55,000 / 15,600 days = ₹ 112.50
Total Profit = ₹ 6,81,000
Total Patient days = 15,600 days
Profit per Patient day = ₹ 6,81,000 / 15,600 days = ₹ 43.65

(ii) Breakeven Point = Fixed Cost / Contribution per Patient day
= ₹ 10,74,000 / ₹ 112.50
= 9,547 patient days

Nov-19. Q3(a)-10 marks

(i) A hotel is being run in a Hill station with 200 single rooms. The hotel offers concessional rate during six off-season months in a year. During this period, half of the full room rent s 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 investments in the hotel is ₹300 lakhs of which 80% relates to buildings and the balances to furniture and other equipment.
3. Room attendants are paid ₹15 per room per day on the basis of occupancy of rooms in a month.
4. Expenses:
    a. Staff salary (excluding that of room attendants) ₹8,00,000
    b. Repairs to Buildings ₹3,00,000
    c. Laundry charges ₹1,40,000
    d. Interior charges ₹2,50,000
    e. Misc. Exp. ₹2,00,000
5. Annual depreciation is to be provided on Building @5% and 15% on Furniture and other Equipment on Straight line method.

6. Monthly lighting charges are ₹110, except in four months in winter when it is 30 per room and this cost is on the basis of full occupancy for a month.

You are required to workout room rent chargeable per day both during the season and the off-season months using the foregoing information.

(assume a month to be 30 days and winter season is to be considered as a part off-season).

Solution:

Working Notes:

(i) Total Room days in a year

Season	Occupancy (Room-days)	Equivalent Full Room charge days
Season – 80% Occupancy	200 Rooms × 80% × 6 months × 30 days in a month = **28,800** Room Days	28,800 Room Days × 100% = 28,800
Off-season – 40% Occupancy	200 Rooms × 40% × 6 months × 30 days in a month = **14,400** Room Days	14,400 Room Days × 50% = 7,200
Total Room Days	28,800 + 14,400 = 43,200 Room Days	36,000 Full Room days

(ii) Lighting Charges:

It is given in the question that lighting charges for 8 months is ₹110 per month and during winter season of 4 months it is ₹30 per month. Further it is also given that peak season is 6 months and off season is 6 months.

It should be noted that – being Hill station, winter season is to be considered as part of Off season. Hence, the non-winter season of 8 months include – Peak season of 6 months and Off season of 2 months.

Accordingly, the lighting charges are calculated as follows:

Season	Occupancy (Room-days)
Season & Non-winter – 80% Occupancy	200 Rooms × 80% × 6 months × ₹ 110 per month = ₹ **1,05,600**
Off- season & Non-winter – 40% Occupancy (8 – 6 months)	200 Rooms × 40% × 2 months × ₹110 per month = ₹ **17,600**
Off- season & -winter – 40% Occupancy months)	200 Rooms × 40% × 4 months × ₹ 30 per month = ₹ **9,600**
Total Lighting charges	₹ 1,05,600+ ₹ 17,600 + ₹ 9,600 = ₹ **132,800**

Statement of total cost:

	(₹)
Staff salary	8,00,000
Repairs to building	3,00,000
Laundry	1,40,000
Interior	2,50,000
Miscellaneous Expenses	2,00,200
Depreciation on Building (₹ 300 Lakhs × 80% × 5%)	**12,00,000**
Depreciation on Furniture & Equipment (₹ 300 Lakhs × 20% × 15%)	**9,00,000**
Room attendant's wages (₹ 15 per Room Day for 43,200 RoomDays)	**6,48,000**
Lighting charges	1,32,800
Total cost	**45,71,000**
Add: Profit Margin (20% on Room rent or 25% on Cost)	11,42,750
Total Rent to be charged	**57,13,750**

Calculation of Room Rent per day:
Total Rent / Equivalent Full Room days = ₹ 57,13,750/ 36,000 = ₹ 158.72
Room Rent during Season – ₹ 158.72
Room Rent during Off season = ₹ 158.72 × 50% = ₹ 79.36

May-18. Q4(b)-10 marks

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.
Other information for a year are as under:

	(₹)
Building Rent	2,25,000 per month
Manager Salary (Number of Manager-03)	50,000 per month to each one
Nurses Salary (Number of Nurses-24)	18,000 per month to each Nurse
Ward boy's Salary (Number of ward boys' - 24)	9,000 per month per person
Doctor's payment (Paid on the basis of number of patients attended and time spent by them)	5,50,000 per month
Food and laundry services (variable)	39,53,000
Medicines to patients (variable)	22,75,000 per year
Administrative Overheads	28,00,000 per year
Depreciation on equipments	15% per annum on original cost

It was reported that for 200 days in a year 50 beds were occupied, for 105 days 30 beds were occupied and for 60 days 20 beds were occupied.

The hospital hired 250 beds at a charge of ₹ 950 per bed to accommodate the flow of patients. However, this never exceeded the normal capacity of 50 beds on any day.

Find out:

1. Profit per patient day, if hospital charges on an average ₹ 2,500 per day from each patient.
2. Breakeven point per patient day (Make calculation on annual basis).

Solution:

Number of Patient Days = (200x50) + (105x30) + (60x20)

=14,350 patient days + 250 = 14,600

Statement Showing Profit

Elements of Cost and Revenue	Total (₹)
A. Revenue (14,600 x ₹ 2,500)	3,65,00,000
B. Variable Costs	
Food and Laundry Service	39,53,000
Medicines to Patients	22,75,000
Doctor's Payment	66,00,000
Hire Charges of Bed (250 x ₹ 950)	2,37,500
Total Variable Cost	1,30,65,500
C. Fixed Costs	
Building Rent	27,00,000
Manager's Salary (₹ 50,000 x 3 x 12)	18,00,000
Nurse's Salary (₹ 18,000 x 12 x 24)	51,84,000
Ward boy's Salary (₹ 9,000 x 12 x 24)	25,92,000
Administrative Overheads	28,00,000
Depreciation on Equipment's	12,75,000
	1,63,51,000
D. Total Cost (B+C)	2,94,16,500
E. Profit (A-D)	70,83,500

Profit per patient day = ₹ 70,83,500/14,600 = ₹ 485.17

(i) Contribution (per patient day) = (₹ 3,65,00,000 – ₹ 1,30,65,500)/ 14,600
= ₹ 1,605.10

BEP = 1,63,51,000/1,605.10 = 10,186.90 or say 10,187 patient days

Notes:

1. Higher Charges for extra beds are a semi variable cost; still, for the sake of convenience it has been considered a variable cost.

2. Assumed, the hospital hired 250 beds at a charge of ₹ 950 per bed to accommodate the flow of patients. However, this never exceeded the 10 beds above the normal capacity of 50 beds on any day.
3. The fees were paid based on the number of patients attended to and the time spent by them, which on an average worked out to ₹ 5,50,000 p.m.

Part-D: Miscellaneous

Question-10 (I.T.)

Following are the data pertaining to Infotech Pvt. Ltd, for the year 20X8-X9

	Amount (₹)
Salary to Software Engineers (5 persons)	15,00,000
Salary to Project Leaders (2 persons)	9,00,000
Salary to Project Manager	6,00,000
Repairs & maintenance	3,00,000
Administration overheads	12,00,000

The company executes a Project XYZ, the details of the same as are as follows:

Project duration – 6 months

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.

Travel expenses incurred for the project – ₹1,87,500

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

Hints: Total project cost = ₹13,75,000

Question-11 (Toll Road)

BHG Toll Plaza Ltd built a 60 km. long highway and now operates a toll plaza to collect tolls from passing vehicles using the same. The company has invested ₹600 crore to build the road and has estimated that a total of 60 crore vehicles will be using the highway during the 10 years toll collection tenure. Toll Operating and Maintenance cost for the month of April 20X9 are as follows:

(i) Salary to –

- Collection Personnel (3 Shifts and 4 persons per shift) - ₹150 per day per person
- Supervisor (2 Shifts and 1 person per shift) - ₹ 250 per day per person

- Security Personnel (3 Shifts and 2 persons per shift) - ₹150 per day per person
- Toll Booth Manager (2 Shifts and 1 person per shift) - ₹400 per day per person

(ii) Electricity – ₹ 80,000

(iii) Telephone – ₹ 40,000

(iv) Maintenance cost – ₹ 30 Lacs

(v) The company needs 25% profit over total cost to cover interest and other costs.

Required:

(i) CALCULATE cost per kilometer.

(ii) CALCULATE the toll rate per vehicle (assume there is only type of vehicle).

Hints: (i) ₹8,87,333.33, (ii) ₹13.31

Question-12 (Financial Institutes)

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 labor:

	(₹)
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.

Hints: Processing cost per loan = ₹570.5

Question-13 (Power House)

From the following data pertaining to the year 20X8-X9 Prepare a cost statement showing the cost of electricity generated per kWh by Chambal Thermal Power Station.

Total units generated 10,00,000 kWh

	Amount (₹)
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.

Hints: Total Cost per kwh = ₹6.55

Question-14 (Educational Institute)

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:

(i)

	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 examinationsin a year	2	2	2	2
Time spent at library by students 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

(ii) One teacher who teaches economics for Arts stream students also teaches commerce stream students. The teacher takes 1,040 classes in a year, it includes 208 classes for commerce students.

(iii) There is another teacher who teaches mathematics for Science stream students also teaches business mathematics to commerce stream students. She takes 1,100 classes a year, it includes 160 classes for commerce students.

(iv) One peon is fully dedicated for higher secondary section. Other peons dedicate their 15% time for higher secondary section.

(v) All school students irrespective of section and age participates in annual functions and sports activities.

Required:

a) CALCULATE cost per student per annum for all three streams.

b) If the management decides to take uniform fee of ₹ 1,000 per month from all higher secondary students, CALCULATE stream wise profitability.

c) If management decides to take 10% profit on cost, COMPUTE fee to be charged from the students of all three streams respectively.

Hints:

a)

Particulars	Arts (₹)	Commerce (₹)	Science (₹)	Total (₹)
Cost per student per annum	17,397	9,533	19,238	13,610

b)

Particulars	Arts (₹)	Commerce (₹)	Science (₹)	Total (₹)
Total Profit/ (Loss)	(6,47,640)	8,88,120	(13,02,840)	(10,62,360)

c)

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

Question-15 (Insurance Company)

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:

(i) 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.

(ii) CALCULATE cost per policy.

(iii) CALCULATE cost per rupee of insured value.

Hints:

(i)

	Particulars	Amount (₹)	Amount (₹)
1.	**Product Development, Marketing and Sales Support:**		
	- Policy development cost	11,25,000	
	- Cost of marketing	45,20,000	
	- Sales support expenses	11,45,000	67,90,000
2.	**Operations:**		
	- Policy issuance cost	10,05,900	
	- Policy servicing cost	35,20,700	
	- Claims management cost	1,25,600	46,52,200
3.	**IT Cost**		74,32,000
4.	**Support functions**		
	- Postage and logistics	10,25,000	
	- Facilities cost	15,24,000	
	- Employees cost	5,60,000	
	- Office administration cost	16,20,400	47,29,400
	Total Cost		**2,36,03,600**

(ii) ₹ 44,703.79

(iii) ₹ 0.0018

Question-16 (New Course Material)

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 Lakh)
1.	Employee cost per year	2500
2.	Solar panel maintenance cost per year	250
3.	Site maintenance cost per year	150
4.	Depreciation per year	5940

CALCULATE cost of generating 1kW of power.

[1 Megawatt = 1,000 kW]

Hints:
Cost of 1 kW (₹) 2.849

TEST YOUR KNOWLEDGE

Question-3 (Toll-fee)

SLS Infrastructure built and operates 110 k.m. highway on the basis of Built- Operate-Transfer (BOT) for a period of 25 years. A traffic assessment 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:

Sl. No.	Activities	Amount (₹ in lakh)
1	Site clearance	170.70
2	Land development and filling work	9,080.35
3	Sub base and base courses	10,260.70
4	Bituminous work	35,070.80
5	Bridge, flyovers, underpasses, Pedestrian subway, footbridge, etc	29,055.60
6	Drainage and protection work	9,040.50
7	Traffic sign, marking and road appurtenance	8,405.00
8	Maintenance, repairing and rehabilitation	12,429.60
9	Environmental management	982.00
	Total Project cost	114,495.25

An estimated 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 the passing vehicles:

Sl. No.	Type of vehicle	
1.	Two wheelers	5%
2.	Car and SUVs	20%

3.	Bus and LCV	30%
4.	Heavy commercial vehicles	45%

Required:

(i) CACULATE the total project cost per day of concession period.

(ii) COMPUTE toll fee to be charged for per vehicle of each type, if the company wants to earn a profit of 15% on total cost.

[Note: Concession period is a period for which an infrastructure is allowed to operate and recovers its investment]

Hints:

(i) Cost per day of concession period (₹ in lakh): 12.67

(ii)

Sl. No.	Type of vehicle	Equivalent cost [A]	Weight [B]	Toll fee per vehicle [A×B]
1.	Two wheelers	₹ 19.06	1	19.06
2.	Car and SUVs	₹ 19.06	4	76.24
3.	Bus and LCV	₹ 19.06	6	114.36
4.	Heavy commercial vehicles	₹ 19.06	9	171.54

B. PAST YEAR EXAM QUESTIONS

May-23. Q1(d)-5 marks (Toll)

RST Toll Plaza Limited built an 80-kilometre-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 that 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 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:

(i) Calculate the toll rate for each type of vehicle if concession facilities are not available on the return journey.

(ii) 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 calculated in option (i) remains the same.

Solution:

Working Notes:

(1) Calculation of equivalent numbers of Light weight vehicles (when no concession is provided on return journey)

Type of vehicle	Monthly traffic (A)	Return traffic (B)	Ratio (C)	Equivalent light weight [(A + B) × C]
Light weight	45,000*	45,000	1	90,000
Medium weight	12,000	12,000	2.5	60,000
Heavy weight	10,000	10,000	5	1,00,000
				2,50,000

*50,000 light vehicles less 10% exempted vehicles

(2) Calculation of equivalent numbers of Light weight vehicles (when concession is provided on return journey)

Type of vehicle	Monthly traffic (A)	Return traffic (B)	Ratio (C)	Equivalent light weight [(A + B) × C]
Light weight	45,000*	41,625 [45,000- (45,000 × 30% × 25%)]	1	86,625
Medium weight	12,000	12,000	2.5	60,000
Heavy weight	10,000	10,000	5	1,00,000
				2,46,625

(i) Calculation of toll rate for each type of vehicle:

Total cost to cover ÷ Equivalent type of vehicles

(₹ 59,09,090 + 10% of ₹ 59,09,090) ÷ 2,50,000 equivalent vehicles

(Refer working note 1)

= 65,00,000 ÷ 2,50,000 = ₹ 26

Toll rate for:

Light weight vehicle = ₹ 26
Medium weight vehicle = ₹ 26 × 2.5 = ₹ 65
Heavy weight vehicle = ₹ 26 × 5 = ₹ 130

(ii) Calculation of toll rate for each type of vehicle:
Revenue earned from Light weight vehicle in (i) above
= 90,000 vehicles × ₹ 26 = ₹ 23,40,000
New toll rate to maintain the same revenue from Light weight vehicle
= ₹ 23,40,000 ÷ 86,625 (Refer working note-2) = ₹ 27.01
Light weight vehicle = ₹ 27.01
Rate to be charged from 13,500 light weight vehicles = 27.01 × 0.75 = 20.26

Alternative presentation

(ii) Toll rate to be charged from light weight vehicles if concession applicable
Revenue share in light vehicles = 90,000 × 26 = ₹ 23,40,000
Suppose rate is x, then outward journey 45,000 x; return journey (45,000 - 30% of 45,000) + 13,500 (x - 0.25)
45,000x + 31,500x + 13500 (0.75x) = ₹ 23,40,000
Toll rate to be charged from light weight vehicles : 86,625x = ₹ 23,40,000 = ₹ 27.01
Rate to be charged from 76,500 light weight vehicles @ 27.01; revenue will be ₹ 20,66,494
Rate to be charged from 13,500 light weight vehicles = 27.01 × 0.75
= 20.26 revenue will be ₹ 2,73,506

Nov-22. Q1(b)-5 marks

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 for 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 expense 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:

(i) Compute the cost of processing a Vehicle Loan application on the assumption that 496 Vehicle Loan applications are processed each month.

(ii) Find out the number of Education Loan Applications processed, if the total processing cost per Education Loan Application is same as in the Vehicle Loan Application as computed in (i) above.

Solution:

Particulars	Vehicle loan Applications (₹)	Education loan Application (₹)	Total (₹)
Employee Cost	2,00,000 (₹ 50,000 × 4)	1,40,000 (₹ 70,000 × 2)	3,40,000
Apportionment of Branch manager's salary	27,000	27,000	54,000
Legal charges, Printing & stationery and Advertising expenses	18,000	18,000	36,000
Other expenses	3,000	3,000	6,000
Total cost	2,48,000	1,88,000	4,36,000

(i) Computation of cost of processing a vehicle loan application:

Total Cost ÷ No. of applications

₹ 2,48,000 ÷ 496 = ₹ 500

(ii) Computation of no. of Education loan Processed

Total Cost = No. of applications × Processing cost per application

₹ 1,88,000 = No. of applications × ₹ 500

No. of education loan applications = ₹1,88,000 ÷ ₹500 = 376 applications

July-21. Q4(b)-5 marks

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
Claim 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
I.T. Cost	?

Number of Policy sold: 2,800
Total insured value of policies - ₹ 3,500 Crores Cost per rupee of insured value - ₹ 0.002

You are required to:
(i) Calculate Total Cost for "COVID-19" Insurance policy segregating the costs into four main activities namely (a) Marketing and Sales support (b) Operations (c) I.T. Cost and (d) Support functions.
(ii) Calculate Cost Per Policy.

Solution:

1. Calculation of total cost for 'COVID-19' Insurance policy

	Particulars	Amount (₹)	Amount (₹)
a.	**Marketing and Sales support:**		
	- Policy development cost	35,00,000	
	- Cost of marketing	1,38,90,000	
	- Sales support expenses	32,00,000	**2,05,90,000**
b.	**Operations:**		
	- Policy issuance cost	29,50,000	
	- Policy servicing cost	96,45,000	
	- Claim management cost	3,80,000	**1,29,75,000**
c.	**IT Cost***		**2,21,00,000**
d.	**Support functions**		
			1,43,35,000
	- **Postage and logistics**	32,40,000	
	- **Facilities cost**	46,75,000	
	- **Employees cost**	16,20,000	
	- **Office administration cost**	48,00,000	
	Total Cost		**7,00,00,000**

*IT cost
= (₹ 3,500 crores x 0.002) – ₹ 4,79,00,000 = ₹ 2,21,00,000

(ii) Calculation of cost per policy = $\frac{\text{Total cost}}{\text{No. of Policies}} = \frac{₹7,00,00,000}{2.800} = ₹25,000$

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS

Question-1 (Costing of Airlines)

In order to develop tourism, ABCL airline has been given permit to operate three flights in a week between X and Y cities (both side). The airline operates a single aircraft of 160 seats capacity. The normal occupancy is estimated at 60% through out the year of 52 weeks. The one-way fare is ₹ 7,200. The cost of operation of flights are:

Fuel cost (variable)	₹ 96,000 per flight Food served
on board on non-chargeable basis	₹ 125 per passenger
Commission	5% of fare applicable for all booking Fixed
cost:	
Aircraft lease	₹ 3,50,000 per flight
Landing Charges	₹ 72,000 per flight

Required:

1. Calculate the net operating income per flight.
2. The airline expects that its occupancy will increase to 108 passengers per flight if the fare is reduced to ₹ 6,720. Advise whether this proposal should be implemented or not

Solution:

(i) No. of passengers 160 seats x 60% = 96

	(₹)	(₹)
Fare collection (96 passengers x ₹7,200)		6,91,200
Variable costs:		
Fuel	96,000	
Food (96 passengers x ₹125)	12,000	
Commission (5% of ₹6,91,200)	34,560	1,42,560
Contribution per flight		5,48,640
Fixed costs:		
Aircraft Lease	3,50,000	
Landing charges	72,000	4,22,000
Net income per flight		1,26,640

(ii)

Fare collection (108 passengers x ₹ 6,720)		7,25,760
Variable costs:		
Fuel	96,000	
Food (108 passengers x ₹125)	13,500	
Commission (5% of ₹ 7,25,760)	36,288	1,45,788
Contribution		5,79,972

There is an increase in contribution by ₹ 31,332. Hence the proposal is acceptable.

Chapter. 12: Standard Costing

Part-I: Material cost variances

A. QUESTION FROM STUDY MATERIAL

Question-1

The standard and actual figures of product 'Z' are as under:

	Standard	Actual
Material quantity	50 units	45 units
Material price per unit	₹ 1.00	₹ 0.80

CALCULATE material cost variances.

Hints: MPV = ₹9(F), MUV = ₹5(F), MCV = ₹14(F)

Question-2

NXE Manufacturing Concern furnishes the following information:

Standard:	Material for 70 kg finished products	100 kg.
	Price of material	₹ 1 per kg.
Actual:	Output	2,10,000 kg.
	Material used	2,80,000 kg.
	Cost of Materials	₹ 2,52,000

CALCULATE: (a) Material usage variance, (b) Material price variance, (c) Material cost variance.

Hints: (a) MUV = ₹20,000(F), (b) ₹28,000(F), (c) ₹48,000(F)

Question-3 (Nov 22 Q5(a))

The standard cost of a chemical mixture is as follows:
40% material A at ₹ 20 per kg.

60% material B at ₹ 30 per kg.

A standard loss of 10% of input is expected in production. The cost records for a period showed the following usage:
90 kg material A at a cost of ₹ 18 per kg. 110

kg material B at a cost of ₹ 34 per kg.

The quantity produced was 182 kg. of good product. CALCULATE all material variances.

Hints:

Material	MPV	MUV
A	180 (F)	182.22 (A)
B	440 (A)	340.00 (F)

Question-4

ABC Ltd. produces an article by lending two basic raw materials. It operates a standard costing system and the following standards have been set for raw materials:

Material	Standard mix	Standard price (₹ per kg)
A	40%	4
B	60%	3

The standard loss in processing is 15%. During April 2021, the company produced 1,700 kgs. of finished output.

The position of stock and purchases for the month of April 2021 are as under:

Material	Stock on 01.04.2021	Stock on 30.04.2021	Purchased during April 2021	
	(Kg.)	(Kg.)	(Kg.)	(₹)
A	35	5	800	3,400
B	40	50	1,200	3,000

Opening stock of material is valued at standard price. CALCULATE the following variances:

(i) Material price variance
(ii) Material usage variance
(iii) Material yield variance
(iv) Material mix variance
(v) Total Material cost variance

Hints:

(i) ₹ 376.25(F)
(ii) ₹ 90(A)
(iii) ₹ 68(A)
(iv) ₹ 22(A)
(v) 286.25 (F)

TEST YOUR KNOWLEDGE

Question-1

For making 10 kg. of CEMCO, the standard material requirements is:

Material	Quantity	Rate per kg. (₹)
A	8 kg	6.00
B	4 kg	4.00

During April, 1,000 kg of CEMCO were produced. The actual consumption of materials is as under:

Material	Quantity (Kg.)	Rate per kg. (₹)
A	750	7.00
B	500	5.00

Calculate (A) Material Cost Variance; (b) Material Price Variance; (c) Material usage Variance.

Hints:

Material	MPV	MUV
A	750(A)	300(F)
B	500(A)	400(A)

Question-2

The standard mix to produce one unit of a product is as follows:

Material X	60 units @ ₹ 15 per unit	=	900
Material Y	80 units @ ₹ 20 per unit	=	1,600
Material Z	100 units @ ₹ 25 per unit	=	2,500
	240 units		5,000

During the month of April, 10 units were actually produced and consumption was as follows:

Material X 640 units @ ₹ 17.50 per unit = 11,200

Material Y 950 units @ ₹ 18.00 per unit = 17,100

Material Z 870 units @ ₹ 27.50 per unit = 23,925

2,460 units 52,225

Calculate all material variances.

Hints:

Material	MPV	MUV	Mix	Yield Variance
X	1600(A)	600(A)	375(A)	225(A)
Y	1900(F)	3000(A)	2600(A)	400(A)

Z	2175(A)	3250(F)	3875(F)	625(A)

Question-3

J.K. Ltd. manufactures NXE by mixing three raw materials. For every batch of 100 kg. of NXE, 125 kg. of raw materials are used. In April, 20X2, 60 batches were prepared to produce an output of 5,600 kg. of NXE. The standard and actual particulars for April, 20X2, are as follows :

Raw Materials	Standard		Actual		Quantity of Raw Materials Purchased
	Mix	Price per kg.	Mix	Price per Kg.	
	(%)	(₹)	(%)	(₹)	(Kg.)
A	50	20	60	21	5,000
B	30	10	20	8	2,000
C	20	5	20	6	1,200

CALCULATE all variances.

Hints:

MPV = ₹3000(A), MUV = ₹14,500(A), Mix = ₹14,500(A), Yield Variance = ₹17,500(F)

Question-4

GAP Limited operates a system of standard costing in respect of one of its products which is manufactured within a single cost centre. Following are the details.

Budgeted data:

Material	**Qty**	**Price (₹)**	**Amount (₹)**
A	60	20	1200
B	40	30	1200
Inputs	100		2400
Normal loss	20		
Output	80		2400

Actual data:

Actual output 80 units.

Material	**Qty**	**Price (₹)**	**Amount (₹)**

A	70	?	?
B	?	30	?

Material Price Variance (A) ₹ 105A
Material cost variance ₹ 275A
You are required to CALCULATE:
(i) Actual Price of material A
(ii) Actual Quantity of material B
(iii) Material Price Variance
(iv) Material Usage Variance
(v) Material Mix Variance
(vi) Material Sub Usage Variance

Hints:
(i) Actual Price of Material A : ₹21.5
(ii) Actual Quantity of Material B : 39 Units
(iii) Material Price Variance : ₹105 (A)
(iv) Material Usage Variance : ₹170 (A)
(v) Material Mix Variance : ₹46 (F)
(vi) Material Yield Variance : ₹216 (A)

Question-5

One kilogram of product K requires two chemicals A and B. The following were the details of product K for the month of June 2021:
(a) Standard mix for chemical A is 50% and chemical B is 50%.
(b) Standard price kilogram of chemical A is ₹ 12 and chemical B is ₹ 15.
(c) Actual input of chemical B is 70 kilograms.
(d) Actual price per kilogram of chemical A is ₹ 15
(e) Standard normal loss is 10% of total input
(f) Total Material cost variance is ₹ 650 adverse.
(g) Total Material yield variance is ₹ 135 adverse.
You are required to CALCULATE:
(i) Total Material mix variance
(ii) Total Material usage variance
(iii) Total Material price variance
(iv) Actual loss of actual input
(v) Actual input of chemical A

(vi) Actual price per kg. of chemical B

Hints:

(i) ₹ 45 (A)
(ii) ₹ 180 (A)
(iii) ₹ 470 (A)
(iv) 20 kg.
(v) 40 kg.
(vi) ₹ 20

Question-6

Following data is extracted from the books of XYZ Ltd. for the month of January:

(i) Estimation-

Particulars	Quantity (kg.)	Price (₹)	Amount (₹)
Material-A	800	?	--
Material-B	600	30.00	18,000
			--

Normal loss was expected to be 10% of total input materials.

(ii) Actuals-

1480 kg of output produced.

Particulars	Quantity (kg.)	Price (₹)	Amount (₹)
Material-A	900	?	--
Material-B	?	32.50	--
			59,825

(iii) Other Information-

Material Cost Variance = ₹ 3,625 (F) Material Price Variance = ₹ 175 (F)

You are required to CALCULATE:

(i) Standard Price of Material-A;
(ii) Actual Quantity of Material-B;
(iii) Actual Price of Material-A;
(iv) Revised standard quantity of Material-A and Material-B; and
(v) Material Mix Variance.

Hints:

(i) ₹45
(ii) 650 kg.
(iii) ₹43

(iv) 886 kg; 664 kg.
(v) ₹210 (A)

B. PAST YEAR EXAM QUESTIONS

Nov-19. Q5(b) (10 marks)

The standard cost of a chemical mixture is as follow:

60% of Material A @ ₹50 per kg

40% Material B @ ₹60 per kg

A standard loss of 25% on output is expected in production. The cost records for a period has shown the following usage.

540 kg of Material A @ ₹60 per kg

260 kg of Material B @ ₹50 per kg

The quantity processed was 680 kg of good product.

From the above given information

Calculate:

(a) Material cost variance

(b) Material price variance

(c) Material usage variance

(d) Material mix variance

(e) Material yield varince

Solution:

May-18. Q5(a)(ii) (5 marks)

Beta Ltd. is manufacturing Product N. This is manufactured by mixing two materials namely Material P and Material Q. The Standard Cost of Mixture is as under:

Material P 150 ltrs. @ ₹ 40 per ltr. Material Q 100 ltrs. @ ₹ 60 per ltr.

Standard loss @ 20 of total input is expected during production. The cost records for the period exhibit following consumption: Material
P 140 ltrs. @ ₹ 42 per ltr,
Material Q 110 ltrs. @ ₹ 56 per ltr, Quantity
produced was 195 ltrs.
Calculate:
(i) Material Cost Variance
(ii) Material Usage Variance.
(iii) Material Price Variance

Solution:

Workings:

Take the good output of 195 ltr. The standard quantity of material required for 195 ltr. of output is

$\frac{195}{80} \times 100 = 243.75$ ltr.

Statement showing computation of Standard Cost/Actual Cost/ Revised Actual Quantity

Material	Standard Cost			Actual Cost		
	Quantity [SQ] (Kg.)	Rate [SP] (₹)	Amount [SQ × SP] (₹)	Quantity [AQ] (Kg.)	Rate [AP] (₹)	Amount [AQ × AP] (₹)
A (60% of 243.75 ltr.)	146.25	40	5,850.00	140	42	5,880
B (40% of. 243.75 Kg.)	97.50	60	5,850.00	110	56	6,160
	243.75		**11,700.00**	**200**		**12,040**

Notes:

SQ = Standard Quantity = Expected Consumption for Actual Output
A = Actual Quantity of Material Consumed
Q = Standard Price Per Unit

Computation of Variances:

Material Cost Variance = SQ × SP – AQ × AP

A = ₹ 146.25 ltr. × ₹ 40– 140 ltr. × ₹ 42 = ₹ 30.00 (A) B=

₹ 97.50 ltr. × ₹ 60 – 110 ltr. × ₹ 56 = ₹ 310.00 (A)
Total = ₹ 30.00 (A) + ₹ 310.00 (A)
= ₹ 340.00 (A)

Material Usage Variance = SP × (SQ – AQ)

A = ₹ 40 × (146.25 ltr. –140 ltr.) = ₹ 250.00 (F) B=
₹ 60 × (97.50 ltr. – 110 ltr.) = ₹ 750.00 (A)
Total = ₹ 250.00 (F) + ₹ 750.00 (A)
= ₹ 500.00 (A)

Material Price Variance = AQ × (SP – AP)

A = 140 Kg. × (₹ 40 – ₹ 42) = ₹ 280 (A) B
= 110 Kg. × (₹ 60 – ₹ 56) = ₹ 440 (F)
Total = ₹ 280 (A) + ₹ 440 (F) = ₹ 160 (F)

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

Following are the details of the product Phomex for the month of April 2013: Standard

quantity of material required per unit	5 kg
Actual output	1000 units
Actual cost of materials used	₹ 7,14,000
Material price variance	₹ 51,000 (Fav)

Actual price per kg of material is found to be less than standard price per kg of material by ₹ 10.

You are required to calculate:

(i) Actual quantity and Actual price of materials used.
(ii) Material Usage Variance
(iii) Material Cost Variance.

Solution:

(i) Actual Quantity and Actual Price of material used

Material Price Variance = Actual Quantity (Std. Price – Actual Price) = ₹51,000

Or, AQ (SP – AP)	=	₹ 51,000
Or, 10 AQ	=	₹ 51,000
Or, AQ	=	5,100 kgs

Actual cost of material used is given i.e.

AQ x AP	=	₹ 7,14,000
Or, 5,100 AP	=	₹ 7,14,000
AP	=	₹ 140
∵ Actual price is less by ₹ 10		
So, Standard Price	=	₹ 140 + ₹ 10 = ₹ 150 per kg
Actual Quantity	=	5,100 kgs
Actual Price	=	₹ 140/kg

(ii) Material Usage Variance

Std. Price (Std. Quantity – Actual Quantity)

Or, SP (SQ – AQ) = ₹ 150 (1,000 units x 5 kg – 5,100 kg)

= ₹ 15,000 (A)

(iii) Material Cost Variance = Std. Cost – Actual Cost

= (SP x SQ) – (AP x AQ)

= ₹ 150 x 5,000 – ₹ 140 x 5,100

= ₹ 7,50,000 – ₹ 7,14,000

= ₹ 36,000 (F)

OR

Material Price Variance + Material Usage Variance

₹ 51,000 (F) + ₹15,000 (A)= ₹ 36,000 (F)

Part-II: Labour cost variances

A. QUESTION FROM STUDY MATERIAL

Question-5

The standard and actual figures of a firm are as under

Standard time for the job 1,000 hours Standard rate per hour ₹ 50

Actual time taken 900 hours

Actual wages paid ₹ 36,000 CALCULATE the variances.

Hints: LRV = ₹9,000(F), Efficiency variance = ₹5,000(F), LCV = ₹14,000(F)

Question-6

The standard labour employment and the actual labour engaged in a week for a job are as under:

	Skilled workers	Semi-skilled workers	Unskilled workers
Standard no. of workers in the gang	32	12	6
Actual no. of workers employed	28	18	4
Standard wage rate per hour	3	2	1
Actual wage rate per hour	4	3	2

During the 40 hours working week, the gang produced 1,800 standard labour hours of work. CALCULATE :

(a) Labour Cost Variance (b) Labour Rate Variance

(c) Labour Efficiency Variance (d) Labour Mix Variance

(e) Labour Yield Variance

Hints:

	LRV	LEV	Mix Variance	LYV
Skilled	1120(A)	96(F)	480(F)	384(A)
Semi-Skilled	720(A)	576(A)	480(A)	96(A)
Unskilled	160(A)	56(F)	80(F)	24(A)

Question-7

The standard and actual figures of a firm are as under Standard time for the job 1,000

hours
Standard rate per hour ₹ 50
Actual time taken 900 hours
Actual wages paid ₹ 36,000 CALCULATE variances.

Hints:

(i) Labour Rate variance = ₹9,000 (F),
(ii) Efficiency variance = ₹5,000 (F)
(iii) Total labour cost variance = ₹14,000 (F)

Question-8

The standard output of product 'EXE' is 25 units per hour in manufacturing department of a company employing 100 workers. The standard wage rate per labour hour is ₹ 6.
In a 42 hours week, the department produced 1,040 units of 'EXE' despite 5% of the time paid being lost due to an abnormal reason. The hourly wages actually paid were ₹ 6.20, ₹ 6 and ₹ 5.70 respectively to 10, 30 and 60 of the workers.
CALCULATE relevant labour variances.

Hints:

1. Labour cost variance = ₹ 432 (F)
2. Labour rate variance = 672 (F)
3. Labour efficiency variance = 1,020 (F)
4. Labour Idle time variance = 1,260 (A)

Question-9

NPX Ltd. uses standard costing system for manufacturing of its product X. Following is the budget data given in relation to labour hours for manufacture of 1 unit of Product X :

Labour	Hours	Rate (₹)
Skilled	2	6
Semi-Skilled	3	4
Un- Skilled	5	3
Total	10	

In the month of January, total 10,000 units were produced following are the details:

Labour	Hours	Rate (₹)	Amount (₹)
Skilled	18,000	7	1,26,000
Semi-Skilled	33,000	3.5	1,15,500
Un- Skilled	58,000	4	2,32,000

Total	1,09,000		4,73,500

Actual Idle hours (abnormal) during the month:

Skilled: 500
Semi- Skilled: 700
Unskilled: 800
Total 2,000

CALCULATE:

(a) Labour Variances.

(b) Also show the effect on Labour Rate Variance if 5,000 hours of Skilled Labour are paid @ ₹ 5.5 per hour and balance were paid @ ₹ 7 per hour.

Hints:

(a) Labour Variances:

a. Labour Cost Variance= (SH×SR – AH×AR)= ₹ 83,500 (A)
b. Labour Rate Variance = (SR – AR)×AH_{Paid} = ₹ 59,500 (A)
c. Labour Efficiency Variance = (SH – AH) × SR = ₹ 15,800 (A)
d. Labour Idle Time Variance = (Idle Hours × SR) = ₹ 8,200 (A)
e. Labour Mix Variance = (RSH – AH_{Worked})×SR = ₹ 11,500 (F)
f. Labour Yield Variance = (SH – RSH) × SR = ₹ 27,300 (A)

(b) ₹ 52,000 (A)

B. PAST YEAR EXAM QUESTIONS

May-19. Q3 (a) (10 marks)

A gang of workers normally consists of 30 skilled workers, 15 semi-skilled workers and 10 unskilled workers. They are paid at standard rate per hour as under:

Skilled ₹ 70
Semi-skilled ₹ 65
Unskilled ₹ 50

In a normal working week of 40 hours, the gang is expected to produce 2,000 units of output. During the week ended 31st March, 2019, the gang consisted of 40 skilled, 10 semi-skilled and 5 unskilled workers. The actual wages paid were at the rate of ₹ 75, ₹ 60 and ₹ 52 per hour respectively. Four hours were lost due to machine breakdown and 1,600 units were produced.

Calculate the following variances showing clearly adverse (A) or favourable (F)

(i) Labour Cost Variance (ii) Labour Rate Variance
(iii) Labour Efficiency Variance (iv) Labour Mix Variance
(v) Labour Idle Time Variance

Solution:

(i) **Labour Cost Variance** = Standard Cost – Actual Cost
= ₹1,14,400 – ₹1,54,400
= 40,000 (A)
(1,600*75+400*60+200*52= ₹1,54,400)

Or

Types of workers	**Standard Cost – Actual Cost**	**Amount (₹)**
Skilled Workers	(30x40x70/2,000x1,600)-(40x40x75) 67,200-1,20,000	52,800 (A)
Semi- Skilled	(15x40x65/2,000x1,600)-(10x40x60) 31,200-24,000	7,200 (F)
Un-Skilled Workers	(10x40x50/2,000x1,600)-(5x40x52) 16,000-10,400	5,600 (F)
Total	1,14,400-1,54,400	**40,000 (A)**

(ii) Labour Rate Variance

Types of workers	**Actual Hours × (Standard Rate - Actual Rate)**	**Amount (₹)**
Skilled Workers	1,600 hours × (₹70.00 – ₹75.00)	8,000 (A)
Semi- Skilled	400 hours × (₹65.00 – ₹60.00)	2,000 (F)
Un-Skilled Workers	200 hours × (₹50.00 – ₹52.00)	400 (A)
Total	₹8,000 (A) + ₹2,000 (F) + ₹400 (A)	**6,400 (A)**

(iii) Labour Efficiency Variance

Types of workers	Standard Rate × (Standard Hours – Actual Hours)	**Amount (₹)**
Skilled Workers	₹70.00 × (960 hours – 1,440 hours)	33,600 (A)
Semi- Skilled	₹65.00 × (480 hours – 360 hours)	7,800 (F)

Un-Skilled Workers	₹50.00 × (320 hours – 180 hours)	7,000 (F)
Total	33,600 (A) + 7,800 (F) + 7,000 (F)	**18,800 (A)**

Alternatively labour efficiency can be calculated on basis of labour hours paid

Types of workers	**Standard Rate × (Standard Hours – Actual Hours)**	**Amount (₹)**
Skilled Workers	70.00 × (960 hours – 1600 hours)	44,800 (A)
Semi- Skilled	65.00 × (480 hours – 400 hours)	5,200 (F)
Un-Skilled Workers	50.00 × (320 hours – 200 hours)	6,000 (F)
Total	33,600 (A) + 7,800 (F) + 7,000 (F)	**33,600 (A)**

(iv) Labour Mix Variance

= Total Actual Time Worked (hours) × {Average Standard Rate per hour of Standard Gang Less Average Standard Rate per hour of Actual Gang} @on the basis of hours worked

$$= 1{,}980 \text{ hours} \times \left[\frac{₹1{,}14{,}400}{1{,}760 \text{ hrs.}} - \frac{1{,}440\text{hrs.} \times ₹70 + 360\text{hrs.} \times ₹65 + 180\text{hrs.} \times ₹50}{1{,}980 \text{ hrs.}}\right]$$

= ₹ 4,500 (A)

Or

Labour Mix Variance

Types of workers	Std. Rate x (Revised Actual Hours *Worked*- *Actual Hours Worked*)	**Amount (₹)**
Skilled Workers	₹70 × (1,080 hrs. – 1440 hrs.)	25,200 (A)
Semi- Skilled	₹65 × (540 hrs. – 360 hrs.)	11,700 (F)
Un Skilled Workers	₹50 × (360 hrs. – 180 hrs.)	9,000 (F)
Total	₹25,200 (A) + ₹11,700 (F) + ₹9,000 (F)	**4,500 (A)**

(v) Labour Idle Time Variance

Types of workers	Standard Rate × (Hours Paid – Hours Worked)	**Amount (₹)**
Skilled Workers	₹70.00 × (1,600 hours – 1,440 hours)	11,200 (A)
Semi- Skilled	₹65.00 × (400 hours – 360 hours)	2,600 (A)

Un-Skilled Workers	₹50.00 × (200 hours – 180 hours)	1,000 (A)
Total	11,200 (A) + 2,600 (A) + 1,000 (A)	**14,800 (A)**

Verification:

Labour Cost Variance

= Labour Rate Variance + Labour Efficiency Variance + Labour Idle Time Variance

= 6,400 (A) + 18,800 (A) + 14,800 (A) = ₹ 40,000 (A)

Labour Cost Variance

= Labour Rate Variance + Labour Efficiency Variance

= 6400(A) + 33600(A)= ₹40000(A)

In this case, labour idle time variance is a part of labour efficiency variance.

Working Notes:

Category	Standard Cost			Actual (1600 units)			Revised Actual Hours
	Hrs.	Rate	Amt. (₹)	Hrs.	Rate	Amt. (₹)	
Skilled	960 (30Wx40x1,600/ 2,000)	70.00	67,200	1,440 (40Wx36)	75.00	1,08,000	1,080 (1,980x6/11)
Semi-Skilled	480 (15Wx40 x1,600/2,000)	65.00	31,200	360 (10Wx36)	60.00	21,600	540 (1,980x3/11)
Unskilled	320 (10Wx40 x1,600/2,000)	50.00	16,000	180 (5Wx36)	52.00	9,360	360 (1,980x2/11)
Total	1,760	65	1,14,400	1,980		1,38,960	1,980

July-2021 Q5 (a) (10 marks)

The standard output of a Product 'DJ' is 25 units per hour in manufacturing department of a Company employing 100 workers. In a 40 hours week, the department produced 960 units of product 'DJ' despite 5% of the time paid was lost due to an abnormal reason. The hourly wage rates actually paid were ₹ 6.20, ₹ 6.00 and ₹ 5.70 respectively to Group 'A' consisting 10 workers, Group 'B' consisting 30 workers and Group 'C' consisting 60 workers. The standard wage rate per labour is same for all the workers. Labour Efficiency Variance is given ₹ 240 (F).

You are required to compute:

(i) Total Labour Cost Variance.
(ii) Total Labour Rate Variance.
(iii) Total Labour Gang Variance.
(iv) Total Labour Yield Variance, and

(v) Total Labour Idle Time Variance.

Solution:

Working Notes:

1. Calculation of Standard Man hours

When 100 workers work for 1 hour, the standard output is 25 units.

Standard man hours per unit = $\frac{100 \text{ hours}}{25 \text{ units}}$ = 4 hours per unit

2. Calculation of standard man hours for actual output:

= 960 units x 4 hours = 3,840 hours.

3. Calculation of actual cost

Type of Workers	No of Workers		Actual Hours Paid	Rate (₹)	Amount (₹)	Idle Hours (5% of hours paid)	Actual hours Worked
Group 'A'	10		400	6.2	2,480	20	380
Group 'B'	30		1,200	6	7,200	60	1,140
Group 'C'	60		2,400	5.7	13,680	120	2,280
	100		**4,000**		**23,360**	**200**	**3,800**

4. Calculation of Standard wage Rate:

Labour Efficiency Variance = 240F

(Standard hours for Actual production – Actual Hours) x SR = 240F

(3,840 – 3,800) x SR = 240

Standard Rate (SR) = ₹ 6 per hour

(i) Total Labour Cost Variance

= (Standard hours x Standard Rate) – (Actual Hours x Actual rate)

= (3,840 x 6) – 23,360 = 320A

(ii) Total Labour Rate Variance

= (Standard Rate – Actual Rate) x Actual Hours

Group 'A' = (6- 6.2) 400 = 80A

Group 'B' = (6- 6) 1,200 = 0

Group 'C' = (6 – 5.7) 2,400 = 720F
640F

(iii) Total Labour Gang Variance
= Total Actual Time Worked (hours) × {Average Standard Rate per hour of Standard Gang -Average Standard Rate per hour of Actual Gang[@]}
[@] on the basis of hours worked

$= 3,800 \times (6 - \frac{3,840 \times 6}{3,800}) = 0$

(iv) Total Labour Yield Variance
= Average Standard Rate per hour of Standard Gang × {Total Standard Time (hours) - Total Actual Time worked (hours)}
= 6 x (3,840 – 3,800)
= 240F

(v) Total Labour idle time variance
= Total Idle hours x standard rate per hour
= 200 hours x 6
= 1,200A

May-2022 Q5 (b) (10 marks)

A manufacturing department of a company has employed 120 workers. The standard output of product "NPX" is 20 units per hour and the standard wage rate is ₹ 25 per labour hour.
In a 48 hours week, the department produced 1,000 units of 'NPX' despite 5% of the time paid being lost due to an abnormal reason. The hourly wages actually paid were ₹ 25.70 per hour.
Calculate:
(i) Labour Cost Variance
(ii) Labour Rate Variance
(iii) Labour Efficiency Variance
(iv) Labour Idle time Variance

Solution:

Working Notes:

1. **Calculation of standard man hours**
When 120 worker works for 1 hr., then the std. output is 20 units.
Std. man hour per unit = $\frac{120 \text{ hours}}{20 \text{ units}}$ = 6 hrs

2. Calculation of std. man hours for actual output

Total std. man hours = 1,000 units × 6 hrs. = 6,000 hrs.

Standard for actual			Actual				
Hours	Rate (₹)	Amount (₹)	Actual hrs. paid	Idle time hrs.	Production hrs.	Rate (₹)	Amount paid (₹)
6,000	25	1,50,000	5,760 (48 hrs. x 120 workers)	288	5,472	25.70	1,48,032

(i) Labour cost variance
= Std. labour cost – Actual labour cost
= 1,50,000 – 1,48,032 = ₹ 1,968 F

(ii) Labour rate variance
= (SR – AR) × AHPaid
= (25 - 25.70) × 5,760 = ₹ 4,032 A

(iii) Labour efficiency variance
= (SH – AH) × SR
= (6,000 – 5,472) × 25 = ₹ 13,200 F

(iv) Labour Idle time variance
= Idle Hours × SR
= 288 × 25 = ₹ 7,200 A

Note: Variances can also be calculated for one worker instead of 120.

D. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

The standard labour employment and the actual labour engaged in a 40 hours week for a job are as under:

Category of Workers	Standard		Actual	
	No. of workers	Wage Rate per hour (₹)	No. of workers	Wage Rate per hour (₹)
Skilled	65	45	50	50
Semi-skilled	20	30	30	35

Unskilled	15	15	20	10

Standard output: 2,000 units; Actual output: 1,800 units Abnormal Idle time 2 hours in the week

Calculate:

(i) Labour Cost Variance

(ii) Labour Efficiency Variance

(iii) Labour Idle Time Variance.

Solution:

Working Note:

Table Showing Standard & Actual Cost

Worker	Standard Hours (a)	Standard Rate per Hour (b)	Standard Cost for Actual Output (c) = (a x b)	Actual Hours Paid (d)	Actual Rate per hour (e)	Actual Cost (f) = (d) x (e)	Idle time (g)	Actual hours worked (h)=(d)-(g)
Skilled	2,340 hrs. [(65 Workers x 40 hrs.)/ 2,000 units)] x1,800 units	₹ 45	₹1,05,300	2,000 hrs. (50 Workers x 40 hrs.)	₹ 50	₹1,00,000	100 hrs. (50 Workers x 2 hrs.)	1,900 hrs. (2,000 hrs.-100 hrs.)
Semi-skilled	720 hrs. [(20 Workers x	₹30	₹21,600	1,200 hrs. (30 Workers	₹35	₹42,000	60 hrs. (30	1,140 hrs. (1,200 hrs.-60
	40 hrs.)/ 2,000 units)] x1,800 units			x 40 hrs.)			Workers x 2 hrs.)	hrs.)
Unskilled	540 hrs.	₹15	₹8,100	800 hrs.	₹10	₹8,000	40 hrs.	760 hrs.
	[(15 Workers x 40 hrs.)/ 2,000 units)] x1,800 units			(20 Workers x 40 hrs.)			(20 Workers x 2 hrs.)	(800 hrs.-40 hrs.)
Total	3,600 hrs.		₹1,35,000	4,000 hrs.		₹1,50,000	200 hrs.	3,800 hrs.

Calculation of Variances

(i) Labour Cost Variance = Standard Cost for actual output – Actual cost

Skilled worker = ₹1,05,300 - ₹1,00,000
= ₹ 5,300 (F)
Semi-skilled worker = ₹ 21,600 - ₹ 42,000
= ₹ 20,400 (A)
Unskilled Worker = ₹ 8,100 - ₹ 8,000
= ₹100 (F)
Total = ₹5,300 (F) + ₹20,400 (A) + ₹100 (F)
= ₹15,000 (A)

(ii) Labour Efficiency Variance = Std. Rate x (Standard hours – Actual hours worked) Skilled worker = ₹ 45 x (2,340 hrs. - 1,900 hrs.)
= ₹19,800 (F)
Semi-skilled worker = ₹ 30 x (720 hrs. - 1,140 hrs.)
= ₹ 12,600 (A)
Unskilled Worker = ₹ 15 x (540 hrs. - 760 hrs.)
= ₹ 3,300 (A)
Total = ₹19,800 (F) + ₹12,600 (A) + ₹3,300 (A)
= ₹3,900 (F)

(iii) Labour Idle Time Variance = Std. Rate x Idle Time (Hrs.) Skilled worker = ₹ 45 x 100 hrs.
= ₹ 4,500 (A)
Semi-skilled worker = ₹ 30 x 60 hrs.
= ₹ 1,800 (A)
Unskilled worker = ₹ 15 x 40 hrs.= ₹ 600 (A)
Total = ₹ 4,500 (A) + ₹ 1,800 (A) + ₹ 600 (A)
= ₹ 6,900 (A)

Question-2

The following information has been provided by a company:

Number of units produced and sold	6,000
Standard labour rate per hour	₹ 8

Standard hours required for 6,000 units	-
Actual hours required	17,094 hours
Labour efficiency	105.3%
Labour rate variance	₹ 68,376 (A)

You are required to calculate:

(i) Actual labour rate per hour

(ii) Standard hours required for 6,000 units

(iii) Labour Efficiency variance

(iv) Standard labour cost per unit

(v) Actual labour cost per unit.

Solution:

SR – Standard labour Rate per Hour
AR – Actual labour rate per hour

SH – Standard Hours
AH – Actual hours

(i) Labour rate Variance = AH(SR – AR)

= 17,094 (8 – AR) = 68,376 (A) = - 68,476

= 8 – AR = -4

= AR = ₹ 12

(ii) Labour Efficiency = $\frac{SH}{AH} \times 100 = 105.3$

= SH = $\frac{AH \times 105.3}{100} = \frac{17,094 \times 105.3}{100}$

= 17,999.982

= SH = 18,000 hours

(iii) Labour Efficiency Variance = SR (SH – AH)

= 8(18,000 – 17,094)

= 8 × 906

= ₹ 7,248 (F)

(iv) Standard Labour Cost per Unit = $\frac{18,000}{6,000}$ x 8 = ₹24

(v) Actual Labour Cost Per Unit = $\frac{17,094}{6,000}$ x 12 = ₹ 34.19

Part-III: Variable overhead variances

A. QUESTION FROM STUDY MATERIAL

Question-10

From the following information of G Ltd., CALCULATE (i) Variable Overhead Cost Variance; (ii) Variable Overhead Expenditure Variance and (iii) Variable Overhead Efficiency Variance:

Budgeted production	6,000 units
Budgeted variable overhead	₹ 1,20,000
Standard time for one unit of output	2 hours
Actual production	5,900 units
Actual overhead incurred	₹ 1,22,000
Actual hours worked	11,600 hours

Hints: (i) ₹4000 (A), (ii) ₹6000(A), (iii) ₹20000 (F)

TEST YOUR KNOWLEDGE

Question-7

The following data for Pijee Ltd. is given:

	Budget	Actual
Production (in units)	400	360
Man hours to produce above	8,000	7,000
Variable overheads (in ₹)	10,000	9,150

The standard time to produce one unit of the product is 20 hours.
CALCULATE relevant Variable overhead variances.

Hints:

(i) Variable overhead cost variance : ₹150 (A)
(ii) Variable overhead expenditure variance : ₹400 (A)
(iii) Variable overhead efficiency variance : ₹250 (F)

Part-IV: Fixed cost variances

A. QUESTION FROM STUDY MATERIAL

Question-11

The cost detail of J&G Ltd. for the month of September, 20X8 is as follows:

	Budgeted	Actual
Fixed overhead	₹15,00,000	₹15,60,000
Units of production	7,500	7,800
Standard time for one unit	2 hours	-
Actual hours worked	-	16,000 hours

Required:
CALCULATE (i) Fixed Overhead Cost Variance (ii) Fixed Overhead Expenditure Variance (iii) Fixed Overhead Volume Variance (iv) Fixed Overhead Efficiency Variance and (v) Fixed Overhead Capacity Variance.
Hints: (i) 0, (ii) ₹60,000(A), (iii) ₹60,000(F), (iv) ₹40,000(A), (v) ₹1,00,000(F)

Question-12

The overhead expense budget for a factory producing to a capacity of 200 units per month is as follows:

Description of overhead	Fixed cost per unit in ₹	Variable cost per unit in ₹	Total cost per unit in ₹
Power and fuel	1,000	500	1,500
Repair and maintenance	500	250	750
Printing and stationary	500	250	750
Other overheads	1,000	500	1,500
	₹ 3,000	₹ 1,500	4,500

The factory has actually produced only 100 units in a particular month. Details of overheads actually incurred have been provided by the accounts department and are as follows:

Description of overhead	Actual cost
Power and fuel	₹ 4,00,000
Repair and maintenance	₹ 2,00,000

Printing and stationary	₹ 1,75,000
Other overheads	₹ 3,75,000

You are required to CALCULATE the Overhead volume variance and the overhead expense variances.

Hints:

Particular	₹
Fixed overhead volume variance	3,00,000(A)
Fixed overhead expenditure variance	4,00,000 (A)
Variable overhead expenditure variance	NIL

Question-13

The following information was obtained from the records of a manufacturing unit using standard costing system.

	Standard	Actual
Production	4,000 units	3,800 units
Working days	20	21
Machine hours	8,000 hours	7,800 hours
Fixed Overhead	₹ 4,00,000	₹ 3,90,000
Variable Overhead	₹1,20,000	₹1,20,000

You are required to CALCULATE the following overhead variance:

(a) Variable overhead variances

(b) Fixed overhead variances

Hints:

(a) Variable overhead expenditure variance = 3,000(A), Efficiency Variance = 3,000 (A)

(b) Expenditure variance = ₹10,000 (F), Volume = ₹20,000(A),
Efficiency variance = ₹10,000(A), Capacity = ₹30,000(A), Calendar = ₹20,000(F)

TEST YOUR KNOWLEDGE

Question-8

XYZ Company has established the following standards for factory overheads.

Variable overhead per unit: ₹ 10/-

Fixed overheads per month ₹ 1,00,000

Capacity of the plant 20,000 units per month. The actual data for the month are as follows:

Actual overheads incurred ₹ 3,00,000

Actual output (units) 15,000 units Required:

CALCULATE overhead variances viz:

1. Production volume variance
2. Overhead expense variance

Hints: Fixed overhead volume variance = ₹25,000(A)
Fixed overhead expense variance = ₹50,000(A)
Variable overhead expense variance = NIL

Question-9

A company has a normal capacity of 120 machines, working 8 hours per day for 25 days in a month. The fixed overheads are budgeted at ₹1,44,000 per month. The standard time required to manufacture one unit of product is 4 hours.

In April, 20X2, the company worked 24 days of 840 machine hours per day and produced 5,305 units of output. The actual fixed overheads were ₹1,42,000.

CACULATE:

(i) Expense variance
(ii) Volume variance
(iii) Total fixed overheads variance.

Hints: (i) ₹2,000(F), (ii) ₹16,680(A), (iii) ₹14,680(A)

Question-10

Following information is available from the records of a factory:

	Budget	Actual
Fixed overhead for June, 20X2	₹10,000	₹12,000
Production in June, 20X2 (units)	2,000	2,100
Standard time per unit (hours)	10	–
Actual hours worked in June	–	21,000

CALCULATE:

i. Fixed overhead cost variance,
ii. Expenditure variance,
iii. Volume variance

Hints: (i) ₹1,500(A), (ii) ₹2,000(A), (iii) ₹500 (F)

Question-11

XYZ Ltd. has furnished you the following information for the month of August, 20X2:

	Budget	Actual
Output (Units)	30,000	32,500
Hours	30,000	33,000
Fixed overheads	₹45,000	₹50,000
Variable Overheads	₹60,000	₹68,000
Working days	25	26

CALCULATE overhead variances.

Hints:

Fixed overhead Variance: Expenditure = ₹5,000(A), Volume = ₹3,750(F), Efficiency = ₹750(A), Capacity = ₹2,700(F), Calendar = ₹1,800(F)

Variable Overhead variances: Expenditure = ₹2,000(A), Efficiency = ₹1,000(A)

Question-12

S.V. Ltd. has furnished the following data:

	Budget	Actual
No. of working days	25	27
Production in units	20,000	22,000
Fixed overheads	₹30,000	₹31,000

Budgeted fixed overhead rate is ₹1.00 per hour. In July, 20X2, the actual hours worked were 31,500.

CALCULATE the following variances:

(i) Volume variance.

(ii) Expenditure variance.

(iii) Total overhead variance.

Hints: (i) ₹1,000(A), (ii) ₹3,000(F), (iii) ₹2,000(F)

Question-13

The following data has been collected from the cost records of a unit for computing the various fixed overhead variances for a period:

Number of budgeted working days	25
Budgeted man-hours per day	6,000

Output (budgeted) per man-hour (in units)	1	
Fixed overhead cost as budgeted	₹ 1,50,000	
Actual number of working days	27	
Actual man-hours per day	6,300	
Actual output per man-hour (in-units)	0.9	
Actual fixed overhead incurred	₹ 1,56,000	CALCULATE

fixed overhead variances:

(a) Expenditure Variance

(b) Volume Variance,

(c) Fixed Cost Variance.

Hints: (a) ₹6,000(A), (b) ₹3,090(F), (c) ₹2,910(A)

B. PAST YEAR EXAM QUESTIONS

Dec-21. Q5 (a) (10 marks)

In a manufacturing company the standard units of production for the year were fixed at 1,20,000 units and overhead expenditures were estimated to be as follows:

Particulars	Amount (₹)
Fixed	12,00,000
Semi-variable (60% expenses are of fixed nature and 40% are ofvariable nature)	1,80,000
Variable	6,00,000

Actual production during the month of April, 2021 was 8,000 units. Each month has 20 working days. During the month there was one public holiday. The actual overheads were as follows:

Particulars	Amount (₹)
Fixed	1,10,000
Semi-variable (60% expenses are of fixed nature and 40% are of variable)	19,200
Variable	48,000

You are required to calculate the following variances for the month of April 2021:

i. Overhead Cost variance

ii. Fixed Overhead Cost variance

iii. Variable Overhead Cost variance
iv. Fixed Overhead Volume variance
v. Fixed Overhead Expenditure Variance
vi. Calendar Variance

Solution:

Workings:

Fixed Overheads = $\frac{\text{Budgeted Fixed Overheads}}{\text{Budgeted Output}} = \frac{₹12,00,000}{1,20,000 \text{ units}}$	₹ 10
Fixed Overheads element in Semi-Variable Overheads i.e. 60% of ₹1,80,000	₹ 1,08,000
Fixed Overheads = $\frac{\text{Budgeted Fixed Overheads}}{\text{Budgeted Output}} = \frac{₹1,08,000}{1,20,000 \text{units}}$	₹ 0.90
Standard Rate of Absorption of Fixed Overheads *per unit* (₹10 + ₹0.90)	₹ 10.90
Fixed Overheads Absorbed on 8,000 units @ ₹ 10.90	₹ 87,200
Budgeted Variable Overheads	₹ 6,00,000
Add: Variable element in Semi-Variable Overheads 40% of ₹ 1,80,000	₹ 72,000
Total Budgeted Variable Overheads	₹ 6,72,000
Standard Variable Cost *per unit* = $\frac{\text{Budgeted Variable Overheads}}{\text{Budgeted Output}} = \frac{₹6,72,000}{1,20,000 \text{ units}}$	₹5.60
Standard Variable Overheads for 8,000 units @ ₹5.60	₹ 44,800
Budgeted Annual Fixed Overheads (₹ 12,00,000 + 60% of ₹ 1,80,000)	₹ 13,08,000
Possible Fixed Overheads = $\frac{\text{Budgeted Fixed Overheads}}{\text{Budgeted Days}} \times \text{Actual Days} = \frac{₹1,09,000}{20 \text{ Days}} \text{ x19 Days}$	₹ 1,03,550
Actual Fixed Overheads (₹1,10,000 + 60% of ₹ 19,200)	₹ 1,21,520
Actual Variable Overheads (₹48,000 + 40% of ₹19,200)	₹ 55,680

COMPUTATION OF VARIANCES

i. Overhead Cost Variance = Absorbed Overheads – Actual Overheads
= (₹ 87,200 + ₹ 44,800) – (₹ 1,21,520 + ₹ 55,680)
= ₹ 45,200 (A)

ii. Fixed Overhead Cost Variance = Absorbed Fixed Overheads – Actual Fixed Overheads
= ₹ 87,200 – ₹ 1,21,520
= ₹ 34,320 (A)

iii. Variable Overhead Cost Variance = Standard Variable Overheads for Production– Actual Variable Overheads
= ₹ 44,800 – ₹ 55,680
= ₹ 10,880 (A)

iv. Fixed Overhead Volume Variance = Absorbed Fixed Overheads – Budgeted Fixed Overheads
= ₹ 87,200 – ₹1,09,000
= ₹ 21,800 (A)

v. Fixed Overhead Expenditure Variance = Budgeted Fixed Overheads – Actual Fixed Overheads
= ₹ 10.90 × 10,000 units – ₹ 1,21,520
= ₹ 12,520 (A)

vi. Calendar Variance = Possible Fixed Overheads – Budgeted Fixed Overheads
= ₹ 1,03,550 – ₹ 1,09,000
= ₹ 5,450 (A)

OR

Calendar Variance = (Actual days – Budgeted days) x Standard fixed overhead rate per day
Standard fixed overhead rate per day = 1308000/20*12 = ₹ 5450
Fixed Overhead Calendar Variance = (19-20) x 5450 = 5450(A)

Jan-21. Q5 (b) (10 marks)

Premier Industries has a small factory where 52 workers are employed on an average for 25 days a month and they work 8 hours per day. The normal down time is 15%. The firm has introduced standard costing for cost control. Its monthly budget for November, 2020 shows that the budgeted variable and fixed overhead are ₹ 1,06,080 and ₹ 2,21,000 respectively. The firm reports the following details of actual performance for November, 2020, after the end of the month:

Actual hours worked	8,100 hrs.
Actual production expressed in standard hours	8,800 hrs.
Actual Variable Overheads	₹ 1,02,000
Actual Fixed Overheads	₹ 2,00,000

You are required to calculate:

(i) Variable Overhead Variances:
- (a) Variable overhead expenditure variance.
- (b) Variable overhead efficiency variance.

(ii) Fixed Overhead Variances:
- (a) Fixed overhead budget variance.
- (b) Fixed overhead capacity variance.
- (c) Fixed overhead efficiency variance.

(iii) Control Ratios:
- (a) Capacity ratio.
- (b) Efficiency ratio.
- (c) Activity ratio.

Solution:

Workings:

Calculation of budgeted hours

Budgeted hours = (52 x 25 x 8) x 85% = 8,840 hours

(i) Variable overheads variance

(a) Variable overhead expenditure variance

= Std. overhead for Actual hours – Actual variable Overhead

= (₹1,06,080 x 8,100) - ₹1,02,000
8,840

= 4800A

(b) Variable overhead efficiency variance
Std. rate per hour × (Std. hours for actual production – Actual hours)

₹ 1,06,080
=_____ (8,800 hours – 8,100 hours)
8,840

= 8400 F

(ii) Fixed overhead variances

(a) Fixed overhead budget variance

= Budgeted overhead – Actual overhead

= ₹ 2,21,000 – ₹ 2,00,000

= 21,000 F

(b) Fixed overhead capacity variance

= Std rate x (Actual hours – budgeted hours)

₹ 2,21,000
=_____ x (8,100 – 8,840)
8,840

= 18,500 A

(c) Fixed overhead efficiency variance

= Std rate x (Std hours for actual production – Actual hours)

₹ 2,21,000
= _____ x (8,800 – 8,100)
8,840

= 17,500 F

(iii) Control Ratios

(a) Capacity Ratio

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

$$= \frac{8,100}{8,840} \times 100 = \mathbf{91.63\%}$$

(b) Efficiency Ratio

$$= \frac{\text{Standard hours}}{\text{Actual hours}} \times 100$$

$$= \frac{8,800}{8,100} \times 100 = \mathbf{108.64\ \%}$$

(c) Activity Ratio

$$= \frac{\text{Standard hours}}{\text{Budgted hours}} \times 100$$

$$= \frac{8,800}{8,840} \times 100 = \mathbf{99.55\%}$$

Nov-20. Q3 (a) (10 marks)

ABC Ltd. has furnished the following information regarding the overheads for the month of June 2020:

(i)	Fixed Overhead Cost Variance	₹ 2,800 (Adverse)
(ii)	Fixed Overhead Volume Variance	₹ 2,000 (Adverse)
(iii)	Budgeted Hours for June, 2020	2,400 hours
(iv)	Budgeted Overheads for June,2020	₹ 12,000
(v)	Actual rate of recovery of overheads	₹ 8 Per Hour

From the above given information

Calculate:

(i) Fixed Overhead Expenditure Variance
(ii) Actual Overheads Incurred
(iii) Actual Hours for Actual Production
(iv) Fixed Overhead Capacity Variance
(v) Standard hours for Actual Production
(vi) Fixed Overhead Efficiency Variance

Solution:

(1) Fixed Overhead Expenditure Variance

= Budgeted Fixed Overheads – Actual Fixed Overheads

= ₹ 12,000 – ₹ 12,800 (as calculated below) = ₹ 800 (A)

(2) Fixed Overhead Cost Variance= Absorbed Fixed Overheads – Actual Fixed Overheads

2,800 (A) = ₹ 10,000 – Actual Overheads Actual Overheads = ₹ 12,800

(3) Actual Hours for Actual Production = ₹ 12,800/ ₹8 = 1,600 hrs.

(4) Fixed Overhead capacity Variance

= Budgeted Fixed Overheads for Actual Hours– Budgeted Fixed Overheads

= ₹ 5 x 1600 hrs. – ₹ 12,000 = ₹ 4,000 (A)

(5) Standard Hours for Actual Production

= Absorbed Overheads/ Std. Rate

= ₹ 10,000/ ₹ 5 = 2,000 hrs.

(6) Fixed Overhead Efficiency Variance

= Absorbed Fixed Overheads – Budgeted Fixed Overheads for Actual Hours

= ₹ 10,000 – ₹ 5 x 1,600 hrs. = ₹ 2,000 (F)

Working Note:

(i) Fixed Overhead Volume Variance = Absorbed Fixed Overheads – Budgeted Fixed Overheads

2,000 (A) = Absorbed Fixed Overheads – ₹12,000 Absorbed Fixed Overheads = ₹ 10,000

(ii) Standard Rate/ Hour = ₹ 5 (₹ 12,000/2,400 hrs.)

Nov-18. Q1 (b) (5 marks)

A manufacturing concern has provided following information related to fixed overheads:

	Standard	Actual
Output in a month	5000 units	4800 units
Working days in a month	25 days	23 days
Fixed overheads	₹ 5,00,000	₹ 4,90,000

Compute:

(vii) Fixed overhead variance

(viii) Fixed overhead expenditure variance

(ix) Fixed overhead volume variance

(x) Fixed overhead efficiency variance

Solution:

Calculation of Variances:

(i) Fixed Overhead Variance: Standard fixed overhead – Actual fixed overhead

= ₹ [(5,00,000÷5000) ×4800] – ₹ 4,90,000 = ₹ 10,000 (A)

(ii) Fixed Overhead Expenditure Variances: Budgeted fixed overhead – Actual fixed overhead

= ₹ 5,00, 000 – ₹ 4,90, 000 = ₹ 10,000 (F)

(iii) Fixed Overhead Volume Variance: Standard fixed overhead – Budgeted fixed overhead

= ₹ 4,80, 000 – ₹ 5,00, 000 = ₹ 20,000 (A)

(iv) Fixed Overhead efficiency Variance: Standard fixed overhead – Budgeted fixed overhead for Actual days

= ₹ 4,80, 000 – [(₹ 5,00, 000÷25) ×23] = ₹ 20,000 (F)

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

SJ Ltd. has furnished the following information:

Standard overhead absorption rate per unit	₹ 20
Standard rate per hour	₹ 4
Budgeted production	12,000 units
Actual production	15,560 units

Actual overheads were ₹ 2,95,000 out of which ₹ 62,500 fixed . Actual hours 74,000

Overheads are based on the following flexible budget

Production (units)	8,000	10,000	14,000
Total Overheads (₹)	1,80,000	2,10,000	2,70,000

You are required to calculate the following overhead variances (on hour's basis) with appropriate workings:

1. Variable overhead efficiency and expenditure variance
2. Fixed overhead efficiency and capacity variance.

Solution:

(a) Variable Overhead rate per unit

= Difference of Overhead at two level
Difference in Production units

= ₹2,10,000 - ₹1,80,000 = ₹15
10,000units - 8,000units

(b) Fixed Overhead = ₹ 1,80,000 - (8,000 units x ₹ 15) = ₹ 60,000

(c) Standard hours per unit of production = Std. Overhead Absorption Rate
Std. Rate per hour
= ₹20 = 5hours
₹ 4

(d) Standard Variable Overhead Rate per hour = Variable Overhead per unit
Std. hour per unit

= ₹15 = ₹3
5 hours

(e) Standard Fixed Overhead Rate per hour = ₹ 4- ₹ 3 = ₹ 1

(f) Actual Variable Overhead = ₹ 2,95,000 – ₹ 62,500= ₹ 2,32,500

(g) Actual Variable Overhead Rate per Hour = ₹2,32,500 = ₹3.1419
74,000hours

(h) Budgeted hours = 12,000 units x 5 hours = 60,000 hours

(i) Standard Hours for Actual Production = 15,560 units x 5 hours = 77,800 hours

(i) Variable Overhead Efficiency and Expenditure Variance:

Variable Overhead Efficiency Variance = Std. Rate per hour (Std. Hours – Actual Hours)

= ₹ 3 (77,800 hours - 74,000 hours)

= ₹ 11,400 (F)

Variable Overhead Expenditure Variance = Actual Hours (Std. Rate - Actual Rate)

= 74,000 hours (₹ 3 - ₹ 3.1419)

= ₹ 10,500 (A)

(ii) Fixed Overhead Efficiency and Capacity Variance:

Fixed Overhead Efficiency Variance = Std. Rate per Hour (Std. Hours-Actual Hours)

= ₹ 1(77,800 hours -74,000 hours) = ₹ 3,800 (F)

Fixed Overheads Capacity Variance = Std. Rate per Hour (Actual Hours -Budgeted Hours)

= ₹ 1(74,000 hours – 60,000 hours)

= ₹ 74,000 - ₹ 60,000= ₹ 14,000 (F)

Part-V: Mix variances

A. QUESTION FROM STUDY MATERIAL

TEST YOUR KNOWLEDGE

Question-14 (Material & Labour)

The following standards have been set to manufacture a product:

Direct Material:	(₹)
2 units of A @ ₹ 4 per unit	8.00
3 units of B @ ₹3 per unit	9.00
15 units of C @ ₹1 per unit	15.00
	32.00
Direct Labour: 3 hours @ ₹8 per hour	24.00
Total standard prime cost	56.00

The company manufactured and sold 6,000 units of the product during the year. Direct material costs were as follows:

12,500 units of A at ₹4.40 per unit	18,000
units of B at ₹2.80 per unit	88,500 units of C
at ₹1.20 per unit	

The company worked 17,500 direct labour hours during the year. For 2,500 of these hours, the company paid at ₹12 per hour while for the remaining, the wages were paid at standard rate.

CALCULATE (i) Materials price variance & Usage variance and (ii) Labour rate & Efficiency variances.

Hints: MPV = ₹19,100(A), MUV = ₹500(A), LRV = ₹10,000(A), LEV = ₹4,000(F)

Question-15 (Mix Variance)

The following data has been collected from the cost records of a unit for computing the various fixed overhead variances for a period:

Number of budgeted working days	25
Budgeted man-hours per day	6,000
Output (budgeted) per man-hour (in units)	1
Fixed overhead cost as budgeted	₹ 1,50,000

Actual number of working days	27
Actual man-hours per day	6,300
Actual output per man-hour (in-units)	0.9
Actual fixed overhead incurred	₹ 1,56,000

CALCULATE fixed overhead variances:

(i) Expenditure Variance

(ii) Volume Variance,

(iii) Fixed Cost Variance.

Hints:

(i) Expenditure Variance: ₹6,000 (A)

(ii) Volume Variance: ₹3,090 (F)

(iii) Fixed Cost Variance: ₹2,910 (A)

Question-16

The following information is available from the cost records of Novell & Co. for the month of March 2021:

Materials purchased	20,000 units @ ₹ 88,000
Materials consumed	19,000 units
Actual wages paid for 4,950 hrs.	₹ 24,750
Units produced	1,800 units
Standard rates and pieces are:	
Direct material	₹ 4 per unit
Standard output	10 number for one unit
Direct labour rate	₹ 4.00 per hour
Standard requirement	2.5 hours per unit

You are required to CALCULATE relevant material and labour variance for the month.

Hints:

1. Material cost variance = ₹ 11,600 (A)
2. Material price variance = ₹ 7,600 (A)
3. Material usage variance = ₹ 4,000 (A)
4. Labour cost variance = ₹ 6,750 (A)

5. Labour rate variance = ₹ 4,950 (A)
6. Labour efficiency variance = ₹ 1,800 (A)

Question-17 16.

Paras Synthetics uses Standard costing system in manufacturing of its product 'Star 95 Mask'. The details are as follows;

Direct Material 0.50 Meter @ ₹ 60 per meter ₹ 30
Direct Labour 1 hour @ ₹ 20 per hour ₹ 20
Variable overhead 1 hour @ ₹ 10 per hour ₹ 10
Total ₹ 60

During the month of August, 10,000 units of 'Star 95 Mask' were manufactured.

Details are as follows:
Direct material consumed 5700 meters @ ₹ 58 per meter
Direct labour Hours ? @ ? ₹ 2,24,400
Variable overhead incurred ₹ 1,12,200
Variable overhead efficiency variance is ₹ 2,000 A. Variable overheads are based on Direct Labour Hours.
You are required to calculate the missing data and all the relevant Variances.

Hints:

(i) Material Variances

	Budget			Std. for actual			Actual		
	Quantity	**Price (₹)**	**Amount (₹)**	**Quantity**	**Price (₹)**	**Amount (₹)**	**Quantity**	**Price (₹)**	**Amount (₹)**
Material	0.5	60	30	5,000	60	3,00,000	5,700	58	3,30,600

Material Cost Variance = ₹ 30,600(A)
Material Price Variance = ₹ 11,400 (F)
Material Usage Variance = ₹ 42,000 (A)

(ii) Variable Overheads variances = ₹ 12,200(A)
Variable overhead Efficiency Variance = ₹ 10,200 (A)

(iii) Labour variances

	Budget			Std. for actual			Actual		
	Hours	**Rate (₹)**	**Amount (₹)**	**Hours**	**Rate (₹)**	**Amount (₹)**	**Hours**	**Rate (₹)**	**Amount (₹)**
Labour	1	20	20	10,000	20	2,00,000	10,200	22	2,24,400

Actual Rate = ₹ 2,24,400÷10,200 hours = ₹22

Labour Cost Variance = ₹ 24,400 (A)
Labour Rate Variance = ₹ 20,400 (A)
Labour Efficiency Variance = ₹ 4,000 (A)

B. PAST YEAR EXAM QUESTIONS

May-23. Q5(a) (10 marks)

NC Limited uses a standard costing system for the manufacturing of its product 'X'. The following information is available for the last week of the month:

- 25,000 kg of raw material were actually purchased for ₹ 3,12,500. The expected output is 8 units of product 'X' from each one kg of raw material. There is no opening and closing inventories. The material price variance and material cost variance, as per cost records, are ₹ 12,500 (F) and ₹ 1800 (A), respectively.
- The standard time to produce a batch of 10 units of product 'X' is 15 minutes. The standard wage rate per labour hour is 50. The company employs 125 workers in two categories, skilled and semi-skilled, in a ratio of 60:40. The hourly wages actually paid were ₹ 50 per hour for skilled workers and ₹ 40 per hour for semi- skilled workers. The weekly working hours are 40 hours per worker. Standard wage rate is the same for skilled and semi- skilled workers.
- The monthly fixed overheads are budgeted at ₹ 76,480 Overheads are evenly distributed throughout the month and assume 4 weeks in a month. In the last week of the month, the actual fixed overhead expenses were ₹ 19,500.

Required:

(i) Calculate the standard price per kg and the standard quantity of raw material.

(ii) Calculate the material usage variance, labour cost variance, and labour efficiency variance.

(iii) Calculate the fixed overhead cost variance, the fixed overhead expenditure variance and the fixed overhead volume variance.

Note: Indicate the nature of variance i.e Favourable or Adverse.

Solution:

(i) Calculation of Standard price per kg and the standard quantity of raw material:

Standard Price

(a) Material Price Variance = Standard Cost of Actual Quantity – Actual Cost

12,500 (F) = (SP × AQ) – ₹ 3,12,500

12,500 (F) = (SP × 25,000) – ₹ 3,12,500

SP = ₹ 13

Standard Quantity

(b) Material Cost Variance = Standard Cost – Actual Cost 1,800 (A) = SQ × ₹13 – ₹ 3,12,500

SQ = 23,900 kg.

(ii) Calculation of Material Usage Variance, Labour Cost Variance and Labour Efficiency Variance

(a) Material Usage Variance = Standard Cost of Standard Quantity for Actual Output – Standard Cost of Actual Quantity

= SQ × SP – AQ × SP

Or

= SP × (SQ – AQ)

= ₹ 13 × (23,900 kg. – 25,000 kg.)

= ₹ 14,300 (A)

(b) Labour Cost Variance = Standard Cost – Actual Cost

= (SH × SR) – (AH × AR)

= ₹ 2,39,000 – ₹ 2,30,000

= ₹ 9,000 (F)

(c) Labour Efficiency Variance= Standard Cost of Standard Time for Actual Production – Standard Cost of Actual Time

= (SH × SR) – (AH × SR)

Or

= (SH – AH) × SR

= ₹ 50 × [4,780 hrs. – 5,000 hrs.]

= ₹ 11,000 (A)

(iii) Calculation of Fixed Overhead Cost Variance, Fixed Overhead Expenditure Variance and Fixed Overhead Volume Variance:

(a) Fixed overhead cost variance = Standard Fixed Overheads – Actual Fixed Overheads

= 18,279 – 19,500

= ₹ 1,221(A)

(b) Fixed Overhead Expenditure = Budgeted Fixed Overheads – Actual Fixed Overheads

Variance = ₹ 19,120 – ₹ 19,500

= ₹ 380 (A)

(c) Fixed overhead volume variance = (Budgeted output – Actual Output) X Budgeted rate per unit

= (2,00,000 – 1,91,200) 0.0956

= ₹ 8,800 x 0.0956

= ₹ 841 (A)

Alternative presentation to part (iii) (a) and (b)

(i) Fixed Overhead Cost Variance:

= Overhead absorbed for actual production – Actual overhead incurred

= $\frac{₹19,120}{2,00,000}$ x 1,91,200 – 19,500 = ₹ 1,221(A)

(iii) Fixed Overhead Volume Variance:

= Absorbed overhead – Budgeted overhead

= $\frac{₹19,120}{2,00,000}$ x 1,91,200 – 19,120 = ₹ 841(A)

Working Notes:

1. Standard time to produce 10 units of product X is 15 minutes. Therefore we can manufacture 40 units in an hour.
   Hours available in a week
   125 Workers x 40 Hours = 5,000 hours
   Therefore budgeted output = 5,000 x 40 units per hour = 2,00,000 units
   Alternatively
   Budgeted time per unit = $\frac{15 \text{ units}}{10 \text{ units}}$ = 1.5 minutes
   So, Budgeted output = $\frac{5,000 \text{ Hours} \times 60 \text{ Minutes}}{1.5 \text{ Minutes}}$ = 2,00,000 units
   Actual output = 23,900 x 8 units = 1,91,200 units
   Standard hour for actual output = 1, 91, 200 × $\frac{0.25 \text{ Hrs}}{10 \text{ units}}$ = 4, 780 Hrs

2.

Labour									
Budget			**Revised standard**			**Actual**			
Hours	**Rate**	**₹**	**Hours**	**Rate**	**₹**		**Hours**	**Rate**	**₹**
5,000	50	2,50,000	4,780	50	2,39,000	Skilled	3000	50	1,50,000
						Semi-Skilled	2000	40	80,000
							5000		2,30,000

3.

	Budget	**Actual**
Units	2,00,000	1,91,200
Fixed Overheads	19,120	19,500

4. Standard Fixed overheads:
   $\frac{19,120}{2,00,000}$ ×1,91,200 = ₹18,279
   Budgeted rate per unit:
   $\frac{19,120}{2,00,000}$ = ₹ 0.0956

May-16. Q3(a) (8 marks)

X Associates undertake to prepare income tax returns for individuals for a fee. They use the weighted average method and actual costs for the financial reporting purposes. However, for internal reporting, they use a standard costs system. The standards, based on equivalent performance, have been established as follows:

Labour per return 5 hrs @ ₹ 40 per hour

Overhead per return 5 hrs @ ₹ 20 per hour

For March 2015 performance, budgeted overhead is ₹98,000 for standard labour hours allowed.

The following additional information pertains to the month of March 2015:

March 1	Return-in-process (25% complete)	200 No.
	Return started in March	825 Nos
March 31	Return-in-process (80% complete)	125 Nos
Cost Data:		
March 1	Return-in-process labour	₹ 12,000
	- Overheads	₹ 5,000
March 1 to 31	Labour : 4,000 hours	₹ 1,78,000
	Overheads	₹ 90,000

You are required to compute:

(a) For each element, equivalent units of performance and the actual cost per equivalent unit.

(b) Actual cost of return-in-process on March 31.

(c) The standard cost per return.

(d) The labour rate and labour efficiency variance as well as overhead volume and overhead expenditure variance.

Solution:

(a) Statement Showing Cost Elements Equivalent Units of Performance and the Actual Cost per Equivalent Unit

Detail of Returns	Detail of Input Units	Details	Equivalent Units				
			Output Units	Labour		Overheads	
				Units	%	Units	%
Returns in Process at Start	200	Returns Completed in March	900	900	100	900	100

Returns Started in March	825	Returns in Process at the end of March	125	100	80	100	80
	1,025		1,025	1,000		1,000	

Costs:	**(₹)**	**(₹)**
From previous month	12,000	5,000
During the month	1,78,000	90,000
Total Cost	1,90,000	95,000
Cost per Equivalent Unit	190.00	95.00

(b) Actual cost of returns in process on March 31:

	Numbers	**Stage of Completion**	**Rate per Return (₹)**	**Total (₹)**
Labour	125 returns	0.80	190.00	19,000
Overhead	125 returns	0.80	95.00	9,500
				28,500

(c) Standard Cost per Return:

Labour 5 Hrs × ₹ 40 per hour = ₹ 200
Overhead 5 Hrs × ₹ 20 per hour = ₹ 100
₹ 300

Budgeted volume for March = ₹ 98,000 / 1000 = 980 Returns
Actual labour rate = ₹ 178000 / 4000 = ₹44.50

(d) Computation of Variances:

Statement Showing Output (March only) Element Wise	**Labour**	**Overhead**
Actual performance in March in terms of equivalent units as Calculated above	1,000	1,000
Less: Returns in process at the beginning of March in terms of equivalent units i.e. 25% of returns (200)	50	50

	950	950

Variance Analysis:

Labour Rate Variance
= Actual Time × (Standard Rate – Actual Rate)
= Standard Rate × Actual Time – Actual Rate × Actual Time
= ₹ 40 × 4,000 hrs. – ₹ 1,78,000 = ₹ 18,000(A)

Labour Efficiency Variance
= Standard Rate × (Standard Time – Actual Time)
= Standard Rate × Standard Time – Standard Rate × Actual Time
= ₹ 40 × (950 units × 5 hrs.) – ₹ 40 × 4,000 hrs.
= ₹ 30,000(F)

Overhead Expenditure or Budgeted Variance
= Budgeted Overhead – Actual Overhead
= ₹ 98,000 – ₹ 90,000
= ₹ 8,000(F)

Overhead Volume Variance
= Recovered/Absorbed Overhead – Budgeted Overhead
= 950 Units × 5 hrs. × ₹20 – ₹ 98,000 = ₹ 3,000(A)

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1 (Material & Labour)

ABC Ltd. had prepared the following estimation for the month of April:

	Quantity	Rate (₹)	Amount (₹)
Material-A	800 kg.	45.00	36,000
Material-B	600 kg.	30.00	18,000
Skilled labour	1,000 hours	37.50	37,500
Unskilled labour	800 hours	22.00	17,600

Normal loss was expected to be 10% of total input materials and an idle labour time of 5% of expected labour hours was also estimated.

At the end of the month the following information has been collected from the cost accounting department:

The company has produced 1,480 kg. finished product by using the followings:

	Quantity	Rate (₹)	Amount (₹)
Material-A	900 kg.	43.00	38,700
Material-B	650 kg.	32.50	21,125
Skilled labour	1,200 hours	35.50	42,600
Unskilled labour	860 hours	23.00	19,780

You are required to calculate:

(a) Material Cost Variance;
(b) Material Price Variance;
(c) Material Mix Variance;
(d) Material Yield Variance;
(e) Labour Cost Variance;
(f) Labour Efficiency Variance and
(g) Labour Yield Variance.

Solution:

Material Variances:

Material	SQ (WN-1)	SP (₹)	SQ × SP (₹)	RSQ (WN-2)	RSQ × SP (₹)	AQ	AQ × SP (₹)	AP (₹)	AQ × AP (₹)
A	940 kg.	45.00	42,300	886 kg.	39,870	900 kg.	40,500	43.00	38,700
B	705 kg.	30.00	21,150	664 kg.	19,920	650 kg.	19,500	32.50	21,125
	1645 kg		63,450	1550 kg	59,790	1550 kg	60,000		59,825

WN-1: Standard Quantity (SQ):

Material A- $\left[\frac{800\text{kg.}}{0.9 \times 1{,}400\text{kg.}} \times 1{,}480\text{kg.}\right]$ = 939.68 or 940 kg.

Material B- $\left[\frac{600\text{kg.}}{0.9 \times 1{,}400\text{kg.}} \times 1{,}480\text{kg.}\right]$ = 704.76 or 705 kg.

WN- 2: Revised Standard Quantity (RSQ):

Material A- $\left[\frac{800\text{kg.}}{1{,}400\text{kg.}} \times 1{,}550\text{kg}\right]$ = 885.71 or 886 kg.

Material B- [600kg. / 1,400kg. x 1,550kg.] = 664.28 or 664 kg.

(a) Material Cost Variance (A + B) = {(SQ × SP) – (AQ × AP)}
= {63,450 – 59,825} = 3,625 (F)

(b) Material Price Variance (A + B) = {(AQ × SP) – (AQ × AP)
= {60,000 – 59,825} = 175 (F)

(c) Material Mix Variance (A + B) = {(RSQ × SP) – (AQ × SP)}
= {59,790 – 60,000} = 210 (A)

(d) Material Yield Variance (A + B) = {(SQ × SP) – (RSQ × SP)}
= {63,450 – 59,790} = 3,660 (F)

Labour Variances:

Labour	SH (WN-3)	SR (₹)	SH × SR (₹)	RSH (WN-4)	RSH × SR (₹)	AH	AH × SR (₹)	AR (₹)	AH × AR (₹)
Skilled	1,116 hrs	37.50	41,850	1144	42,900	1,200	45,000	35.50	42,600
Unskilled	893 hrs	22.00	19,646	916	20,152	860	18,920	23.00	19,780
	2,009 hrs		61,496	2,060	63,052	2,060	63,920		62,380

WN- 3: Standard Hours (SH):

Skilled labour- [0.95 x 1,000hr. / 0.90 x 1,400kg.] x 1,480kg. =1,115.87 or 1,116 hrs.

Unskilled labour- [0.95x 800hr. / 0.90 x 1,400kg.] x 1,480kg. = 892.69 or 893 hrs

WN- 4: Revised Standard Hours (RSH):

Skilled labour- (1,000hr. / 1,800 hr.) x 2,060hr. = 1,144.44 or 1,144 hrs.

Unskilled labour- (800hr. / 1,800 hr.) x 2,060hr. = 915.56 or 916 hrs.

(e) Labour Cost Variance (Skilled + Unskilled) = {(SH × SR) – (AH × AR)}
= {61,496 – 62,380} = 884 (A)

(f) Labour Efficiency Variance (Skilled + Unskilled) = {(SH × SR) – (AH × SR)}

= {61,496 – 63,920} = 2,424 (A)

(g) Labour Yield Variance (Skilled + Unskilled) = {(SH × SR) – (RSH × SR)}

= {61,496 – 63,052} = 1,556 (A)

Question-2 (All Variances)

SP Limited produces a product 'Tempex' which is sold in a 10 Kg. packet. The standard cost card per packet of 'Tempex' are as follows:

	(₹)
Direct materials 10 kg @ ₹ 45 per kg	450
Direct labour 8 hours @ ₹ 50 per hour	400
Variable Overhead 8 hours @ ₹ 10 per hour	80
Fixed Overhead	200
	1,130

Budgeted output for the third quarter of a year was 10,000 Kg. Actual output is 9,000 Kg. Actual cost for this quarter are as follows :

	(₹)
Direct Materials 8,900 Kg @ ₹ 46 per Kg.	4,09,400
Direct Labour 7,000 hours @ ₹ 52 per hour	3,64,000
Variable Overhead incurred	72,500
Fixed Overhead incurred	1,92,000

You are required to calculate :

(i) Material Usage Variance
(ii) Material Price Variance
(iii) Material Cost Variance
(iv) Labour Efficiency Variance
(v) Labour Rate Variance
(vi) Labour Cost Variance
(vii) Variable Overhead Cost Variance
(viii) Fixed Overhead Cost Variance.

Solution:

(i) Material Usage Variance = Std. Price (Std. Quantity – Actual Quantity)
= ₹ 45 (9,000 kg. – 8,900 kg.)
= ₹ 4,500 (Favourable)

(ii) Material Price Variance = Actual Quantity (Std. Price – Actual Price)
= 8,900 kg. (₹ 45 – ₹ 46) = ₹ 8,900 (Adverse)

(iii) Material Cost Variance = Std. Material Cost – Actual Material Cost
= (SQ × SP) – (AQ × AP)
= (9,000 kg. × ₹ 45) – (8,900 kg. × ₹ 46)
= ₹ 4,05,000 – ₹ 4,09,400
= ₹4,400 (Adverse)

(iv) Labour Efficiency Variance = Std. Rate (Std. Hours – Actual Hours)
= ₹ 50 ($\frac{9,000}{10}$ x 8hours – 7,000 hrs.)
= ₹ 50 (7,200 hrs. – 7,000 hrs.)
= ₹ 10,000 (Favourable)

(v) Labour Rate Variance = Actual Hours (Std. Rate – Actual Rate)
= 7,000 hrs. (₹ 50 – ₹52)
= ₹ 14,000 (Adverse)

(vi) Labour Cost Variance = Std. Labour Cost – Actual Labour Cost
= (SH × SR) – (AH × AR)
= (7,200 hrs. × ₹ 50) – (7,000 hrs. × ₹ 52)
= ₹ 3,60,000 – ₹ 3,64,000
= ₹4,000 (Adverse)

(vii) Variable Cost Variance = Std. Variable Cost – Actual Variable Cost
= (7,200 hrs. × ₹ 10) – ₹ 72,500
= ₹ 500 (Adverse)

(viii) Fixed Overhead Cost Variance = Absorbed Fixed Overhead – Actual Fixed Overhead
= $\frac{₹\ 200}{10\ kgs}$ x 9,000kgs. - ₹1,92,000
= ₹ 1,80,000 – ₹ 1,92,000 = ₹ 12,000 (Adverse)

Question-3 (All variances)

Gama Ltd. has furnished the following standard cost data per' unit of production: Material 10 kg @ ₹ 10 per kg.

Labour 6 hours @ ₹ 5.50 per hour Variable overhead 6 hours @ ₹10 per hour.

Fixed overhead ₹ 4,50,000 per month (Based on a normal volume of 30,000 labour hours.) The actual cost data for the month of August 2013 are as follows:

Material used 50,000 kg at a cost of ₹ 5,25,000.

Labour paid ₹ 1,55,000 for 31,000 hours worked

Variable overheads₹ 2,93,000

Fixed overheads ₹ 4,70,000

Actual production 4,800 units.

Calculate:

(i) Material Cost Variance.
(ii) Labour Cost Variance.
(iii) Fixed Overhead Cost Variance.
(iv) Variable Overhead Cost Variance.

Solution:

Budgeted Production 30,000 hours ÷ 6 hours per unit = 5,000 units

Budgeted Fixed Overhead Rate = ₹ 4,50,000 ÷ 5,000 units = ₹ 90 per unit

Or

= ₹ 4,50,000 ÷ 30,000 hours = ₹ 15 per hour.

(i) Material Cost Variance = (Std. Qty. × Std. Price) – (Actual Qty. × Actual Price)

= (4,800 units × 10 kg. × ₹10) - ₹ 5,25,000

= ₹ 4.80,000 – ₹ 5,25,000

= ₹ 45,000 (A)

(ii) Labour Cost Variance = (Std. Hours × Std. Rate) – (Actual Hours × Actual rate)

= (4,800 units × 6 hours × ₹ 5.50) – ₹1,55,000

= ₹ 1,58,400 – ₹ 1,55,000

= ₹ 3,400 (F)

(iii) Fixed Overhead Cost Variance = (Budgeted Rate × Actual Qty) – Actual Overhead

= (₹ 90 x 4,800 units) – ₹ 4,70,000

= ₹ 38,000 (A)

OR = (Budgeted Rate × Std. Hours) – Actual Overhead

= (₹ 15 x 4,800 units × 6 hours) – ₹ 4,70,000

= ₹ 38,000 (A)

(iv) Variable Overhead Cost Variance= (Std. Rate × Std. Hours) – Actual Overhead

= (4,800 units × 6 hours × ₹ 10) - ₹ 2,93,000

= ₹ 2,88,00 - ₹ 2,93,000

= ₹ 5,000 (A)

Question-4 (Material & Labour)

KPR Limited operates a system of standard costing in respect of one of its products which is manufactured within a single cost centre. The Standard Cost Card of a product is as under:

Standard		**Unit cost (₹)**
Direct material	5 kg. @ ₹ 4.20	21.00
Direct labour	3 hours @ ₹ 3.00	9.00
Factory overhead	₹ 1.20 per labour hour	3.60
	Total manufacturing cost	33.60

The production schedule for the month of June, 2013 required completion of 40,000 units. However, 40,960 units were completed during the month without opening and closing work-in- process inventories.

Purchases during the month of June, 2013, 2,25,000 kg. of material at the rate of ₹ 4.50 per kg. Production and Sales records for the month showed the following actual results.

Material used	2,05,600 kg.
Direct labour 1,21,200 hours; cost incurred	₹ 3,87,840
Total factory overhead cost incurred	₹ 1,00,000

Sales 40,000 units

Selling price to be so fixed as to allow a mark-up of 20 per cent on selling price.

Required:

(i) Calculate material variances based on consumption of material.

(ii) Calculate labour variances and the total variance for factory overhead.

(iii) Prepare Income statement for June, 2013 showing actual gross margin.

(iv) An incentive scheme is in operation in the company whereby employees are paid a bonus of 50% of direct labour hour saved at standard direct labour hour rate. Calculate the Bonus amount.

Solution:

(i) Material variances:

(a) Direct Material Cost Variance = Standard Cost – Actual Cost

= (40,960 units × 5 kg.× ₹ 4.20) – (2,05,600 kg.× ₹4.50)

= ₹ 8,60,160 – ₹ 9,25,200 = ₹ 65,040 (A)

(b) Material Price Variance = Actual Qty. (Std. Price – Actual Price)

= 2,05,600* kg. (₹ 4.20 – ₹4.50) = ₹ 61,680 (A)

(*Material variances are calculated on the basis of consumption)

(c) Material Usages Variance = Std. Price (Std. Qty. – Actual Qty.)

= ₹ 4.20 (40,960 units x 5 kg. – 2,05,600 kg.)

= ₹ 3,360 (A)

(ii) Labour Variances and Overhead Variances:

(a) Labour Cost Variance = Standard cost – Actual cost

= (40,960 units × 3 hours × ₹ 3) – ₹ 3,87,840

= ₹19,200 (A)

(b) Labour Rate Variance = Actual Hours (Std. Rate – Actual Rate)

= 1,21,200 hours (₹ 3 – ₹ 3.20)

= ₹ 24,240 (A)

(c) Labour Efficiency Variance = Std. Rate (Std. Hour – Actual Hour)

= ₹ 3 (40,960 units × 3 hour – 1,21,200 hour)

= ₹ 5,040 (F)

(d) Total Factory Overhead Variance

= Factory Overhead Absorbed – Actual Factory Overhead

= (Actual Hours × Std. Rate) – Actual Factory Overhead

= (40,960 units × 3 hours × ₹1.20) – ₹1,00,000

= ₹ 47,456 (F)

(iii) **Preparation of Income Statement**

Calculation of unit selling price	**(₹)**
Direct material	21.00
Direct labour	9.00
Factory overhead	3.60
Factory cost	33.60
Margin 25% on factory cost	8.40
Selling price	42.00

Income Statement

	(₹)	**(₹)**
Sales (40,000 units × ₹ 42)		16,80,000
Less: Standard cost of goods sold (40,000 units × ₹33.60)		13,44,000
		3,36,000
Less: Adverse Variances:		
Material Price variance	61,680	
Material Usage variance	3,360	
Labour Rate variance	24,240	89,280
		2,46,720
Add: Favourable variances:		
Labour efficiency variance	5,040	
Factory overhead	47,456	52,496
Actual gross margin		2,99,216

(iv)

(v) Labour hour saved	(₹)
Standard labour hours (40,960 units x 3 hours)	1,22,880
Actual labour hour worked	1,21,200
Labour hour saved	1,680

Bonus for saved labour = 50% (1,680 hours x ₹ 3) = ₹ 2,520.

Question-5 (Ratio)

Calculate Efficiency and Capacity ratio from the following figures:

	Budgeted
production	80 units
Actual production	60 units
Standard time per unit	8 hours
Actual hours worked	500 hours.

Solution:

Efficiency Ratio = $\frac{\text{Actual output in terms of standard hours}}{\text{Actual hour worked}} \times 100$

Or, $\frac{60 \text{ units} \times 8 \text{ hours}}{500 \text{ hours}} \times 100$ Or, $\frac{480 \text{ hours}}{500 \text{ hours}} \times 100 = 96\%$

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

Or, $\frac{500 \text{ hours}}{80 \text{ units} \times 8 \text{ hours}} \times 100$ Or, $\frac{500 \text{ hours}}{640 \text{ hours}} \times 100 = 78.12\%$

Question-6 (Sales variance)

Compute the sales variances (total, price and volume) from the following figures:

Product	Budgeted quantity	Budgeted Price per Unit (₹)	Actual quantity	Actual Price per unit (₹)
P	4000	25	4800	30
Q	3000	50	2800	45
R	2000	75	2400	70

S	1000	100	800	105

Solution:

Working:

Product	Budgeted Price (₹)	Actual Price (₹)	Budgeted Qty.	Actual Qty.	Budgeted Sales (₹)	Standard Sales (Actual Sales at Budgeted price) (₹)	Actual sales (₹)
	(a)	(b)	(c)	(d)	(e) = (a × c)	(f) = (a × d)	(g) =(b x d)
P	25	30	4,000	4,800	1,00,000	1,20,000	1,44,000
Q	50	45	3,000	2,800	1,50,000	1,40,000	1,26,000
R	75	70	2,000	2,400	1,50,000	1,80,000	1,68,000
S	100	105	1,000	800	1,00,000	80,000	84,000
					5,00,000	5,20,000	5,22,000

Calculation of Variances:

Sale Price Variance = Actual Quantity (Actual Price – Budgeted Price)

= Actual Sales – Standard. Sales

= ₹ 5,22,000 – ₹ 5,20,000 = ₹ 2,000 (F)

Sales Volume Variance = Budgeted Price (Actual Quantity – Budgeted Quantity)

= Standard Sales – Budgeted Sales

= ₹ 5,20,000 – ₹ 5,00,000 = ₹ 20,000 (F)

Total Sales Variance = Actual Sales – Budgeted Sales

= ₹ 5,22,000 – ₹ 5,00,000 = ₹ 22,000 (F)

Verification, Total Sales Variance = Sales Price Variance + Sales Volume Variance

₹ 22,000 (F) = ₹ 2,000 (F) + ₹ 20,000 (F)

Chapter. 13: Marginal Costing

Part-A: Small concept based questions

(Marginal concept, BEPS, MOS, FC, P/V Ratio, Desired Sale etc).

A. QUESTION FROM STUDY MATERIAL

Question-1 (BEP)

MNP Ltd sold 2,75,000 units of its product at ₹37.50 per unit. Variable costs are ₹ 17.50 per unit (manufacturing costs of ₹ 14 and selling cost ₹ 3.50 per unit). Fixed costs are incurred uniformly throughout the year and amounting to ₹ 35,00,000 (including depreciation of ₹ 15,00,000). There is no beginning or ending inventories.

Required:

COMPUTE breakeven sales level quantity and cash breakeven sales level quantity.

Hints: 1,75,000 units, 1,00,000 units

Question-2 (BEP & Desired Sale)

You are given the following particulars CALCULATE:

(a) Break-even point

(b) Sales to earn a profit of ₹ 20,000

i. Fixed cost ₹ 1,50,000

ii. Variable cost ₹ 15 per unit

iii. Selling price is ₹ 30 per unit

Hints: (a) 10,000 units, (b) ₹3,40,000

Question-3 (BEP & Fixed Cost)

PQR Ltd. has furnished the following data for the two years:

	20X3	20X4
Sales	₹ 8,00,000	?
Profit/Volume Ratio (P/V ratio)	50%	37.5%
Margin of Safety sales as a % of total sales	40%	21.875%

There has been substantial savings in the fixed cost in the year 20X4 due to the restructuring process. The company could maintain its sales quantity level of 20X3 in 20X4 by reducing selling price.

You are required to CALCULATE the following:

(i) Sales for 20X4 in Value,

(ii) Fixed cost for 20X4,

(iii) Break-even sales for 20X4 in Value.

Hints: (i) ₹6,40,000, (ii) ₹5,00,000, (iii) ₹1,87,500

Question-4 (BEP, P/V Ratio, MOS-Graphical Presentation)

You are given the following data for the year 20X7 of Rio Co. Ltd:

Variable cost	60,000	60%
Fixed cost	30,000	30%
Net profit	10,000	10%
Sales	1,00,000	100%

Find out (a) Break-even point, (b) P/V ratio, and (c) Margin of safety.
Also draw a break-even chart showing contribution and profit.
Hints: (a) ₹75,000, (b) 40%, (c) ₹25,000

Question-5 (BEP- Graphical Presentation)

PREPARE a profit graph for products A, B and C and find break-even point from the following data:

Products	**A**	**B**	**C**	**Total**
Sales (₹)	7,500	7,500	3,750	18,750
Variable cost (₹)	1,500	5,250	4,500	11,250
Fixed cost (₹)	---	---	---	5,000

Hints: Composite BEP = ₹12,500

Question-6 (MOS)

A company earned a profit of ₹ 30,000 during the year 20X4. If the marginal cost and selling price of the product are ₹ 8 and ₹ 10 per unit respectively, FIND OUT the amount of margin of safety.

Hints: MOS = ₹1,50,000

Question-7 (BEP & MOS)

A Ltd. Maintains margin of safety of 37.5% with an overall contribution to sales ratio of 40%. Its fixed costs amount to ₹ 5 lakhs.

CALCULATE the following:

i. Break-even sales
ii. Total sales
iii. Total variable cost
iv. Current profit

New 'margin of safety' if the sales volume is increased by 7 ½ %.

Hints: (i) ₹12,50,000, (ii) ₹20,00,000, (iii) VC = ₹12,00,000, (iv) ₹3,00,000, (v) New MOS = ₹9,00,000

Question-8 (Reasoning)

By noting "P/V will increase or P/V will decrease or P/V will not change", as the case may be, STATE how the following independent situations will affect the P/V ratio:

(i) An increase in the physical sales volume;

(ii) An increase in the fixed cost;

(iii) A decrease in the variable cost per unit;

(iv) A decrease in the contribution margin;

(v) An increase in selling price per unit;

(vi) A decrease in the fixed cost;

(vii) A 10% increase in both selling price and variable cost per unit;

(viii) A 10% increase in the selling price per unit and 10% decrease in the physical sales volume;

(ix) A 50% increase in the variable cost per unit and 50% decrease in the fixed cost.

(x) An increase in the angle of incidence.

TEST YOUR KNOWLEDGE

Question-1 (Basic- P/V Ratio)

If P/V ratio is 60% and the Marginal cost of the product is ₹ 20. CALCULATE the selling price?

Hints: VC = ₹40 & SP = ₹100 and VC = ₹20 then SP = ₹50

Question-2 (Desire sale and profit)

The ratio of variable cost to sales is 70%. The break-even point occurs at 60% of the capacity sales. Find the capacity sales when fixed costs are ₹ 90,000. Also COMPUTE profit at 75% of the capacity sales.

Hints: Profit (75% Capacity) = ₹22,500

Question-3 (Basic- FC & BEP)

		(₹)
1.	Determine profit, when sales	= 2,00,000
	Fixed cost	= 40,000
	BEP	= 1,60,000
2.	Determine sales, when fixed cost	= 20,000
	Profit	= 10,000
	BEP	= 40,000

Hints: (i) ₹10,000, (ii) Sales = ₹60,000

Question-4 (Basic- FC & BEP)

A company has three factories situated in north, east and south with its Head Office in Mumbai. The management has received the following summary report on the operations of each factory for a period:

(₹ in '000)

	Sales		Profit	
	Actual	**Over/(Under) Budget**	**Actual**	**Over/(Under) Budget**
North	1,100	(400)	135	(180)
East	1,450	150	210	90
South	1,200	(200)	330	(110)

CALCULATE for each factory and for the company as a whole for the period :
1. the fixed costs. 2. break-even sales.

Hints: (i) Fixed cost = ₹1,350, (ii) BEP (Total) = ₹2,500

Question-5 (BEP)

A company sells its product at ₹ 15 per unit. In a period, if it produces and sells 8,000 units, it incurs a loss of ₹ 5 per unit. If the volume is raised to 20,000 units, it earns a profit of ₹ 4 per unit. CALCULATE break-even point both in terms of Value as well as in units.

Hints: Fixed Cost = ₹1,20,000, BEP = 12,000 units or ₹1,80,000

Question-6 (Mix)

You are given the following data:

	Sales	**Profit**
Year 20x8	₹1,20,000	8,000
Year 20x9	₹1,40,000	13,000

FIND OUT –

(i) P/V ratio,
(ii) B.E. Point,
(iii) Profit when sales are ₹1,80,000,
(iv) Sales required earn a profit of ₹12
(v) Margin of safety in year 20X9.

Hints: FC = ₹22,000, BEP = ₹88,000, Profit = ₹23,000, Sales = ₹1,36,000, MOS = ₹52,000

Question-7

A single product company sells its product at ₹60 per unit. In the year 20x8 company operated at a margin of safety of 40%. The fixed cost amounted to ₹3,60,000 and the

variable cost ratio to sales was 80%.
In 20X9, it is estimated that the variable cost will go up by 10% and the fixed cost will increase by 5%.

(i) FIND the selling price required to be fixed in 20X9 to earn the same P/V ratio as in 20X8.

(ii) Assuming the same selling price of ₹ 60 per unit in 20X9, FIND the number of units required to be produced and sold to earn the same profit as in 20X8.

Hints: (i) Profit (20x8) = ₹2,40,000, SP (20x9) = 66 p.u.

(ii) No. of units = 85,834 units

Question-8 (MOS)

A company has made a profit of ₹ 50,000 during the year 20X8-X9. If the selling price and marginal cost of the product are ₹ 15 and ₹ 12 per unit respectively, FIND OUT the amount of margin of safety.

Hints: P/V ratio = 20%, MOS = ₹2,50,000

Question-9 (Basic)

(a) If margin of safety is ₹ 2,40,000 (40% of sales) and P/V ratio is 30% of AB Ltd, CALCULATE its (1) Break even sales, and (2) Amount of profit on sales of ₹9,00,000.

(b) X Ltd. has earned a contribution of ₹2,00,000 and net profit of ₹1,50,000 of sales of ₹8,00,000. What is its margin of safety ?

Hints: (a) Profit = ₹1,62,000, (b) BEP = ₹2,00,000, MOS = ₹6,00,000

Question-10 (BEP, MOS and Desire sale)

A company had incurred fixed wxpenses of ₹4,50,000, with sales of ₹15,00,000 and earned a profit of ₹3,00,000 during the first half year. In the second half, it suffered a loss of ₹1,50,000.

Calculate:

1. The profit-volume ratio, break-even point and margin of safety for the first half year.
2. Expected sales volume for the second half year assuming that selling price and fixed expenses remained unchanged during the second half year.
3. The break-even point and margin of safety for the whole year.

Hints: (i) MOS = ₹6,00,000 (ii) Expected Sales = ₹6,00,000, (iii) MOS = ₹3,00,000

Question-11 (BEP, P/V Ratio, FC)

The following information is given by Star Ltd.:

Margin of Safety	₹ 1,87,500
Total Cost	₹ 1,93,750
Margin of Safety	3,750 units
Break-even Sales	1,250 units

Required:

CALCULATE Profit, P/V Ratio, BEP Sales (in ₹) and Fixed Cost.

Hints: MOS = 75%, Sales = ₹2,50,000, Profit = ₹56,250, BEP = ₹62,500, FC = ₹18,750

Question-12 (BEP)

(a) You are given the following data for the coming year for a factory.

Budgeted output	8,00,000 units
Fixed expenses	₹40,00,000
Variable expenses per unit	₹ 100
Selling price per unit	₹ 200

Draw a break-even chart showing the break-even point.

(b) If price is reduced to ₹ 180, what will be the new break-even point?

Hints: (a) BEP = 40,000 units, (b) New BEP = 50,000 units

Question-13 (Simple Question)

A company has made a profit of ₹ 50,000 during the year. If the selling price and marginal cost of the product are ₹ 15 and ₹ 12 per unit respectively, FIND OUT the amount of margin of safety.

Hints: ₹ 2,50,000

B. PAST YEAR EXAM QUESTIONS

Jan-21. Q1(a) (5 marks)

During a particular period ABC Ltd has furnished the following data:

Sales ₹ 10,00,000

Contribution to sales ratio 37% and

Margin of safety is 25% of sales.

A decrease in selling price and decrease in the fixed cost could change the "contribution to sales ratio" to 30% and "margin of safety" to 40% of the revised sales. Calculate:

(i) Revised Fixed Cost.

(ii) Revised Sales and

(iii) New Break-Even Point.

Solution:

Contribution to sales ratio (P/V ratio) = 37%

Variable cost ratio = 100% - 37% = 63%

Variable cost = ₹ 10,00,000 x 63% = ₹ 6,30,000

After decrease in selling price and fixed cost, sales quantity has not changed. Thus, variable cost is ₹ 6,30,000.

Revised Contribution to sales = 30%

Thus, Variable cost ratio = 100% - 30% = 70%

Thus, Revised sales = ₹ 6,30,000/70% = = ₹ 9,00,000

Revised, Break-even sales ratio = 100% - 40% (revised Margin of safety) = 60%

(i) Revised fixed cost = revised breakeven sales x revised contribution to sales ratio

= ₹ 5,40,000 (₹ 9,00,000 x 60%) x 30%

= ₹ 1,62,000

(ii) Revised sales = ₹ 9,00,000 (as calculated above)

(iii) Revised Break-even point = Revised sales x Revised break-even sales ratio

= ₹ 9,00,000 x 60%

= ₹ 5,40,000

Nov-19. Q1(d) (5 marks)

When volume is 4000 units, average cost is ₹3.75 per unit. When volume is 5000 units, average cost is ₹3.50 per unit. The Break-Even point is 6000 units.

Calculate: (i) Variable cost per unit, (ii) Fixed cost and (iii) Profit volume ratio.

Solution:

Part-B: Unique Questions

(Marginal concepts, BEP, MOS, FC, P/V Ratio, Desired sale etc)

A. QUESTION FROM STUDY MATERIAL

Question-9 (Desired Sale)

A company has a P/V ratio of 40%. COMPUTE by what percentage must sales be increased to offset: 20% reduction in selling price?

Hints: Sales to be increased by 60%

Question-10 (NP Ratio & Composite BEP)

M.K. Ltd. manufactures and sells a single product X whose selling price is ₹ 40 per unit and the variable cost is ₹ 16 per unit.

(i) If the Fixed Costs for this year are ₹ 4,80,000 and the annual sales are at 60% margin of safety, CALCULATE the rate of net return on sales, assuming an income tax level of 40%

(ii) For the next year, it is proposed to add another product line Y whose selling price would be ₹ 50 per unit and the variable cost ₹ 10 per unit. The total fixed costs are estimated at ₹ 6,66,600. The sales mix of X : Y would be 7 : 3. DETERMINE at what level of sales next year, would M.K. Ltd. break even? Give separately for both X and Y the break-even sales in rupee and quantities.

Hints: (i) 21.6%

(ii)

	X	Y
BEP (Units)	16,202	6,944
BEP (₹)	₹6,48,080	₹3,47,200

TEST YOUR KNOWLEDGE

Question-14 (Composite BEP)

The product mix of a Gama Ltd. is as under:

	Products	
	M	**N**
Units	54,000	18,000
Selling price	₹ 7.50	₹ 15.00
Variable cost	₹ 6.00	₹ 4.50

FIND the break-even points in units, if the company discontinues product 'M' and replace with product 'O'. The quantity of product 'O' is 9,000 units and its selling price and variable cost respectively are ₹18 and ₹9. Fixed costs ₹15,000.

Hints: BEP: N = 1,000 units, O = 500 units

Question-15

Prisha Limited manufactures three different products and the following information has been collected from the books of accounts:

	Products		
	A	**B**	**C**
Sales Mix	40%	35%	25%
Selling Price	₹ 300	₹ 400	₹ 200
Variable Cost	₹ 150	₹ 200	₹ 120
Total Fixed Costs			₹ 18,00,000
Total Sales			₹ 60,00,000

The company has currently under discussion, a proposal to discontinue the manufacture of Product C and replace it with Product E, when the following results are anticipated:

	Products		
	A	**B**	**E**
Sales Mix	45%	30%	25%
Selling Price	₹ 300	₹400	₹ 300
Variable Cost	₹ 150	₹200	₹ 150

Total Fixed Costs	₹ 18,00,000
Total Sales	₹ 64,00,000

Required:

(i) Calculate the total contribution to sales ratio and present break-even sales at existing sales mix.

(ii) Calculate the total contribution to sales ratio and present break-even sales at proposed sales mix.

(iii) State whether the proposed sales mix is accepted or not?

Hints: Present Break-Even Sales At Existing Sales Mix = ₹37,89,473.68

Present Break-Even Sales At Proposed Sales Mix. = ₹ 36,00,000

B. PAST YEAR EXAM QUESTIONS

May-23. Q1(c) (5 marks)

The following information pertains to ZB Limited for the year:

Profit volume ratio	30%
Margin of Safety (as % of total sales	25%
Fixed cost	₹ 12,60,000

You are required to calculate:

(i) Break even sales value (₹).

(ii) Total sales value (₹) at present,

(iii) Proposed sales value (₹) if company wants to earn the present profit after reduction of 10% in fixed cost,

(iv) Sales in value (₹) to be made to earn a profit of 20% on sales assuming fixed cost remains unchanged,

(v) New Margin of Safety if the sales value at present as computed in (ii) decreased by 12.5%.

Solution:

(i) Calculation of Break-even sales in value:

= Fixed Cost ÷ P/V Ratio

= ₹ 12,60,000 ÷ 30% = ₹ 42,00,000

(ii) Calculation of Total Sales value:
Sales value (S) = Break-even Sales + Margin of Safety Or, S = 42,00,000 + 0.25S
Or, 0.75 S = 42,00,000
Or, S = 42,00,000 ÷ 0.75
Or, Sales = ₹ 56,00,000

(iii) Calculation of proposed sales value to earn present profit:
Present profit = Sales – Variable cost – Fixed Cost
= ₹ 56,00,000 – 70% of 56,00,000 – ₹ 12,60,000
= ₹ 56,00,000 – ₹ 39,20,000 – ₹ 12,60,000
= ₹ 4,20,000
Proposed Sales value (S) = 0.7S + (90% of ₹ 12,60,000) + 4,20,000 S = 0.7S + 11,34,000 + 4,20,000
S = 15,54,000 ÷ 0.3 = ₹ 51,80,000

(iv) Calculation of sales value to earn 20% on sales:
Sales Value (S) = 0.7 S + 12,60,000 + 0.2S S = 12,60,0000 ÷ 0.10 = ₹ 1,26,00,000

(v) New Margin of Safety:
= (Sales – BES) ÷ Sales
= (87.5% of 56,00,000 – 42,00,000) ÷ (87.5% of 56,00,000)
= (49,00,000 – 42,00,000) ÷ 49,00,000
= 7,00,000 ÷ 49,00,000 = 14.29%
Or
= (Sales – BES)
= (87.5% of 56,00,000 – 42,00,000)
= ₹ 7,00,000

May-22. Q4(b) (5 marks)

UV Limited started a manufacturing unit from 1st October 2021. It produces designer lamps and sells its lamps at ₹ 450 per unit.
During the quarter ending on 31st December, 2021, it produced and sold 12,000 units and suffered a loss of ₹ 35 per unit.

During the quarter ending on 31st March, 2022, it produced and sold 30,000 units and earned a profit of ₹ 40 per unit.

You are required to calculate:

(i) Total fixed cost incurred by UV ltd. per quarter.

(ii) Break Even sales value (in rupees)

(iii) Calculate Profit, if the sale volume reaches 50,000 units in the next quarter (i.e., quarter ending on 30th June, 2022).

Solution:

	Quarter ending 31st December, 2021 (₹)	Quarter ending 31st March, 2022 (₹)
Sales (No. of units sold x ₹ 450 per unit)	54,00,000	1,35,00,000
Profit (Loss)	(4,20,000) [12,000 × 35]	12,00,000 [30,000 × 40]

$$\text{P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$$

$$= \frac{16,20,000}{81,00,000} \times 100 = 20\%$$

(i) Fixed Cost = Sales × P/V ratio – profit

= ₹ 1,35,00,000 × 20% – 12,00,000

= ₹ 15,00,000

Alternative Presentation for the calculation of Fixed cost

	Quarter ending 31st December, 2021 (₹)	Quarter ending 31st March, 2022 (₹)

Sales (No. of units sold x ₹ 450 per unit)	54,00,000	1,35,00,000
Profit (Loss)	(4,20,000) [12,000 × 35]	12,00,000 [30,000 × 40]
Total cost	58,20,000	1,23,00,000

VC per unit = (1,23,00,000 – 58,20,000) / (30,000 – 12,000)
= 64,80,000 / 18,000 =₹ 360 per unit
Fixed cost = TC – VC , 58,20,000 (360 x12,000 units) ₹15,00,000

(ii) Break even sales value (in Rupees) = $\frac{\text{Fixed Cost}}{\text{P/V ratio}}$ x 100

= $\frac{15,00,000}{20\%}$ = ₹75,00,000

(iii) Profit, if sales reach 50,000 units for the quarter ending 30th June, 2022

	(₹)
Sales (50,000 × ₹ 450)	2,25,00,000
Less: Variable cost	1,80,00,000
Contribution	45,00,000
Less: Fixed cost	15,00,000
Profit	**30,00,000**

Dec-21. Q2(b) (10 marks)

AZ company has prepared its budget for the production of 2,00,000 units. The variable cost per unit is ₹ 16 and fixed cost is ₹ 4 per unit. The company fixes its selling price to fetch a profit of 20% on total cost.

You are required to calculate:

(i) Present break-even sales (in ₹ and in quantity).

(ii) Present profit-volume ratio.

(iii) Revised break-even sales in ₹ and the revised profit-volume ratio, if it reduces its selling price by 10%.

(iv) What would be revised sales- in quantity and the amount, if a company desires a profit

increase of 20% more than the budgeted profit and selling price is reduced by 10% as above in point (iii).

Solution:

Variable Cost per Unit=₹16

Fixed Cost per Unit =₹ 4, Total Fixed Cost= 2,00,000 units x ₹ 4 = ₹8,00,000

Total Cost per Unit =₹20

Selling Price per Unit=Total Cost+ Profit =₹ 20+₹ 4 =₹ 24

Contribution per Unit=₹ 24-₹16=₹ 8

(i) Present Break-even Sales (Quantity) = $\frac{\text{Fixed cost}}{\text{Contribution margin per unit}} = \frac{₹8,00,000}{₹\ 8}$ = 1,00,000 units

Present Break-even Sales (₹) = 1,00,000 units x ₹ 24 = ₹ 24,00,000

(ii) Present P/V Ratio = $\frac{8}{24} \times 100$ = 33.33%

(iii) Revised Selling Price per Unit = ₹ 24 – 10% of ₹ 24 = ₹ 21.60

Revised Contribution per Unit=₹ 21.60-₹ 16 = ₹ 5.60

(iv) Revised P/V Ratio = $\frac{5.60}{21.6} \times 100$ = 25.926 %

Revised Break-even point (₹) = $\frac{\text{Fixed cost}}{\text{P/V Ratio}} = \frac{8,00,000}{25.926\%}$ = ₹ 30,85,705

OR

Revised Break-even point (units) = $\frac{\text{Fixed cost}}{\text{Contribution margin per unit}}$

= $\frac{8,00,000}{5.60}$ =1,42,857 Units

Revised Break-even point (₹) = 1,42,857 units x ₹ 21.60 = ₹ 30,85,711

Jan-21. Q3(a) (10 marks)

Two manufacturing companies A and B are planning to merge. The details are as follows:

	A	B

Capacity utilisation (%)	90	60
Sales (₹)	63,00,000	48,00,000
Variable Cost (₹)	39,60,000	22,50,000
Fixed Cost (₹)	13,00,000	15,00,000

Assuming that the proposal is implemented, calculate:

(i) Break-Even sales of the merged plant and the capacity utilization at that stage.

(ii) Profitability of the merged plant at 80% capacity utilization.

(iii) Sales Turnover of the merged plant to earn a profit of ₹ 60,00,000.

(iv) When the merged plant is working at a capacity to earn a profit of ₹ 60,00,000, what percentage of increase in selling price is required to sustain an increase of 5% in fixed overheads.

Solution:

Workings:

1. Statement showing computation of Breakeven of merged plant and other required information

S. No.	Particulars	Plan A		Plant B		Merged Plant (100%) (₹)
		Before (90%) (₹)	After (100%) (₹)	Before (60%) (₹)	After (100%) (₹)	
(i)	Sales	63,00,000	70,00,000	48,00,000	80,00,000	1,50,00,000
(ii)	Variable cost	39,60,000	44,00,000	22,50,000	37,50,000	81,50,000
(iii)	Contribution (i - ii)	23,40,000	26,00,000	25,50,000	42,50,000	68,50,000
(iv)	Fixed Cost	13,00,000	13,00,000	15,00,000	15,00,000	28,00,000
(v)	Profit (iii - iv)	10,40,000	13,00,000	10,50,000	27,50,000	40,50,000

2. PV ratio of merged plant $= \frac{\text{Contribution}}{\text{Sales}} \times 100$

$= \frac{₹68,50,000}{₹\ 1,50,00,000} \times 100$

(i) Break even sales of merged plant = $\frac{\text{Fixed Cost}}{\text{P/V Ratio}}$

= $\frac{₹28,00,000}{45.67\%}$

= ₹ 61,30,939.34 (approx.)

Capacity utilisation = $\frac{₹\ 61,30,939.34}{₹\ 1,50,00,000}$ x 100 = 40.88%

(ii) Profitability of the merged plant at 80% capacity utilisation

= (₹ 1,50,00,000 x 80%) x P/v ratio – fixed cost

= ₹ 1,20,00,000 x 45.67% – ₹ 28,00,000

= ₹ 26,80,400

(iii) Sales to earn a profit of ₹ 60,00,000

Desired sales = $\frac{\text{Fixed Cost + Desired Profit}}{\text{P/V Ratio}}$

= $\frac{₹\ 28,00,000 + ₹60,00,000}{45.67\%}$

= ₹ 1,92,68,666 (approx.)

(iv) Increase in fixed cost

= ₹ 28,00,000 x 5% = ₹ 1,40,000

Therefore, percentage increase in sales price

= $\frac{₹1,40,000}{₹\ 1,92,68,666}$ x 100 = 0.726% (approx.)

May-19. Q5(a) (5 marks)

M/s Gaurav Private Limited is manufacturing and selling two products:

'BLACK' and 'WHITE' at selling price of ₹ 20 and ₹ 30 respectively.

The following sales strategy has been outlined for the financial year 2019-20:

(i) Sales planned for the year will be ₹ 81,00,000 in the case of 'BLACK' and ₹ 54,00,000 in the case of 'WHITE'.

(ii) The selling price of 'BLACK' will be reduced by 10% and that of 'WHITE' by 20%.

(iii) Break-even is planned at 70% of the total sales of each product.

(iv) Profit for the year to be maintained at ₹ 8,26,200 in the case of 'BLACK' and ₹ 7,45,200 in the case of 'WHITE'. This would be possible by reducing the present annual fixed cost of ₹ 42,00,000 allocated as ₹ 22,00,000 to 'BLACK' and ₹ 20,00,000 to 'WHITE'.

You are required to calculate:

(1) Number of units to be sold of 'BLACK' and 'WHITE' to Break even during the financial year 2019-20.

(2) Amount of reduction in fixed cost product-wise to achieve desired profit mentioned at (iv) above.

Solution:

(i) Statement showing Break Even Sales

Particulars	**Black**	**White**
Sales Planned	81,00,000	54,00,000
Selling Price (₹)	18	24
Number of Units to be sold	4,50,000	2,25,000
Break Even sales (in Units),70% of total sales	**3,15,000**	**1,57,500**
Or		
Break Even sales (in ₹),70% of total sales	**56,70,000**	**37,80,000**

(ii) Statement Showing Fixed Cost Reduction

Profit to be maintained (₹)	8,26,200	7,45,200
Margin of Safety (70% of Sales) (₹)	24,30,000	16,20,000
PVR (Profit/ Margin of Safety) x 100	34%	46%
Contribution (Sales x 34% or 46%) (₹)	27,54,000	24,84,000
Less: Profit (₹)	8,26,200	7,45,200
Revised Fixed Cost (₹)	**19,27,800**	**17,38,800**
Present Fixed Cost (₹)	22,00,000	20,00,000
Reduction in Fixed Cost	**2,72,200**	**2,61,200**

Nov-18. Q2(b) (10 marks)

A manufacturing company is producing a product 'A' which is sold in the market at ₹45 per unit. The company has the capacity to produce 40000 units per year. The budget for the year 2018-19 projects a sale of 30000 units.

The costs of each unit are expected as under:

	₹
Materials	12
Wages	9
Overheads	6

Margin of safety is ₹ 4,12,500. You are required to:

(i) calculate fixed cost and break-even point.
(ii) calculate the volume of sales to earn profit of 20% on sales.
(iii) if management is willing to invest ₹ 10,00,000 with an expected return of 20%, calculate units to be sold to earn this profit.
(iv) Management expects additional sales if the selling price is reduced to ₹ 44. Calculate units to be sold to achieve the same profit as desired in above (iii).

Solution:

Margin of Safety $= \frac{\text{Profit}}{\text{P/V Ratio}}$ = ₹4,12,500

$= \frac{\text{Profit}}{\frac{45-(12+9+6)}{45}}$ = ₹4,12,500

$= \frac{\text{Profit}}{18/45}$ = ₹4,12,500

Profit = ₹1,65,000 or P/V = (18/45) x 100 = 40%

(i) Fixed Cost

Profit = (Sales × P/V Ratio) – Fixed Cost
₹1,65,000 = (30,000 x 18/45) – Fixed Cost
Or Fixed Cost = ₹5,40,000 - ₹1,65,000
= ₹3,75,000

OR

Profit = Contribution – Fixed Cost=₹ 5,40,000-₹ 3,75,000 =₹.1,65,000

P/V Ratio = 18/45 = 40%

Break-even Point = Total Sales – Margin of Safety

= ₹ (30,000 × 45) – 4,12,500

= 13,50,000 – 4,12,500 =₹ 9,37,500

OR

BEP Cost = Fixed / P/V Ratio = ₹3,75,000 / 40% = ₹9,37,000 or 20833.33 units

(ii) Let's assume, Sales Volume = S unit so total sales value is 45 S and Contribution is 45 S - 27 S =18 S

Now, Contribution = Fixed Cost + Desired Profit 18 S

= 3,75,000 + 9 S (20% of 45 S)

Or, 9S = 3,75,0000

So, S = 3,75,000 units / 9

Volume of sale = 3,75,000 x 45 / 9 = ₹18,75,000 units or 41666.67

(iii) Contribution = Fixed Cost + Desired Profit

18S = 3,75,000 + Return on Investment

18S = 3,75,000 + 2,00,000

S = 5,75,000 units / 18 = 31,945 Units (approx.)

So,31,945 Units to be sold to earn a return of ₹ 2,00,000.

(iv) Revised Contribution = Fixed Cost + Desired Profit

17S = 3,75.000 + 2,00,000

S = 5,75,000 units / 17

S = 33,824 units (approx.)

∴ Additional Sales to be sold to achieve the same profit is 33,824 Units.

May-18. Q5(b) (10 marks)

PH Gems Ltd. is manufacturing readymade suits. It has annual production capacity of 2,000 pieces. The Cost Accountant has presented following information for the year to the management:

Particulars	**Amount (₹)**	**Amount (₹)**
Sales 1,500 pieces @ ₹ 1,800 per piece		27,00,000
Direct Material	5,94,200	
Direct Labour	4,42,600	
Overheads (40% Fixed)	11,97,000	22,33,800
Net Profit		4,66,300

Evaluate following options:

(i) If selling price is increased by ₹ 200, the sales will come down to 60% of the total annual capacity. Should the company increase its selling price?

(ii) The company can earn a profit of 20% on sales if the company provide TIEPIN with ready-made suit. The cost of each TIEPIN is ₹ 18. Calculate the sales to earn a profit of 20% on sales.

Solution:

(i) Evaluation of Option (i)

Selling Price = ₹ 1800 + ₹ 200 = ₹ 2,000

Sales = 2000 x 60% = 1200 Pieces

	(₹)
Sales (1,200 pieces @ ₹ 2,000)	24,00,000
Less: Direct Material (₹5,94,000 x 1200) / 1500 units	4,75,360
Direct Labour (₹4,42,600 x 1200) / 1500 units	3,54,080
Variable Overhead (₹ 11,97,000x 60% × 1,200) / 1500 units	5,74,560
Contribution	9,96,000

Less: Fixed cost (Rs. 11,97,000x40%)	4,78,800
Profit	5,17,200

If price has been increased by 11.11% (increases by 200 on 1,800) sales goes down by 20% (decreased by 300 on 1,500). Change in demand is greater than change in price. Since the variable costs are still same profit has been arose to ₹ 5,17,200 in-spite of high elasticity of demand. PH gems would not be able to sustain this policy on account of change if any in variable costs.

(ii) Evaluation of Option (ii)

	(₹)
Sales	1,800.00
Less: Direct Material (₹5,94,200) / 1,500	396.13
Cost of Tie PIN	18.00
Direct Labour (₹4,42,600) / 1,500	295.07
Variable Overheads (₹11,97,000 x 60%) / 1,500	478.80
Contribution	612.00
P/V Ratio (₹ 612/1800x100)	34.0%

Sales to required earn a profit of 20%

$$\text{Sales} = \frac{₹\ 4,78,800 + 0.20 \text{ of Sales}}{34.00\ \%}$$

Sales = ₹ 34,20,000 or 1,900 units (₹ 34,20,000/1800)

To earn profit 20% on sales of readymade suit (along with TIE PIN) company has to sold 1,900 units i.e. 95% of the full capacity. This sales level of 1,900 units is justified only if variable cost is constant. Any upside in variable cost would impact profitability, to achieve the desired profitability. Production has to be increased but the scope is limited to 5% only.

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

A company produces single product which sells for ₹ 20 per unit. Variable cost is ₹ 15 per unit and Fixed overhead for the year is ₹ 6,30,000.

Required:

(i) Calculate sales value needed to earn a profit of 10% on sales.

(ii) Calculate sales price per unit to bring BEP down to 1,20,000 units.

(iii) Calculate margin of safety sales if profit is ₹ 60,000.

Solution:

(a) Suppose Sales units are x then S = V + F + P

(S = Sales ; V = Variable Cost; F = Fixed Cost; P = Profit)

₹ 20x = ₹ 15x + ₹ 6,30,000 + ₹ 2x

₹ 20x - ₹17x = ₹ 6,30,000

x $\frac{6,30,000}{3}$ = 2,10,000 units

Sales value = 2,10,000 units ₹ 20 = ₹ 42,00,000 to earn a profit of 10% on sales.

(b) Sales price to bring down BEP to 1,20,000 units

B.E.P (Units) = $\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$

Or, Contribution per unit = $\frac{₹6,30,000}{1,20,000 \text{units}}$ = ₹ 5.25

So, Sales Price = ₹ 15 + ₹ 5.25 = ₹ 20.25

(c) Margin of Safety Sales = $\frac{\text{Profit}}{\text{P/V Ratio}}$ or, $\frac{₹60,000}{\text{P/V Ratio}}$

where, P/V Ratio = $\frac{\text{Contribution per unit}}{\text{Sales Price}}$ x 100 Or, $\frac{₹5}{₹20}$ x 100 = 25%

Margin of Safety Sales = $\frac{₹\ 60,000}{25\%}$ = ₹2,40,000

So if profit is ₹ 60,000, margin of safety sale will be ₹ 2,40,000.

Question-2

PQ Ltd. reports the following cost structure at two capacity levels:

	(100% capacity)	**(75% capacity)**
	2,000 units	1,500 units
Production overhead I	₹ 3 per unit	₹ 4 per unit
Production overhead II	₹ 2 per unit	₹ 2 per unit

If the selling price, reduced by direct material and labour is ₹ 8 per unit, what would be its break-even point?

Solution:

Computation of Break-even point in units:

	2,000 units	**1,500 units**
Production Overhead I: Fixed Cost (₹)	6,000 (2,000 unit x ₹ 3)	6,000 (1,500 unit x ₹ 4)
Selling price – Material and labour (₹) (A)	8	8
Production Overhead II (Variable Overhead) (B)	2	2
Contribution per unit (A) – (B)	6	6

Breakeven Point = $\frac{\text{Fixed cost}}{\text{Contribution per unit}}$ = $\frac{₹60,000}{₹6}$ = 1,000 units

Question-3

MNP Ltd sold 2,75,000 units of its product at ₹ 37.50 per unit. Variable costs are ₹ 17.50 per unit (manufacturing costs of ₹ 14 and selling cost ₹ 3.50 per unit). Fixed costs are incurred uniformly throughout the year and amount to ₹ 35,00,000 (including depreciation of ₹15,00,000). there are no beginning or ending inventories.

Required:

(i) Estimate breakeven sales level quantity and cash breakeven sales level quantity.

(ii) Estimate the P/V ratio.

(iii) Estimate the number of units that must be sold to earn an income (EBIT) of ₹ 2,50,000.

(iv) Estimate the sales level achieve an after-tax income (PAT) of ₹ 2,50,000. Assume 40% corporate Income Tax rate.

Solution:

(i) Contribution = ₹ 37.50 - ₹ 17.50 = ₹ 20 per unit.

Break even Sales Quantity = $\frac{\text{Fixed cost}}{\text{Contribution margin per unit}} = \frac{₹35,00,000}{₹20} = 1,75,000$ units

Cash Break even Sales Qty = $\frac{\text{Cash Fixed Cost}}{\text{Contribution margin per unit}} = \frac{₹20,00,000}{20} = 1,00,000$ units

(ii) P/V ratio = $\frac{\text{Contribution / unit}}{\text{Selling Price / unit}} \times 100 = \frac{₹20}{37.50} \times 100 = 53.33\%$

(iii) No. of units that must be sold to earn an Income (EBIT) of ₹ 2, 50,000

$\frac{\text{Fixed cost + Desired EBIT level}}{\text{Contribution margin per unit}} = \frac{35,00,000 + 2,50,000}{20} = 1,87,500$ units

(iv) After Tax Income (PAT) = ₹2, 50,000

Tax rate = 40%

Desired level of Profit before tax = $\frac{₹2,50,000}{60} \times 100 = ₹4,16,667$

Estimate Sales Level = $\frac{\text{Fixed Cost + Desired Profit}}{\text{P/ V ratio}}$

Or, $\frac{\text{Fixed cost + desired profit}}{\text{Contribution per unit}} \times$ selling price per unit

$= \frac{₹35,00,000 + ₹4,16,667}{53.33\%} = ₹73,43,750$

Question-4

The following figures are related to LM Limited for the year ending 31st March, 2014 : Sales - 24,000 units @ ₹ 200 per unit; P/V Ratio 25% and Break-even Point 50% of sales. You are required to calculate:

(i) Fixed cost for the year
(ii) Profit earned for the year
(iii) Units to be sold to earn a target net profit of ₹ 11,00,000 for a year.
(iv) Number of units to be sold to earn a net income of 25% on cost.
(v) Selling price per unit if Break-even Point is to be brought down by 4,000 units.

Solution:

Break- even point (in units) is 50% of sales i.e. 12,000 units.
Hence, Break- even point (in sales value) is 12,000 units x ₹ 200 = ₹ 24,00,000

(i) We know that Break even sales = $\frac{\text{Fixed cost}}{\text{P/V Ratio}}$

Or, ₹24,00,000 = $\frac{\text{Fixed cost}}{25\%}$

Or, Fixed Cost = ₹24,00,000 x 25% = ₹6,00,000

So Fixed Cost for the year is ₹ 6,00,000

(ii) Contribution for the year = (24,000 units × ₹ 200) × 25% = ₹ 12,00,000

Profit for the year = Contribution – Fixed Cost

= ₹ 12,00,000 - ₹ 6,00,000 = ₹ 6,00,000

(iii) Target net profit is ₹11,00,000

Hence, Target contribution = Target Profit + Fixed Cost

= ₹11,00,000 + ₹ 6,00,000 = ₹ 17,00,000

Contribution per unit = 25% of ₹ 200 = ₹ 50 per unit

No. of units = $\frac{₹17,00,000}{₹50 \text{ per unit}}$ = 34 units

So, 34,000 units to be sold to earn a target net profit of ₹ 11,00,000 for a year.

(iv) Net desired total Sales (Number of unit × Selling price) be *x* then desired profit is 25% on Cost or 20% on Sales i.e. 0.2 *x*

Desired sales = $\frac{\text{Fixed cost + desired profit}}{\text{P/V Ratio}}$

$x = \frac{6,00,000 + 0.2\,x}{25\%}$

or, $0.25\,x = 6,00,000 + 0.2\,x$

or, 0.05 x = 6,00,000

or, x = ₹ 1,20,00,000

No. of units sold = $\frac{₹1,20,00,000}{₹200}$ = 60,000 units

(v) If Break- even point is to be brought down by 4,000 units then Break-even point will be 12,000 units – 4,000 units = 8,000 units

Let Selling price be ₹ x and fixed cost and variable cost per unit remain unchanged i.e. ₹ 6,00,000 and ₹ 150 respectively.

Breakeven point: Sales revenue = Total cost 8,000 x = 8,000 × ₹ 150 + ₹ 6,00,000

Or, 8,000 x = ₹ 12,00,000 + ₹ 6,00,000

Or, x = $\frac{₹18,00,000}{8,000}$ = ₹25

∴ Selling Price should be ₹ 225

Hence, selling price per unit shall be ₹ 225 if Break-even point is to be brought down by 4,000 units.

Question-5

MFN Limited started its operation in 2012 with the total production capacity of 2,00,000 units. The following data for two years is made available to you:

	2012	2013
Sales units	80,000	1,20,000
Total cost (₹)	34,40,000	45,60,000

There has been no change in the cost structure and selling price and it is expected to continue in 2014 as well. Selling price is ₹ 40 per unit.

You are required to calculate:

(i) Break-Even Point (in units)

(ii) Profit at 75% of the total capacity in 2014

Solution:

	2012	**2013**	**Difference**
Sales Units	80,000	1,20,000	40,000

Sale Value @ ₹ 40	32,00,000	48,00,000	16,00,000
Total Cost (₹)	34,40,000	45,60,000	11,20,000

Variable Cost per unit = $\frac{\text{Change in total cost}}{\text{Change in sale volume}}$

= $\frac{11,20,000}{40,000 \text{ units}}$ = ₹28 per unit

Total Fixed Cost (₹) = ₹ 45,60,000 – (1,20,000 units × ₹28) = ₹12,00,000

(i) Break-even point (in units) = $\frac{\text{Fixed cost}}{\text{Contribution per unit}}$

= $\frac{₹12,00,000}{(₹40 - ₹28)}$ = 1,00,000 units

(ii) Profit at 75% Capacity in 2014.

= (2,00,000 units × 75%) × Contribution per unit – Fixed Cost

= 1,50,000 units × ₹ 12 - ₹ 12,00,000 = ₹ 6,00,000.

Question-6

Arnav Ltd. manufacture and sales its product R-9. The following figures have been collected from cost records of last year for the product R-9:

Elements of Cost	Variable Cost portion	Fixed Cost
Direct Material	30% of Cost of Goods Sold	--
Direct Labour	15% of Cost of Goods Sold	--
Factory Overhead	10% of Cost of Goods Sold	₹ 2,30,000
General & Administration Overhead	2% of Cost of Goods Sold	₹ 71,000
Selling & Distribution Overhead	4% of Cost of Sales	₹ 68,000

Last Year 5,000 units were sold at ₹185 per unit. From the given data find the followings:

(a) Break-even Sales (in rupees)

(b) Profit earned during last year

(c) Margin of safety (in %)

(d) Profit if the sales were 10% less than the actual sales.

Solution:

Working Notes:

(i) Calculation of Cost of Goods Sold (COGS):

COGS = {(DM- 0.3 COGS) + (DL- 0.15 COGS) + (FOH- 0.10 COGS + ₹2,30,000) + (G&AOH- 0.02 COGS + ₹ 71,000)}

Or COGS = 0.57 COGS + ₹ 3,01,000

Or $COGS = \frac{₹3,01,000}{0.43} = ₹7,00,000$

(ii) Calculation of Cost of Sales (COS):

COS = COGS + (S&DOH- 0.04 COS + ₹ 68,000)

Or COS = ₹ 7,00,000 + (0.04 COS + ₹ 68,000)

Or $COS = \frac{₹7,68,000}{0.96} = ₹8,00,000$

(iii) Calculation of Variable Costs:

Direct Material -	(0.3 × ₹ 7,00,000)	₹ 2,10,000
Direct Labour-	(0.15 × ₹ 7,00,000)	₹ 1,05,000
Factory Overhead-	(0.10 × ₹ 7,00,000)	₹ 70,000
General & Administration OH-	(0.02 × ₹ 7,00,000)	₹ 14,000
Selling & Distribution OH	(0.04 × ₹ 8,00,000)	₹ 32,000
		₹4,31,000

(iv) Calculation of total Fixed Costs:

Factory Overhead-	₹ 2,30,000
General & Administration OH-	₹ 71,000
Selling & Distribution OH-	₹ 68,000
	₹3,69,000

(v) Calculation of P/V Ratio:

$P/V\ ratio = \frac{Contribution}{Sales} \times 100 = \frac{Sales - variable\ cost}{Sales} \times 100$

$= \frac{(₹185 \times 5,000\ units) - ₹4,31,000}{₹185 \times 5,000\ units} \times 100 = 53.41\%$

(a) Break-even sale = $\frac{\text{Fixed cost}}{\text{P/V ratio}}$ = $\frac{₹3,69,000}{53.41\%}$ = ₹6,90,882

(b) Profit earned during the last year

= (Sales – Total Variable Costs) – Total Fixed Costs

= (₹ 9,25,000 - ₹ 4,31,000) - ₹ 3,69,000

= ₹ 1,25,000

(c) Margin of safety (%) = $\frac{\text{Sales – Breakeven sales}}{\text{Sales}}$ x 100

= $\frac{₹9,25,000 – 6,90,882}{₹9,25,000}$ x 100 = 25.31%

(d) Profit if the sales were 10% less than the actual sales:

Profit = 90% (₹ 9,25,000 - ₹ 4,31,000) - ₹ 3,69,000

= ₹ 4,44,600 - ₹ 3,69,000 = ₹ 75,600

Question-7

Maxim Ltd. manufactures a product "N-joy". In the month of August 2014, 14,000 units of the product "N-joy" were sold, the details are as under:

	(₹)
Sale Revenue	2,52,000
Direct Material	1,12,000
Direct Labour	49,000
Variable Overheads	35,000
Fixed Overheads	28,000

A forecast for the month of September 2014 has been carried out by the General manger of Maxim Ltd. As per the forecast, price of direct material and variable overhead will be increased by 10% and 5% respectively.

Required to calculate:

(i) Number of units to be sold to maintain the same quantum of profit that made in August 2014.

(ii) Margin of safety in the month of August 2014 and September 2014.

Solution:

Calculation of Profit made in the month of August 2014 by selling 14,000 units.

	Amount per unit (₹)	Amount (₹)
Sales Revenue	18.00	2,52,000
Less: Variable Costs:		
- Direct Material	8.00	1,12,000
- Direct Labour	3.50	49,000
- Variable Overhead	2.50	35,000
Contribution	4.00	56,000
Less: Fixed Overhead	2.00	28,000
Profit	2.00	28,000

(i) To maintain the same amount of profit i.e. ₹ 28,000 in September 2014 also, the company needs to maintain a contribution of ₹ 56,000.

Let, number of units to be sold in September 2014 is '*x*', then the contribution will be

₹ 18 *x* – [(₹8 × 1.10) + ₹ 3.5 + (₹ 2.5 × 1.05)] *x* = ₹ 56,000

₹ 18 *x* – (₹ 8.8 + ₹ 3.5 + ₹ 2.625) *x* = ₹ 56,000

Or, x = ₹56,000 = 18,211.38 units or 18,212 units
₹3.075

(ii) Margin of safety

	August 2014	September 2014
Profit	₹ 28,000	₹ 28,000
P/V Ratio	₹4 x 100 / ₹18	₹3.075 x 100 / ₹18
	₹1,26,000	₹1,63,902.44
Margin of Safety (Profit x 100) / P/V Ratio	(28,000 x 18 x 100) / 400	(28,000 x 18 x 100) / 307.5

Question-8

Maryanne Petrochemicals Ltd. is operating at 80 % capacity and presents the following information:

Break-even Sales ₹ 400 crores

P/V Ratio 30 %

Margin of Safety ₹ 120 crores

Maryanne's management has decided to increase production to 95 % capacity level with the following modifications:

(a) The selling price will be reduced by 10%.

(b) The variable cost will be increased by 2% on sales

(c) The fixed costs will increase by ₹ 50 crores, including depreciation on additions, but excluding interest on additional capital.

Additional capital of ₹ 100 crores will be needed for capital expenditure and working capital.

Required:

(i) Indicate the sales figure, with the working, that will be needed to earn ₹ 20 crores over and above the present profit and also meet 15% interest on the additional capital.

(ii) What will be the revised

(a) Break-even Sales

(b) P/V Ratio

(c) Margin of Safety

Solution:

Working Notes:

1. Total Sales = Break -even Sales + Margin of Safety
   = ₹ 400 crores + ₹ 120 crores
   = ₹ 520 crores
2. Variable Cost = Total Sales × (1- P/V Ratio)
   = ₹ 520 crores × (1 – 0.3)
   = ₹ 364 crores
3. Fixed Cost= Break-even Sales × P/V Ratio
   = ₹ 400 crores × 30%
   = ₹ 120 crores
4. Profit = Total Sales – (Variable Cost + Fixed Cost)

= ₹ 520 crores – (₹ 364 crores + ₹ 120 crores)

= ₹ 36 crores

(i) Revised Sales figure to earn profit of ₹ 56 crores (i.e. ₹ 36 crores + ₹ 20 crores)

$$\text{Revised Sales} = \frac{\text{Revised Fixed cost*} + \text{Desired profit}}{\text{Revised P/V ratio**}}$$

$$= \frac{₹185 \text{ crores} + ₹56 \text{ crores}}{28\%}$$

= ₹860.71 Crores

*Revised Fixed Cost = Present Fixed Cost + Increment in fixed cost + Interest on additional Capital

= ₹ 120 crores + ₹ 50 crores + 15% of ₹ 100 crores

= ₹ 185 crores

**Revised P/V Ratio : Let current selling price per unit be ₹ 100.

Therefore, Reduced selling price per unit = ₹ 100 × 90% = ₹ 90

Revised Variable Cost on Sales = 70%+ 2% = 72%

Variable Cost per unit = ₹ 90 × 72% = ₹ 64.80

Contribution per unit = ₹ 90 - ₹ 64.80 = ₹ 25.20

$$\text{Revised P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{₹25.2}{₹90} \times 100 = 28\%$$

(ii) (a) $\text{Revised Break-even Sales} = \frac{\text{Fixed cost}}{\text{P/V ratio}} \times 100 = \frac{₹185 \text{ crores}}{28\%}$ = ₹660.71 crores

(b) Revised P/V Ratio = 28% (as calculated above)

(c) Revised Margin of safety = Total Sales – Break-even Sales

= ₹ 860.71 crores - ₹ 660.71 crores

= ₹ 200 crores.

Question-9

Maximum Production capacity of KM (P) Ltd. is 28000 units per month. Output at different levels along with cost data is furnished below:

	Activity Level

Particulars of Costs	16,000 units	18,000 units	20,000 units
Direct Material	₹ 12,80,000	₹ 14,40,000	₹ 16,00,000
Direct labour	₹ 17,60,000	₹ 19,80,000	₹ 22,00,000
Total factory overheads	₹ 22,00,000	₹ 23,70,000	₹ 25,40,000

You are required to work out the selling price per unit a an activity level of 24,000 units by considering profit at the rate of 25% on sales.

Solution:

Computation of Overheads:

Variable overheads per unit = $\frac{\text{Change in factory overheads}}{\text{Change in factory level}}$

$= \frac{23,70,000 - 22,00,000}{18000 - 16,000}$ or $\frac{25,40,000 - 23,70,000}{20,000 - 18,000}$

$= \frac{17,000}{2,000}$ = ₹85 per unit

Fixed Overhead

Activity level = 16,000 units

Particulars	Amount (₹)
Total factory overheads	22,00,000
Less : Variable overheads 16,000 units @ ₹85 per unit	13,60,000
Fixed Overhead	8,40,000

Computation of Costs at Activity Level 24,000 units

	Per Unit (₹)	Amount (₹)
Direct Material (12,80,000/16,000)	80.00	19,20,000
Direct Labour (17,60,000/16,000)	110.00	26,40,000
Variable Overhead (As calculated above)	85.00	20,40,000
Fixed Overhead		8,40,000
Total Cost		74,40,000

Computation of Selling Price at activity level 24,000 units

Profit required is 25% on selling price, hence cost will be 75%.

Therefore, desired profit = $\frac{25 \times 74,40,000}{75}$ = ₹24,80,000

Cost of 24,000 units	74,40,000
Desired Profit	24,80,000
Total Sales	99,20,000

Selling price per unit = $\frac{\text{Total sales}}{\text{No. of units}} = \frac{99,20,000}{24,000}$ = ₹413.33 or ₹413

Question-10 (RTP Nov. 20) New Course

SK Lit. is engaged in the manufacture of tyres. Analysis of income statement indicated a profit of ₹ 150 lakhs on a sales volume of 50,000 units. The fixed costs are ₹ 850 lakhs which appears to be high. Existing selling price is ₹ 3,400 per unit. The company is considering to revise the profit target to ₹ 350 lakhs. You are required to compute –

(i) Break- even point at existing levels in units and in rupees.

(ii) The number of units required to be sold to earn the target profit.

(iii) Profit with 15% increase in selling price and drop in sales volume by 10%.

(iii) Volume to be achieved to earn target profit at the revised selling price as calculated in (ii) above, if a reduction of 8% in the variable costs and ₹ 85 lakhs in the fixed cost is envisaged.

Solution:

Sales Volume 50,000 Units

Computation of existing contribution

Particulars	Per unit (₹)	Total (₹ In lakhs)
Sales	3,400	1,700
Fixed Cost	1,700	850
Profit	300	150
Contribution	2,000	1,000
Variable Cost	1,400	700

(i) Break-even sales in units = $\frac{\text{Fixed cost}}{\text{Contribution per unit}} = \frac{₹85,00,000}{2,000}$ = 42,500 units

Break even sales in rupees = 42,500 units × ₹ 3,400 = ₹ 1,445 lakhs

OR

P/V Ratio = $\frac{2,000}{}$ x 100 = 58.82%

3,400

B.E.P. (Rupees) = $\frac{FC}{P/V\ Ratio}$ = $\frac{8,50,00,000}{58.82\%}$ = ₹1445 Lakhs (approx.)

(ii) Number of units sold to achieve a target profit of ₹350 lakhs:

Desired Contribution = Fixed Cost + Target Profit
= 850 L + 350 L = 1,200L

No. of units to be sold = $\frac{\text{Desired contribution}}{\text{Contribution per unit}}$ = $\frac{12,00,00,000}{2,000}$ = 60,000 units

(iii) Profit if selling price is increased by 15% and sales volume drops by 10%:

Existing Selling Price per unit = ₹ 3,400

Revised selling price per unit = ₹ 3,400 x 115% = ₹ 3,910

Existing Sales Volume = 50,000 units

Revised sales volume = 50,000 units – 10% of 50,000 = 45,000 units.

Statement of profit at sales volume of 45,000 units @ ₹ 3910 per unit

Particulars	Per unit (₹)	Total (₹ In lakhs)
Sales	3,910.00	1,759.50
Less: Variable Costs	1,400.00	630.00
Contribution	2,510.00	1,129.50
Less: Fixed Cost		850.00
Profit		279.50

(vi) Volume to be achieved to earn target profit of ₹350 lakhs with revised selling price and reduction of 8% in variable costs and ₹85 lakhs in fixed cost:

Revised selling price per unit = ₹ 3,910

Variable costs per unit existing = ₹1,400

Revised Variable Costs

Reduction of 8% in variable costs = ₹ 1,400 – 8% of 1,400
= ₹ 1,400 – ₹112 = ₹1,288

Total Fixed Cost (existing) = ₹ 850 lakhs

Reduction in fixed cost = ₹ 85 lakhs

Revised fixed cost = ₹ 850 lakhs – ₹ 85 lakhs = ₹765 lakhs

Revised Contribution (unit) = Revised selling price per unit – Revised Variable Costs per units

Revised Contribution per unit = ₹ 3,910 – ₹ 1,288 = ₹ 2,622

Desired Contribution = Revised Fixed Cost + Target Profit

= ₹ 765 lakhs + ₹350 lakhs = ₹1,115 lakhs

No. of units to be sold = Desired contribution / Contribution per units = ₹1,115 lakhs / ₹2,622 = 42,525 units

Part-C: Cost Indifference and Shut-down Point

A. QUESTION FROM STUDY MATERIAL

TEST YOUR KNOWLEDGE

Question-16 (Shut-down point)

Mr. X has 2,00,000 investments in his business firm. He wants a 15 per cent return on his money. From an analysis of recent cost figures, he finds that his variable cost of operating is 60 per cent of sales, his fixed costs are ₹ 80,000 per year. Show COMPUTATIONS to answer the following questions:

(i) What sales volume must be obtained to break even?

(ii) What sales volume must be obtained to get 15 per cent return on investment?

(iii) Mr. X estimates that even if he closed the doors of his business, he would incur ₹ 25,000 as expenses per year. At what sales would he be better off by locking his business up?

Hints: (i) BEP = ₹2,00,000 (ii) Contribution = ₹1,10,000 (iii) Shut down point = ₹1,37,500

Question-17 (Cost Indifference)

The following are cost data for three alternative ways of processing the clerical work for cases brought before the LC Court System:

	A Manual (₹)	B Semi-Automatic (₹)	C Fully-Automatic (₹)
Monthly fixed cost:			
Occupancy	15, 000	15,000	15,000
Maintenance contract	---	5,000	10,000
Equipment lease	---	25,000	1,00,000
Unit Variable Costs (per report):			
Supplies	40	80	20
Labour	₹200 (5 hrs × ₹40)	₹60 (1 hr × ₹60)	₹20 (0.25 hr × ₹80)

Required

(i) CALCULATE cost indifference points. Interpret your results.

(ii) If the present case load is 600 cases and it is expected to go up to 850 cases in near future, SELECT most appropriate on cost considerations?

Hints: Cost indifference: A& B = 300 units, B & C = 800 units, A & C = 550 units

Question-18 (BEP & Cost-Indifference)

XY Ltd. makes two products X and Y, whose respective fixed costs are F1 and F2. You are given that the unit contribution of Y is onefifth less than the unit contribution of X, that the total of F 1 and F2 is ₹1,50,000, that the BEP of X is 1,800 units (for BEP of X, F2 is not considered) and that 3,000 units is the indifference point between X and Y.(i.e. X and Y make equal profits at 3,000 unit volume, considering their respective fixed costs). There is no inventory buildup as whatever is produced is sold.

Required

FIND OUT the values F1 and F2 and units contributions of X and Y.

Hints:

	Contribution	FC
X	50	₹90,000
Y	40	₹60,000

B. PAST YEAR EXAM QUESTIONS

July-21 Q1(b) (5 marks)

LR Ltd. is considering two alternative methods to manufacture a new product it intends to market. The two methods have a maximum output of 50,000 units each and produce identical items with a selling price of ₹ 25 each. The costs are:

	Method-1 Semi-Automatic (₹)	Method-2 Fully-Automatic (₹)
Variable cost per unit	15	10
Fixed costs	1,00,000	3,00,000

You are required to calculate:

(1) Cost Indifference Point in units. Interpret your results.
(2) The Break-even Point of each method in terms of units.

Solution:

(i) Cost Indifference Point

	Method-1 and Method-2 (₹)
Differential Fixed Cost (I)	₹ 2,00,000 (₹ 3,00,000 – ₹ 1,00,000)
Differential Variable Costs (II)	₹ 5 (₹ 15 – ₹ 10)
Cost Indifference Point (I/II) (Differential Fixed Cost / Differential Variable Costs *per unit*)	**40,000**

Interpretation of Results

At activity level below the indifference points, the alternative with lower fixed costs and higher variable costs should be used. At activity level above the indifference point, alternative with higher fixed costs and lower variable costs should be used.

No. of Product	Alternative to be Chosen
Product ≤ 40,000 units	Method-1, Semi-Automatic
Product ≥ 40,000 units	Method-2, Automatic

Break Even point (in units)

	Method-1	Method-2
$\text{BEP (in units)} = \frac{\text{Fixed cost}}{\text{Contribution per unit}}$	$\frac{1,00,000}{(25-15)} = 10,000$	$\frac{3,00,000}{(25-10)} = 20,000$

Part-D: Miscellaneous Questions

A. QUESTION FROM STUDY MATERIAL

Question-11 (Profit Calc. under –Marginal & Absorption)

Wonder Ltd. manufactures a single product, ZEST. The following figures relate to ZEST for a one-year period:

Activity Level	50%	100%
Sales and production (units)	400	800
	(₹)	(₹)
Sales	8,00,000	16,00,000
Production costs:		
- Variable	3,20,000	6,40,000
- Fixed	1,60,000	1,60,000
Selling and distribution costs:		

- Variable	1,60,000	3,20,000
- Fixed	2,40,000	2,40,000

The normal level of activity for the year is 800 units. Fixed costs are incurred evenly throughout the year, and actual fixed costs are the same as budgeted. There were no stocks of ZEST at the beginning of the year.

In the first quarter, 220 units were produced and 160 units were sold. Required:

(a) COMPUTE the fixed production costs absorbed by ZEST if absorption costing is used?

(b) CALCULATE the under/over-recovery of overheads during the period?

(c) CALCULATE the profit using absorption costing?

(d) CALCULATE the profit using marginal costing?

Hints: (a) ₹44,000, (b) ₹4,000, (c) Profit = ₹40,000, (d) Profit = ₹28,000

Question-12 (Profit Calculation)

The profit for the year of R.J. Ltd. works out to 12.5% of the capital employed and the relevant figures are as under:

Sales	₹ 5,00,000
Direct Materials	₹ 2,50,000
Direct Labour	₹ 1,00,000
Variable Overheads	₹40,000
Capital Employed	₹ 4,00,000

The new Sales Manager who has joined the company recently estimates for next year a profit of about 23% on capital employed, provided the volume of sales is increased by 10% and simultaneously there is an increase in Selling Price of 4% and an overall cost reduction in all the elements of cost by 2%.

Required:

Find Out by computing in detail the cost and profit for next year, whether the proposal of Sales Manager can be adopted.

Hints: Proposal of sales manager should be accepted (ROCE = 23.19%, Profit = ₹92,780).

Question-13 (Opportunity Cost)

A company can make any one of the 3 products X, Y or Z in a year. It can exercise its option only at the beginning of each year.

Relevant information about the products for the next year is given below.

	X	Y	Z
Selling Price (₹ / unit)	10	12	12
Variable Costs (₹ / unit)	6	9	7
Market Demand (unit)	3,000	2,000	1,000
Production Capacity (unit)	2,000	3,000	900
Fixed Costs (₹)	30,000		

Required
COMPUTE the opportunity costs for each of the products.
Hints: Opportunity cost: X = ₹6,000, Y = ₹8,000, Z = ₹8,000

Question-14 (Decision making – Key factor)

X Ltd. supplies spare parts to an air craft company Y Ltd. The production capacity of X Ltd. facilitates production of any one spare part for a particular period of time. The following are the cost and other information for the production of the two different spare parts A and B:

		Part A	Part B
Per unit			
Alloy usage		1.6 kgs.	1.6 kgs.
Machine Time: Machine A		0.6 hrs	0.25 hrs.
Machine Time: Machine B		0.5 hrs.	0.55 hrs.
Target Price (₹)		145	115
Total hours available	Machine A 4,000 hours		
	Machine B 4,500 hours		

Alloy available is 13,000 kgs. @ ₹ 12.50 per kg.
Variable overheads per machine hours Machine A: ₹ 80

Machine B: ₹ 100

Required

(i) Identify the spare part which will optimize contribution at the offered price.

(ii) If Y Ltd. reduces target price by 10% and offers ₹ 60 per hour of unutilized machine hour, calculate the total contribution from the spare part identified above?

Hints: (i) Spare part 'A' shall optimize contribution (i.e. A = 1,79,982 & B = 1,62,500)
(ii) Total Contribution = ₹1,53,345

Question-15 (Decision making)

ABC Limited produces and sells two product- X and Y. The product is highly demanded in the market. Following information relating to both the products are given as under :

	X	Y
Direct Materials	140	180
Direct Wages	60	100
Variable Overheads (₹ 5 per machine hour)	20	40
Selling price	300	450

The company is facing scarcity of machine hours for working. The availability of machine hours are limited to 60,000 hrs in a month. At present, the monthly demand of product X and product Y is 8,000 units and 6,000 units respectively. The fixed expenses of the company are ₹ 2,25,000 per month.

You are required to:
DETERMINE the product mix that generates maximum profit to the company in the given situation and also CALCULATE the profit of the company.

Hints:

(i) Product mix to maximise the profit

Produce 'X' = 8,000 units
Hours Required = 32,000 hrs (8,000 units × 4 hrs.)
Balance Hours Available = 28,000 hrs (60,000 hrs. – 32,000 hrs.)
Produce 'Y' (balance) = 3,500 units (28,000 hrs./ 8 hrs.)

(ii) Profitability of the concern in the best Product mix

	X (₹)	Y (₹)	Total (₹)
Sales (in units)	8,000 units	3,500 units	
Contribution per unit	80	130	
Contribution	6,40,000	4,55,000	10,95,000
Less: Fixed cost			2,25,000
Profit			**8,70,000**

Question-16 (Special Order)

PQR Ltd. manufactures medals for winners of athletic events and other contests. Its manufacturing plant has the capacity to produce 10,000 medals each month. The company has current production and sales level of 7,500 medals per month. The current domestic market price of the medal is ₹ 150.

The cost data for the month of August 2021 is as under:

	(₹)
Variable costs:	
- Direct materials	2,62,500
- Direct labour cost	3,00,000
- Overhead	75,000
Fixed manufacturing costs	2,75,000
Fixed marketing costs	1,75,000
	10,87,500

PQR Ltd. has received a special one-time only order for 2,500 medals at ₹ 120 per medal.

Required:

(i) Should PQR Ltd. accept the special order? Why? EXPLAIN briefly.

(ii) Suppose the plant capacity was 9,000 medals instead of 10,000 medals each month. The special order must be taken either in full or rejected totally. ANALYSE whether PQR Ltd. should accept the special order or not.

Hints:

(i) The offer for 2,500 unit be accepted as it increases the profit by ₹ 87,500 (₹ 1,25,000 – ₹ 37,500).

(ii) By accepting the special order at ₹ 120 per unit, the total profit of the company is increased by ₹ 22,500 (₹ 60,000 – ₹ 37,500) hence the order may be accepted, however, other qualitative factors may also be taken care-off.

Question-17 (Make or Buy Decision)

NN Ltd. manufactures automobiles accessories and parts. The following are the total cost of processing 2,00,000 units:

Direct materials cost	₹ 375 per unit
Direct labour cost	₹ 80 per unit
Variable factory overhead	₹ 16 per unit
Fixed factory overhead	₹ 500 lakhs

The purchase price of the component is ₹ 485. The fixed overhead would continue to be incurred even when the component is bought from outside.

REQUIRED:

(a) Should the part be made or bought from outside considering that the present facility when released following a buying decision would remain idle?

(b) In case the released capacity can be rented out to another manufacturer for ₹ 32,00,000 having good demand. What should be the decision?

Hints:

(a) The decision shall be made comparing the marginal cost of making and buying the component.

Here the variable cost of making the component is ₹ 471 as compared to buying cost of ₹ 485. The component shall be made by using own production facility as it would save the company ₹ 14 per unit.

(b) If by releasing the production facility the company can earn a rental income of ₹ 32,00,000, then the additional cost of buying from outside and the rental income from releasing the capacity shall be compared for making decision. The component should be bought from outside as it would save the company ₹ 4,00,000 in fixed cost.

TEST YOUR KNOWLEDGE

Question-19 (Profit Calc. under – Marginal & Absorption)

XYZ Ltd. has a production capacity of 2,00,000 units per year. Normal capacity utilisation is reckoned as 90%. Standard variable production costs are ₹11 per unit. The fixed costs are ₹3,60,000 per year. Variable selling costs are ₹3 per unit and fixed selling costs are ₹2,70,000 per year. The unit selling price is ₹20.

In the year just ended on 30th June, 20X4, the production was 1,60,000 units and sales were 1,50,000 units. The closing inventory on 30th June was 20,000 units. The actual variable production costs for the year were ₹ 35,000 higher than the standard.

(i) Calculate the profit for the year
   a. by absorption costing method and
   b. by marginal costing method.

(ii) Explain the difference in the profits.

Hints: Absorption = ₹2,59,275, Marginal = ₹2,39,375

Question-20 (Determine Selling price- Cost Sheet)

An Indian soft drink company is planning to establish a subsidiary company in Bhutan to produce mineral water. Based on the estimated annual sales of 40,000 bottles of the mineral water, cost studies produced the following estimates for the Bhutanese subsidiary:

	Total annual costs	**Percent of Total Annual Cost which is variable**
Material	2,10,000	100%
Labour	1,50,000	80%
Factory Overheads	92,000	60%
Administration Expenses	40,000	35%

The Bhutanese production will be sold by manufacturer's representatives who will receive a commission of 8% of the sale price. No portion of the Indian office expenses is to be allocated to the Bhutanese subsidiary. You are required to

1. COMPUTE the sale price per bottle to enable the management to realize an estimated 10% profit on sale proceeds in Bhutan.
2. CALCULATE the break-even point in rupees sales as also in number of bottles for the Bhutanese subsidiary on the assumption that the sale price is ₹ 14 per bottle.

   Hints: (i) SP per bottle = ₹15, (ii) BEP = ₹4,48,000

Question-21 (Determine profit- Cost Sheet)

An automobile manufacturing company produces different models of Cars. The budget in respect of model 007 for the month of March, 20X9 is as under:

Budgeted Output			**40,000 Units**
		₹ In lakhs	₹ In lakhs
Net Realisation			2,10,000
Variable costs:			
Material		79,200	

Labour		15,600	
Direct Expenses		37,200	1,32,000
Specific Fixed Costs		27,000	
Allocated Fixed Cost		33,750	60,750
	Total Cost		1,92,750
	Profit		17,250
	Sales		2,10,000

CALCULATE:

(i) Profit with 10 percent increase in selling price with a 10% reduction in sales volume.
(ii) Volume to be achived to maintain the proginal profit after a 10% rise in material costs, at the originally budgeted selling price per unit.

Hints: (i) Profit = ₹28,350, (ii) Required sales = 44,521 units

Question-22

A company is considering four alternative proposals for a new toy manufacturing Machine launched in the market. New machine is expected to produce approximately 25,000 toys every year. The proposals are as follows:

(i) Purchase and maintain the new toy manufacturing Machine and bear all related costs. These machines will run on fuel. The average cost of a Machine is ₹ 10,00,000. Life of the machine is 4 years with annual production of 25,000 toys and the Resale value is ₹ 2,00,000 at the end of the fourth year.

(ii) Hire from Agency-A: It can hire the machine from the Agency-A and pay hire charges at the rate of ₹ 20 per toy and bear no other cost.

(iii) Hire from Agency-B: It can hire the machine from the Agency-B and pay hire charges at the rate of ₹ 12 per toy and also bear insurance costs. All other costs will be borne by Agency-B.

(iv) Hire from Agency-C: Hire machine from Agency-C at ₹ 2,50,000 per year. These machines are more advanced and run on electricity and therefore, the running cost is considerably low. The company will have to bear costs of electricity, licensing fees and spare parts. However, Repairs and maintenance and Insurance cost are borne by Agency-C.

The following further details are available:

The cost of Fuel is ₹ 8 per toy, the cost of spare parts is ₹ 0.20 per toy and the cost of electricity is ₹ 2 per toy. Further, the cost of Repairs and maintenance is ₹ 0.25 per toy, the amount of licensing fees to be paid is ₹ 5,000 per machine per annum and the cost of Insurance to be paid is ₹ 25,000 per machine per annum. Consider no taxes.

You are required to:

(i) CALCULATE the relative costs of four proposals on cost per toy basis.

(ii) RANK the proposals on the basis of total cost for 25,000 toys per year.

(iii) RECOMMEND the best proposal to company in view of (ii) above.

Hints:

Particulars	**Proposals**			
	Purchase of machine (₹)	**Hire Agency-A (₹)**	**Hire Agency-B (₹)**	**Hire Agency-C (₹)**
Total Cost (A)	4,41,250	5,00,000	3,25,000	3,10,000
No. of toys (units) (B)	25,000	25,000	25,000	25,000
(i) Cost per toy (A/B)	17.65	20.00	13.00	12.40
(ii) Ranking of proposals	III	IV	II	I

Recommendation: Proposal of Hire machine from Agency-C is acceptable as the cost of manufacturing toys is lowest.

B. PAST YEAR EXAM QUESTIONS

May-23. Q4(c) (5 marks)

MNP Company Limited produces two products 'A' and 'B'. The relevant cost and sales data per unit of output is as follows.

Particulars	Product A (₹)	Product B (₹)
Direct material	55	60
Direct labour	35	45
Variable factory overheads	40	20
Selling Price	180	175

The availability of machine hours is limited to 55,000 hours for the month. The monthly demand for product 'A' and product 'B' is 5,000 units and 6,000 units, respectively. The fixed expenses of the company are ₹1,40,000 per month. Variable factory overheads are ₹ 4 per machine hour. The company can produce both products according to the market demand.

Required:

Calculate the product mix that generates maximum profit for the company in the situation and also calculate profit of the company.

Solution:

Particulars	Product A ₹	Product B ₹
Selling Price	180	175
Variable cost:		
Direct Material	55	60
Direct labour	35	45
Variable factory overheads	40	20
	130	125
Contribution	50	50
Machine hour (p.u.)	10	5
Contribution per hour	**5**	**10**
Rank	**II**	**I**

Calculation of Product Mix

Hours available	55,000
Product B (6000 x 5)	**30,000**
Balance Hours	25,000
Product A (2500 x 10)	**25,000**
Balance Hours	0

Calculation of Profit

		₹
Contribution		
A	2500 units x 50	
B	6000 units x 50	4,25,000
Less:	Fixed cost	(1,40,000)
	Profit	**2,85,000**

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1 (Profit Calc. Under- Marginal & Absorption Costing)

Mega Company has just completed its first year of operations. The unit costs on a normal costing basis are as under:

		(₹)
Direct material 4 kg @ ₹ 4	=	16.00
Direct labour 3 hrs @ ₹ 18	=	54.00
Variable overhead 3 hrs @ ₹ 4	=	12.00
Fixed overhead 3 hrs @ ₹ 6	=	18.00
		100.00

Selling and administrative costs:

Variable ₹ 20 per unit
Fixed ₹ 7,60,000

During the year the company has the following activity:

Units produced = 24,000
Units sold = 21,500

Unit selling price	=	₹ 168
Direct labour hours worked	=	72,000

Actual fixed overhead was ₹ 48,000 less than the budgeted fixed overhead. Budgeted variable overhead was ₹ 20,000 less than the actual variable overhead. The company used an expected actual activity level of 72,000 direct labour hours to compute the predetermine overhead rates.

Required :

(i) Compute the unit cost and total income under:
- *(a)* Absorption costing
- *(b)* Marginal costing

(ii) Under or over absorption of overhead.
Reconcile the difference between the total income under absorption and marginal costing.

Solution:

(i) Computation of Unit Cost & Total Income

Unit Cost	**Absorption Costing (₹)**	**Marginal Costing (₹)**
Direct Material	16.00	16.00
Direct Labour	54.00	54.00
Variable Overhead (₹12 + ₹20,000/24,000)	12.83	12.83
Fixed Overhead	18.00	--
Unit Cost	100.83	82.83

Income Statements

Absorption Costing	**(₹)**
Sales (21,500 units × ₹168)	36,12,000
Less: Cost of goods sold (Refer the working note)	(21,19,917)
	14,92,083
	(11,90,000)

Less: Selling & Distribution Expenses	3,02,083
Profit	

Marginal Costing	**(₹)**
Sales (as above)	36,12,000
Less: Cost of goods sold (Refer the working note)	(17,80,917)
	18,31,083
Less: Selling & Distribution	(4,30,000)
Expenses Contribution	14,01,083
Less: Fixed Factory and Selling & Distribution Overhead (₹ 3,84,000 + ₹ 7,60,000)	(11,44,000)
Profit	2,57,083

(ii) Under or over absorption of overhead:

	(₹)
Fixed Overhead:	
Budgeted (₹6 × 72,000 hours)	4,32,000
Actual (₹4,32,000 – ₹48,000)	3,84,000
Over-absorption	48,000
Variable Overhead: Budgeted (₹4 × 72,000 hours)	
Actual (₹2,88,000 + ₹20,000)	2,88,000
Under-absorption	3,08,000
	20,000

(iii) Reconciliation of Profit:

Difference in Profit: ₹ 3,02,083 – ₹ 2,57,083 = ₹ 45,000

Due to Fixed Factory Overhead being included in Closing Stock in Absorption Costing not in Marginal Costing.

Therefore, Difference in Profit = Fixed Overhead Rate (Production – Sale)

= ₹18 (24,000 – 21,500) = ₹45,000

Working Note:

Calculation of Cost of Goods Sold

	Absorption Costing	**Marginal Costing**

Direct Materials (₹16 × 24,000)	3,84,000	3,84,000
Direct labour (₹54 × 24,000)	12,96,000	12,96,000
Variable OH (₹12 × 24,000 + ₹20,000)	3,08,000	3,08,000
Fixed Overhead (₹18 × 24,000)	4,32,000	--
	24,20,000	19,88,000
Add: Opening stock	--	--
Less: Closing Stock (24,000 – 21,500)	(2,52,083)	(2,07,083)
	(₹24,20,000 x 2500 units) 24,000 units	(₹19,88,000 x 2500 units) 24,000 units
Cost of Goods Produced	21,67,917	17,80,917
Add: Adjustment for over/ under absorption	(48,000)	--
	21,19,917	17,80,917

Question-2 (Profit Calc. Under- Marginal & Absorption Costing)

ABC Ltd. can produce 4,00,000 units of a product per annum at 100% capacity. The variable production costs are ₹ 40 per unit and the variable selling expenses are ₹ 12 per sold unit. The budgeted fixed production expenses were ₹ 24,00,000 per annum and the fixed selling expenses were ₹ 16,00,000. During the year ended 31st March, 2014, the company worked at 80% of its capacity. The operating data for the year

Production	3,20,000 units
Sales @ ₹ 80 per unit	3,10,000 units
Opening stock of finished goods	40,000 units

are as follows:

Fixed production expenses are absorbed on the basis of capacity and fixed selling expenses are recovered on the basis of period.

You are required to prepare Statements of Cost and Profit for the year ending 31st March, 2014:

(i) On the basis of marginal costing

(ii) On the basis of absorption costing

Solution:

(i) Statement of Cost and Profit under Marginal Costing

for the year ending 31st March, 2014

Output = 3,20,000 units

Particulars	**Amount (₹)**	**Amount (₹)**
Sales: 3,10,000 units @ ₹ 80		2,48,00,000
Marginal cost / variable cost:		
Variable cost of production (3,20,000 x ₹ 40)	1,28,00,000	
Add: Opening stock 40,000 units @ ₹ 40	16,00,000	
	1,44,00,000	
Less: Closing Stock (₹1,44,00,000 x 50,000 units*)	(20,00,000)	
3,60,000 units		
Variable cost of production of 3,10,000 units	1,24,00,000	
Add: Variable selling expenses @ ₹ 12 per unit	37,20,000	1,61,20,000
Contribution (sales – variable cost)		86,80,000
Less: Fixed production cost	24,00,000	
Fixed selling expenses	16,00,000	(40,00,000)
Actual profit under marginal costing		46,80,000

* Closing stock = 40,000 + 3,20,000 – 3,10,000 = 50,000 units

Statement of Cost and Profit under Absorption Costing
for the year ending 31st March, 2014

Output = 3,20,000 units

Particulars	**Amount (₹)**	**Amount (₹)**
Sales: 3,10,000 units @ ₹ 80		2,48,00,000
Less: Cost of Goods sold:		
Variable cost of production		
(3,20,000 @ ₹ 40)	1,28,00,000	

Add: Fixed cost of production absorbed 3,20,000 units @ ₹ 6 (1)	19,20,000	
	1,47,20,000	
Add: Opening Stock (₹1,47,20,000 x 40,000) / 3,20,000	18,40,000	
	1,65,60,000	
Less: Closing Stock (₹1,65,60,000 x 50,000) / 3,60,000	(23,00,000)	
	1,42,60,000	
Production cost of 3,10,000 units		
Adjustment for Over/ under-absorption:	4,80,000	
Under absorption of fixed production overheads (2)	1,47,40,000	
Cost of Goods Sold	37,20,000	
Selling expenses:	16,00,000	(2,00,60,000)
Variable: ₹ 12 x 3,10,000 units		
Fixed		
Actual profit under absorption costing		47,40,000

Working:

1. Absorption rate for fixed cost of production = ₹24,00,000 / 4,00,000 units = ₹6 per unit
2. Fixed production overhead under absorbed = ₹ (24,00,000 – 19,20,000) =₹4,80,000.

D. PAST YEAR EXAM QUESTIONS

Nov-22. Q4(a) (5 marks)

An agriculture based company having 210 hectares of land is engaged in growing three different cereals namely, wheat, rice and maize annually. The yield of the different crops and their selling prices are given below:

	Wheat	Rice	Maize
Yield (in kgs per hectare)	2,000	500	100
Selling Price (₹ per kg)	20	40	250

The variable cost data of different crops are given below:

(All figures in ₹ per kg)

Crop	Labour charges	Packing Materials	Other variable expenses
Wheat	8	2	4
Rice	10	2	1
Maize	120	10	20

The company has a policy to produce and sell all the three kinds of crops. The maximum and minimum area to be cultivated for each crop is as follows:

Crop	Maximum Area (in hectares)	Minimum Area (in hectares)
Wheat	160	100
Rice	50	40
Maize	60	10

You are required to:

(i) Rank the crops on the basis of contribution per hectare.

(ii) Determine the optimum product mix considering that all the three cereals are to be produced.

(iii) Calculate the maximum profit which can be achieved if the total fixed cost per annum is ₹ 21,45,000.

(Assume that there are no other constraints applicable to this company)

Solution:

(i) Statement showing Ranking of crops on the basis of Contribution per hectare

Sl. No	Particulars	Wheat	Rice	Maize
(I)	Sales price per kg (₹)	20	40	250
(II)	Variable cost* per kg (₹)	14	13	150
(III)	Contribution per kg (₹)	6	27	100
(IV)	Yield (in kgs per hectare)	2,000	500	100
(V)	Contribution per hectare (₹)	12,000	13,500	10,000
(VI)	Ranking	II	I	III

*Variable cost = Labour Charges +Packing Material+ Other Variable Expenses
Therefore, to maximize profits, the order of priority of production would be Rice, Wheat and Maize.

(ii) & (iii) Statement showing optimum product mix considering that all the three cereals are to be produced and maximum profit thereof

Sl. No.	Particulars	Wheat	Rice	Maize	Total
(i)	Minimum Area (in hectare)	100	40	10	150
(ii)	Remaining area (in hectare)				60
(iii)	Distribution of remaining area based on ranking considering Maximum area	50	10	-	60
(iv)	Optimum mix (in hectare)	150	50	10	210
(v)	Contribution per hectare (₹)	12,000	13,500	10,000	
(vi)	Total contribution (₹)	18,00,000	6,75,000	1,00,000	25,75,000
(vii)	Fixed cost (₹)				21,45,000
(viii)	Maximum Profit (₹)				4,30,000

Optimum Product Mix and calculation of maximum profit earned by company can also be presented as below

(ii) Optimum Product Mix:

Particular	Area (in hectares)	Yield (kg per hectare)	Total Production (in kgs)
(a) Maximum of Rice	50	500	25000
(b) Minimum of Maize	10	100	1000
(c) Balance of Wheat	150	2000	300000
	210		326000

(iii) Calculation of maximum profit earned by the company:

	Production (in kgs)	Contribution (₹ per kg)	Total contribution (₹)
(a) Rice	25,000	24	6,75,000
(b) Maize	1,000	100	1,00,000
(c) Wheat	3,00,000	6	18,00,000
Total contribution			25,75,000
Less: Total Fixed Cost per annum			(21,45,000)
Maximum profits earned by the company			4,30,000

Nov-20. Q1(b) (5 marks)

Moon Ltd. produces products 'X', 'Y' and 'Z' and has decided to analyse it's production mix in respect of these three products - 'X', 'Y' and 'Z'.

You have the following information:

	X	Y	Z
Direct Materials ₹ (per unit)	160	120	80
Variable Overheads ₹ (per unit)	8	20	12

Direct labour:

Departments:	Rate per Hour (₹)	Hours per unit	Hours per unit	Hours per unit
		X	Y	Z
Department-A	4	6	10	5
Department-B	8	6	15	11

From the current budget, further details are as below :

	X	Y	Z
Annual Production at present (in units)	10,000	12,000	20,000
Estimated Selling Price per unit (₹)	312	400	240
Sales departments estimate of possible sales in thecoming year (in units)	12,000	16,000	24,000

There is a constraint on supply of labour in Department-A and its manpower cannot be increased beyond its present level.

Required:

(i) Identify the best possible product mix of Moon Ltd.

(ii) Calculate the total contribution from the best possible product mix.

Solution:

(i) Statement Showing "Calculation of Contribution/ unit"

Particulars	**X (₹)**	**Y (₹)**	**Z (₹)**
Selling Price (A)	312	400	240
Variable Cost:			
Direct Material	160	120	80
Direct Labour			
Dept. A (Rate x Hours)	24	40	20
Dept. B (Rate x Hours)	48	120	88
Variable Overheads	8	20	12
Total Variable Cost (B)	240	300	200
Contribution per unit (A - B)	72	100	40
Hours in Dept. A	6	10	5
Contribution per hour	12	10	8
Rank	I	II	III

Existing Hours = 10,000 x 6 hrs. + 12,000 x 10 hrs. + 20,000 x 5 hrs. = 2,80,000 hrs. Best possible product mix (Allocation of Hours on the basis of ranking)

Produce 'X'	=	12,000 units
Hours Required	=	72,000 hrs (12,000 units × 6 hrs.)
Balance Hours Available	=	2,08,000 hrs (2,80,000 hrs. – 72,000 hrs.)
Produce 'Y' (the Next Best)	=	16,000 units
Hours Required	=	1,60,000 hrs (16,000 units × 10 hrs.)
Balance Hours Available	=	48,000 hrs (2,08,000 hrs. – 1,60,000 hrs.)
Produce 'Z' (balance)	=	9,600 units (48,000 hrs./ 5 hrs.)

(ii) Statement Showing "Contribution"

Product	Units	Contribution/ Unit (₹)	Total Contribution (₹)
X	12,000	72	8,64,000
Y	16,000	100	16,00,000
Z	9,600	40	3,84,000
		Total	**28,48,000**

May-22. Q1(c) (5 marks)

Top-tech a manufacturing company is presently evaluating two possible machines for the manufacture of superior Pen-drives. The following information is available:

Particulars	Machine A	Machine B
Selling price per unit	₹ 400.00	₹ 400.00
Variable cost per unit	₹ 240.00	₹ 260.00
Total fixed costs per year	₹ 350 lakhs	₹ 200 lakhs
Capacity (in units)	8,00,000	10,00,000

Required:

(i) Recommend which machine should be chosen?

(ii) Would you change your answer, if you were informed that in near future demand will be unlimited and the capacities of the two machines are as follows?
Machine A - 12,00,000 units

Machine B - 12,00,000 units
Why?

Solution:

		Machine-A	Machine-B	Total
A	Selling price per unit (₹)	400	400	
B	Variable cost per cost (₹)	240	260	
C	Contribution per unit (₹) [A-B]	160	140	
D	Units	8,00,000	10,00,000	
E	Total contribution (₹ [C×D]	12,80,00,000	14,00,00,000	26,80,00,000
F	Fixed Cost (₹)	3,50,00,000	2,00,00,000	5,50,00,000
G	Profit [E-F] (₹)	9,30,00,000	12,00,00,000	21,30,00,000
H	Profit per unit [G÷D] (₹)	116.25	120.00	

(ii) Machine B has the higher profit of ₹2,70,00,000 than the Machine-A. Further, Machine-B's fixed cost is less than the fixed cost of Machine-A and higher capacity. Hence, Machine B be recommended.

Note: This question can also be solved as below:

Indifferent point = Difference in fixed cost / difference in variable cost per unit

= 1,50,00,000 / 20 = 7,50,000 units

At the level of demand 7,50,000 units both machine options equally profitable. If demand below 7,50,000 units, select machine B (with lower FC).

If demand above 7,50,000 units, select machine A (with lower VC).

(iii) When the capacities of both the machines are same and demand for the product is unlimited, calculation of profit will be as follows:

		Machine-A	Machine-B	Total
A	Contribution per unit (₹)	160	140	
B	Units	12,00,000	12,00,000	
C	Total contribution (₹) [A×B]	19,20,00,000	16,80,00,000	36,00,00,000
D	Fixed Cost (₹)	3,50,00,000	2,00,00,000	5,50,00,000

E	Profit [C-E] (₹)	15,70,00,000	14,80,00,000	30,50,00,000
F	Profit per unit [E÷B] (₹)	130.83	123.33	

Yes, the preference for the machine would change because now, Machine A is having higher contribution and higher profit, hence recommended.

Chapter. 14: Budget & Budgetary Costing

Part-A: Flexible Budget

A. QUESTION FROM STUDY MATERIAL

Question-1

A factory which expects to operate 7,000 hours, i.e., at 70% level of activity, furnishes details of expenses as under:

Variable expenses	₹1,260
Semi-variable expenses	₹1,200
Fixed expenses	₹1,800

The semi-variable expenses go up by 10% between 85% and 95% activity and by 20% above 95% activity. PREPARE a flexible budget for 80, 90 and 100 per cent activities.

Hints:

Capacity	70%	80%	90%	100%
Total Expense (₹)	4260	4440	4740	5040
Recovery Rate	0.61	0.55	0.53	0.50

Question-2

A department of Company X attains sale of ₹ 6,00,000 at 80 per cent of its normal capacity and its expenses are given below:

Administration costs:	(₹)
Office salaries	90,000
General expenses	2 per cent of sales
Depreciation	7,500
Rates and taxes	8,750
Selling costs:	
Salaries	8 per cent of sales
Travelling expenses	2 per cent of sales

Sales office expenses	1 per cent of sales
General expenses	1 per cent of sales
Distribution costs:	
Wages	15,000
Rent	1 per cent of sales
Other expenses	4 per cent of sales

PREPARE flexible administration, selling and distribution costs budget, operating at 90 per cent, 100 per cent and 110 per cent of normal capacity.

Hints:

Capacity	80%	90%	100%	110%
Sales (₹)	6,00,000	6,75,000	7,50,000	8,25,000
Total Cost (₹)	2,35,250	2,49,500	2,63,750	2,78,000

Question-3

Action Plan Manufacturers normally produce 8,000 units of their product in a month, in their Machine Shop. For the month of January, they had planned for a production of 10,000 units. Owing to a sudden cancellation of a contract in the middle of January, they could only produce 6,000 units in January.

Indirect manufacturing costs are carefully planned and monitored in the Machine Shop and the Foreman of the shop is paid a 10% of the savings as bonus when in any month the indirect manufacturing cost incurred is less than the budgeted provision.
The Foreman has put in a claim that he should be paid a bonus of ₹88.50 for the month of January. The Works Manager wonders how anyone can claim a bonus when the Company has lost a sizeable contract.

The relevant figures are as under:

Indirect manufacturing	Expenses for a normal month (₹)	Planned for January (₹)	Actual incosts January (₹)
Salary of foreman	1,000	1,000	1,000
Indirect labour	720	900	600
Indirect material	800	1,000	700
Repairs and maintenance	600	650	600
Power	800	875	740
Tools consumed	320	400	300
Rates and taxes	150	150	150
Depreciation	800	800	800
Insurance	100	100	100
	5,290	5,875	4,990

Do you agree with the Works Manager? Is the Foreman entitled to any bonus for the performance in January? Substantiate your answer with facts and figures. EXPLAIN.

Hints:

Particulars	Flexible Budget	Actual	Difference
Total Expense (₹)	4705	4990	285

TEST YOUR KNOWLEDGE

Question-1

ABC Ltd. is currently operating at 75% of its capacity. In the past two years, the levels of operations were 55% and 65% respectively. Presently, the production is 75,000 units. The company is planning for 85% capacity level during 20X3-20X4. The cost details are as follows:

	55% (₹)	65% (₹)	75% (₹)
Direct Materials	11,00,000	13,00,000	15,00,000
Direct Labour	5,50,000	6,50,000	7,50,000
Factory Overheads	3,10,000	3,30,000	3,50,000
Selling Overheads	3,20,000	3,60,000	4,00,000
Administrative Overheads	1,60,000	1,60,000	1,60,000
	24,40,000	28,00,000	31,60,000

Profit is estimated @ 20% on sales.

The following increases in costs are expected during the year:

	In percentage
Direct Materials	8
Direct Labour	5
Variable Factory Overheads	5
Variable Selling Overheads	8
Fixed Factory Overheads	10
Fixed Selling Overheads	15
Administrative Overheads	10

PREPARE flexible budget for the period 20X3-20X4 at 85% level of capacity. Also ascertain profit and contribution.

Hints: Contribution = ₹14,57,300, Profit = ₹9,46,300

Question-2

TQM Ltd. has furnished the following information for the month ending 30th June, 20X9:

	Master Budget	Actual	Variance
Units produced and sold	80,000	72,000	
Sales (₹)	3,20,000	2,80,000	40,000 (A)
Direct material (₹)	80,000	73,600	6,400 (F)
Direct wages (₹)	1,20,000	1,04,800	15,200 (F)
Variable overheads (₹)	40,000	37,600	2,400 (F)
Fixed overhead (₹)	40,000	39,200	800 (F)
Total Cost	2,80,000	2,55,200	

The Standard costs of the products are as follows:

	Per unit (₹)
Direct materials (1 kg. at the rate of ₹1 per kg.)	1.00
Direct wages (1 hour at the rate of ₹ 1.50)	1.50
Variable overheads (1 hour at the rate of ₹ 0.50)	0.50

Actual results for the month showed that 78,400 kg. of material were used and 70,400 labour hours were recorded.

Required:

1. Prepare flexible budget for the month and compare with the actual result.
2. Calculate material, labour, sales price, variable overhead and fixed overhead expenditure variance and sales volume (profit) variance.

Hints: (i)

Particulars	Flexible Budget	Actual
Net Profit	32,000	24,800

(ii) SPV = 8000 (A), MPV = 4800 (F), MUV = 6400 (A), LRV = 800 (F), Labour Efficiency Variance = 2400 (F), V.O. = 1600 (A), FOEV = 800 (F), Sales Volume Variance = 4000 (A)

Question-3

During the FY 2020-21, P Limited has produced 60,000 units operating at 50% capacity level. The cost structure at the 50% level of activity is as under:

	(₹)
Direct Material	300 per unit
Direct Wages	100 per unit
Variable Overheads	100 per unit
Direct Expenses	60 per unit
Factory Expenses (25% fixed)	80 per unit
Selling and Distribution Exp. (80% variable)	40 per unit
Office and Administrative Exp. (100% fixed)	20 per unit

The company anticipates that in FY 2021-22, the variable costs will go up by 20% and fixed costs will go up by 15%.
The selling price per unit will increase by 10% to ₹ 880 Required:

(i) CALCULATE the budgeted profit/ loss for the FY 2020-21.

(ii) PREPARE an Expense budget on marginal cost basis for the FY 2021-22 for the company at 50% and 60% level of activity and FIND OUT the profits at respective levels.

Hints:

(i) Profit = 60,00,000

(ii)

	60,000 units		**72,000 units**	
	Per unit(₹)	**Amount(₹)**	**Per unit(₹)**	**Amount(₹)**
Profit	--	25,44,000	--	37,15,200

Question-4

The accountant of manufacturing company provides you the following details for year 2020-21:

	(₹)		(₹)
Direct materials	1,75,000	Other variable costs	80,000
Direct Wages	1,00,000	Other fixed costs	80,000
Fixed factory overheads	1,00,000	Profit	1,15,000
Variable factory overheads	1,00,000	Sales	7,50,000

During the year, the company manufactured two products A and B and the output and costs were:

	A	B
Output (units)	2,00,000	1,00,000
Selling price per unit	₹ 2.00	₹ 3.50
Direct materials per unit	₹ 0.50	₹ 0.75
Direct wages per unit	₹ 0.25	₹ 0.50

Variable factory overhead is absorbed as a percentage of direct wages. Other variable costs have been computed as: Product A ₹ 0.25 per unit; and B ₹ 0.30 per unit.

During 2021-22, it is expected that the demand for product A will fall by 25 % and for B by 50%. It is decided to manufacture a further product C, the cost for which is estimated as follows:

	Product C
Output (units)	2,00,000
Selling price per unit	₹ 1.75
Direct materials per unit	₹ 0.40
Direct wages per unit	₹ 0.25

It is anticipated that the other variable costs per unit will be the same as for product A.

PREPARE a budget to present to the management, showing the current position and the position for 2021-22. Comment on the comparative results.

Hints: Introduction of Product C is likely to increase profit by ₹ 10,000 (i.e. from ₹ 1,15,000 to ₹ 1,25,000) in 2021-22 as compared to 2020-21. Therefore, introduction of product C is recommended.

B. PAST YEAR EXAM QUESTIONS

May-23. Q3(a)-10 marks

PQR Limited manufactures three products - Product X, Product Y and Product Z. The output for the current year is 2,50,000 units of Product X, 2,80,000 units of Product Y and 3,20,000 units of Product Z respectively.

Selling price of Product X is 1.25 times of Product Z whereas Product Y can be sold at double the price at which product Z can be sold. Product Z can be sold at a profit of 20% on its marginal cost.

Other information are as follows:

	Product X	Product Y	Product Z
Direct Material Cost (Per unit)	₹ 20	₹ 20	₹ 20
Direct Wages Cost (per unit)	₹ 16	₹ 24	₹ 16

Raw material used for manufacturing all the three products is the same. Direct Wages are paid @ ₹ 4 per labour hour,

Total overhead cost of the company is ₹ 52,80,000 for the year, out of which ₹ 1 per labour hour is variable and the rest is fixed.

In the next year it is expected that sales of product X and product Z will increase by 12% and 15% respectively and sale of product Y will decline by 5%. The total overhead cost of the company for the next year is estimated at ₹ 55,08,000. The variable cost of ₹ 1 per labour hour remains unchanged.

It is anticipated that all other costs will remain same for the next year and there is opening and closing stock. Selling Price per unit of each product will remain unchanged in the next year.

Required:

Prepare a budget showing the current position and the position for the next year clearly indicating the total product-wise contribution and profit for the company as a whole.

Solution:

(i) Budget showing current position of total product wise contribution and profitability

	Particulars	Product X (₹)	Product Y (₹)	Product Z (₹)	Total (₹)
A	Direct material cost(per unit)	20	20	20	

B	Direct wages cost(per unit)	16	24	16	
C	Variable overheadper unit (Refer WN-1)	4	6	4	
D	Total variable cost/ Marginal cost per unit [A+B+C]	40	50	40	
E	Add: Profit [20% of D]	-	-	8	
F	Selling price unit [D+E]	-	-	48	
G	Price weight	1.25	2	1	
H	Selling price per unit [Selling price of Product Z × G]	60	96	48	
I	Contribution per unit [H-D]	20	46	8	
J	Quantity to be sold	2,50,000	2,80,000	3,20,000	
K	Total Contribution [J×I]	50,00,000	1,28,80,000	25,60,000	2,04,40,000
L	Fixed Overheads [Refer WN-1]				13,20,000
M	Profit				1,91,20,000

Working Notes:

1. Segregation of Overheads into variable and fixed in current year

	Particulars	**Product X (₹)**	**Product Y (₹)**	**Product Z (₹)**	**Total (₹)**
A	Total overhead cost	-	-	-	52,80,000
B	Labour hour per unit [Direct wages Cost ÷ Re.1]	4	6	4	
C	Quantity produced	2,50,000	2,80,000	3,20,000	
D	Total variable overhead cost [B×C]	10,00,000	16,80,000	12,80,000	39,60,000
E	Fixed overhead cost [A-D]				13,20,000

(ii) Budget showing next year's position of total product wise contribution and Profitability

	Particulars	Product X (₹)	Product Y (₹)	Product Z (₹)	Total (₹)
A	Selling price per unit	60	96	48	
B	Contribution per unit	20	46	8	
C	Quantity to be sold	2,80,000 [112% of 2,50,000]	2,66,000 [95% of 2,80,000]	3,68,000 [115% of 3,20,000]	
D	Total Contribution [B×C]	56,00,000	1,22,36,000	29,44,000	2,07,80,000
	Fixed Overheads [Refer WN-2]				13,20,000
	Profit				1,94,60,000

Working Notes:

2. Segregation of Overheads into variable and fixed in next year

	Particulars	Product X (₹)	Product Y (₹)	Product Z (₹)	Total (₹)
A	Total overhead cost	-	-	-	55,08,000
B	Labour hour per unit [Direct wages Cost ÷ Re.1]	4	6	4	
C	Quantity produced	2,80,000	2,66,000	3,68,000	
D	Total variable overhead cost [B×C]	**11,20,000**	**15,96,000**	**14,72,000**	**41,88,000**
E	Fixed overhead cost [A-D]				13,20,000

Nov-22. Q1(a)-05 marks

A Ltd. is a pharmaceutical company which produces vaccines for diseases like Monkey Pox, Covid-19 and Chickenpox. A distributor had 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:

(i) Total Sales value for 1,600 Monkey Pox Vaccines

(ii) Selling price per unit of the Vaccine.

Solution:

(i) & (ii) Calculation of Sales value and Selling price per unit of Monkey Pox vaccine

Particulars	**Amount (₹) per Batch**	**Amount (₹) for 1600 units or 20 batches**	**Amount (₹) per unit**
Direct materials	4,250	85,000	53.125
Direct wages	500	10,000	6.250
Lab set-up cost	1,400	28,000	17.500
Production overheads (20% of direct wages)	100	2,000	1.250
Production Cost	6,250	1,25,000	78.125
Selling, distribution and administration cost (20% of Production cost)	1,250	25,000	15.625
Total Cost	7,500	1,50,000	93.75
Add: Profit (1/3rd of Totalcost or 25% of Sales value)	2,500	50,000	31.25
Sales value	10,000	2,00,000	125.00

Jan-21. Q3(b)-10 marks

XYZ Ltd. is engaged in the manufacturing of toys. It can produce 4,20,000 toys at its 70% capacity on per annum basis. Company is in the process of determining sales price for the financial year 2020-21. It has provided the following information:

Direct Material ₹ 60 per unit

Direct Labour ₹ 30 per unit Indirect

Overheads:

Fixed	₹ 65,50,000 per annum
Variable	₹ 15 per unit
Semi-variable	₹ 5,00,000 per annum up to 60% capacity and ₹ 50,000 for every 5% increase in capacity or part thereof up to 80% capacity and thereafter ₹ 75,000 for every 10% increase in capacity or part thereof.

Company desires to earn a profit of ₹ 25,00,000 for the year. Company has planned that the factory will operate at 50% of capacity for first six months of the year and at 75% of capacity for further three months and for the balance three months, factory will operate at full capacity.

You are required to :

(1) Determine the average selling price at which each of the toy should be sold to earn the desired profit.

(2) Given the above scenario, advise whether company should accept an offer to sell each Toy at:

(a) ₹ 130 per Toy

(b) ₹ 129 per Toy

Solution:

(1) Statement of Cost

	For first 6 months	**For further 3 months**	**For remaining 3 months**	**Total**
	6,00,000 x 6/12 x 50% = 1,50,000 units	**6,00,000 x 3/12 x 75% = 1,12,500 units**	**6,00,000 x 3/12 = 1,50,000 units**	**4,12,500 units**
Direct Material	90,00,000	67,50,000	90,00,000	2,47,50,000
Direct labour	45,00,000	33,75,000	45,00,000	1,23,75,000
Indirect – Variable Expenses	22,50,000	16,87,500	22,50,000	61,87,500
Indirect – Fixed Expenses	32,75,000	16,37,500	16,37,500	65,50,000
Indirect Semi-variable expenses				

- For first six months @ 5,00,000 per annum	2,50,000			
- For further three months @ 6,50,000* per annum		1,62,500		
- For further three months @ 8,50,000** per annum			2,12,500	6,25,000
Total Cost	1,92,75,000	1,36,12,500	1,76,00,000	5,04,87,500
Desired Profit				25,00,000
Sales value				5,29,87,500
Average Sales price per Toy				**128.45**

* ₹ 5,00,000+ [3 times (from 60% to 75%) x 50,000] = ₹ 6,50,000

** ₹ 6,50,000+ [1 time (from 75% to 80%) x 50,000] + [2 times (from 80% to 100%) × 75,000] = ₹ 8,50,000

(2) (a) Company Should accept the offer as it is above its targeted sales price of ₹ 128.45 per toy.

(b) Company Should accept the offer as it is above its targeted sales price of ₹ 128.45 per toy.

Nov-20. Q1(a)-5 marks

G Ltd. manufactures a single product for which market demand exists for additional quantity. Present sales of ₹ 6,00,000 utilises only 60% capacity of the plant. The following data are available:

(1) Selling price : ₹ 100 per unit
(2) Variable cost : ₹ 30 per unit
(3) Semi-variable expenses : ₹ 60,000 fixed + ₹ 5 per unit
(4) Fixed expenses : ₹ 1,00,000 at present level, estimated to increase by 25% at and above 80% capacity.

You are required to prepare a flexible budget so as to arrive at the operating profit at 60%, 80% and 100% levels.

Solution:

Flexible Budget

Activity Level	**60%**	**80%**	**100%**

Production (units)	**6,000**	**8,000**	**10,000**
	(₹)	**(₹)**	**(₹)**
Sales @ ₹ 100 per unit	6,00,000	**8,00,000**	**10,00,000**
Variable Cost (@ ₹ 35 (₹ 30 + ₹ 5) per unit)	2,10,000	2,80,000	3,50,000
Contribution (A)	3,90,000	5,20,000	6,50,000
Fixed Cost (part of semi-variable cost)	60,000	60,000	60,000
Other Fixed Cost	1,00,000	**1,25,000**	**1,25,000**
Total Fixed Cost (B)	1,60,000	1,85,000	1,85,000
Operating Profit (A – B)	**2,30,000**	**3,35,000**	**4,65,000**

Nov-19. Q5(a)-10 marks

PJ Ltd. Manufactures hockey sticks. It sells the products at ₹500 each and makes a profit of ₹125 on each stick. The company is producing 5000 sticks annually by using 50% of its machinery capacity.

The cost of each stick is as under:

Direct Material	₹150
Direct wages	₹50
Works overhead	₹125 (50% fixed)
Selling Expenses	₹50 (25% variable)

The anticipation for the next year is that cost will go up as under:

Fixed charges	10%
Direct wages	20%
Direct material	5%

There will not be any change in selling price

There is an additional order for 2000 sticks in the next year.

Calculate the lowest price that can be quoted so that the company can earn the same profit as it earned in te current year ?

Solution:

Selling Price = ₹ 500

Profit = ₹ 125

No of Sticks = 5,000

Particular	**Current Year (₹)**	**Next Year (₹)**

Direct Material	**150**	**157.50 (150 + 5%)**
Direct Wages	**50**	**60 (50+20%)**
Works Overheads	**62.50 (125 × 50%)**	**62.5**
Selling Expenses	**12.50 (50 × 25%)**	**12.5**
Total Variable Cost	**275**	**292.50**
Fixed Cost (62.5 × 5,000) = 3,12,500; (37.5 × 5,000) = 1,87,500	**5,00,000**	**5,50,000**

Let: Lowest Price Quoted = K

Now, Sales = Target Profit (5,000 units × ₹ 125) + Variable Cost + Fixed Cost
Or, = (5,000 × 500) + (2,000 × K) = 6,25,000 + 20,47,500 + 5,50,000
Or, K = ₹ 361.25

So, Lowest Price that can be quoted to earn the profit of ₹ 6,25,000 (same as current year) is ₹ 361.25

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS)

Question-1

RST, Limited is presently operating at 50% capacity and producing 30000 units. The entire output is sold at a price of ₹ 200 per unit. The cost structure at the 50% level of activity is as under:

	(₹)

Direct Material	75 per unit
Direct Wages	25 per unit
Variable Overheads	25 per unit
Direct Expenses	15 per unit
Factory Expenses (25% fixed)	20 per unit
Selling and Distribution Exp. (80% variable)	10 per unit
Office and Administrative Exp. (100% fixed)	5 per unit

The company anticipates that the variable costs will go up by 10% and fixed costs will go up by 15%.

You are required to prepare an Expense budget, on the basis of marginal cost for the company at 50% and 60% level of activity and find out the profits at respective levels.

Solution:

Expense Budget of RST Ltd. for the period

	Per unit (₹)	30,000 units Amount (₹)	36,000 units Amount (₹)
Sales **(A)**	200.00	60,00,000	72,00,000
Less: Variable Costs:			
- Direct Material	82.50	24,75,000	29,70,000
- Direct Wages	27.50	8,25,000	9,90,000
- Variable Overheads	27.50	8,25,000	9,90,000
- Direct Expenses	16.50	4,95,000	5,94,000
- Variable factory expenses (75% of ₹ 20 p.u.)	16.50	4,95,000	5,94,000
- Variable Selling & Dist. exp. (80% of ₹ 10 p.u.)	8.80	2,64,000	3,16,800
Total Variable Cost **(B)**	179.30	53,79,000	64,54,800
Contribution **(C) = (A – B)**	20.70	6,21,000	7,45,200
Less: Fixed Costs:			
- Office and Admin. exp. (100%)	--	1,72,500	1,72,500
- Fixed factory exp. (25%)	--	1,72,500	1,72,500
- Fixed Selling & Dist. exp. (20%)	--	69,000	69,000
Total Fixed Costs **(D)**	--	4,14,000	4,14,000
Profit **(C – D)**	--	2,07,000	3,31,200

Question-2 (Dec 2021 Q1(b))

S Ltd. has prepared budget for the coming year for its two products A and B.

	Product A (₹)	Product B (₹)
Production & Sales unit	6,000 units	9,000 units
Raw material cost per unit	60.00	42.00
Direct labour cost per unit	30.00	18.00
Variable overhead per unit	12.00	6.00
Fixed overhead per unit	8.00	4.00
Selling price per unit	120.00	78.00

After some marketing efforts, the sales quantity of the Product A & B can be increased by 1,500 units and 500 units respectively but for this purpose the variable overhead and fixed overhead will be increased by 10% and 5% respectively for the both products.

You are required to prepare flexible budget for both the products:

(a) Before marketing efforts

(b) After marketing efforts.

Solution:

(a) Flexible Budget before marketing efforts:

	Product A (₹) 6,000 units		Product B (₹) 9,000 units	
	Per unit	Total	Per unit	Total
Sales	120.00	7,20,000	78.00	7,02,000
Raw material cost	60.00	3,60,000	42.00	3,78,000
Direct labour cost per unit	30.00	1,80,000	18.00	1,62,000
Variable overhead per unit	12.00	72,000	6.00	54,000
Fixed overhead per unit	8.00	48,000	4.00	36,000
Total cost	110.00	6,60,000	70.00	6,30,000
Profit	10.00	60,000	8.00	72,000

(b) Flexible Budget after marketing efforts:

	Product A (₹) 7,500 units		Product B (₹) 9,500 units	
	Per unit	**Total**	**Per unit**	**Total**
Sales	120.00	9,00,000	78.00	7,41,000
Raw material cost	60.00	4,50,000	42.00	3,99,000
Direct labour cost per unit	30.00	2,25,000	18.00	1,71,000
Variable overhead per unit	13.20	99,000	6.60	62,700
Fixed overhead per unit	6.72	50,400	3.98	37,800
Total cost	109.92	8,24,400	70.58	6,70,500
Profit	10.08	75,600	7.42	70,500

Part-B: Functional Budget

A. QUESTION FROM STUDY MATERIAL

Question-4

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

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

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

The opening stock of raw materials in the beginning of the year is 10,000 kg. and the closing stock at the end of the year is required to be maintained at 5,000 kg. Each unit of finished output requires 2 kg. of raw materials.

The company proposes to purchase the entire annual requirement of raw materials in the first three quarters in the proportion and at the prices given below:

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

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

(i) Production budget (in units).

(ii) Raw material consumption budget (in quantity).

(iii) Raw material purchase budget (in quantity and value).

Priced stores ledger card of the raw material using First in First out method.

Hints:

Particulars	I	II	III	IV
a. Production (Units)	31,500	38,250	42,000	48,250
b. Consumption (₹)	63,000	76,500	84,000	96,500
c. Purchase (₹)	1,89,000	4,72,500	2,52,000	-

Total Raw Material purchase = 3,15,000 units

Question-5

A company is engaged in the manufacture of specialised sub-assemblies required for certain electronic equipment. The company envisages that in the forthcoming month, December, 20X9, the sales will take a pattern in the ratio of 3 : 4 : 2 respectively of sub-assemblies, ACB, MCB and DP.

The following is the schedule of components required for manufacture:

		Component requirements			
Sub-assembly	**Selling Price**	**Base board**	**IC08**	**IC12**	**IC26**
ACB	520	1	8	4	2
MCB	500	1	2	10	6
DP	350	1	2	4	8
Purchase price (₹)		60	20	12	8

The direct labour time and variable overheads required for each of the sub- assemblies are:

Labour hours			**Variable overheads**
	Grade A	**Grade B**	
ACB	8	16	36
MCB	6	12	24
DP	4	8	24
Direct wage rate per hour (₹)	5	4	—

The labourers work 8 hours a day for 25 days a month.

The opening stocks of sub-assemblies and components for December, 20X9 are as under:

Sub-assemblies		**Components**	
ACB	800	Base Board	1,600
MCB	1,200	IC08	1,200
DP	2,800	IC12	6,000
		IC26	4,000

Fixed overheads amount to ₹7,57,200 for the month and a monthly profit target of ₹ 12 lacs has been set.

The company is eager for a reduction of closing inventories for December, 20X9 of sub-assemblies and components by 10% of quantity as compared to the opening stock. PREPARE the following budgets for December 20X9:

(a) Sales budget in quantity and value.
(b) Production budget in quantity
(c) Component usage budget in quantity.
(d) Component purchase budget in quantity and value.

Manpower budget showing the number of workers and the amount of wages payable.

Hints:

	ACB	MCB	DP
Sales (Units)	6300	8400	4200
Sales (₹)	32,72,000	42,00,000	14,70,000
Production (Units)	6,220	8,280	3,920
Component IC08	49,760	16,560	7,840
Component IC12	24,880	82,800	15,680
Component IC26	12,440	49,680	31,360
Board	6,220	8,280	3,920

TEST YOUR KNOWLEDGE

Question-5

Jigyasa Ltd. is drawing a production plan for its two products Minimax (MM) and Heavyhigh (HH) for the year 20X9-X0. The company's policy is to hold closing stock of finished goods at 25% of the anticipated volume of sales of the succeeding month. The following are the estimated data for two products:

	Minimax (MM)	**Heavyhigh (HH)**
Budgeted Production units	1,80,000	1,20,000
	(₹)	(₹)
Direct material cost per unit	220	280
Direct labour cost per unit	130	120
Manufacturing overhead	4,00,000	5,00,000

The estimated units to be sold in the first four months of the year 20X9- X0 are as under

	April	May	June	July
Minimax	8,000	10,000	12,000	16,000
Heavyhigh	6,000	8,000	9,000	14,000

PREPARE production budget for the first quarter in monthwise.

Hints:

Product	MM	HH
Production Cost	₹1,12,71,111	₹1,01,04,167

Question-6

Concorde Ltd. manufactures two products using two types of materials and one grade of labour. Shown below is an extract from the company's working papers for the next month's budget:

	Product-A	Product-B
Budgeted sales (in units)	2,400	3,600
Budgeted material consumption per unit (in kg):		
Material-X	5	3
Material-Y	4	6
Standard labour hours allowed per unit of product	3	5

Material-X and Material-Y cost ₹ 4 and ₹ 6 per kg and labours are paid ₹ 25 per hour. Overtime premium is 50% and is payable, if a worker Works for more than 40 hours a week. There are 180 direct workers.

The target productivity ratio (or efficiency ratio) for the productive hours worked by the d workers in actually manufacturing the products is 80%. In addition non-productive down-time is budgeted at 20% of the productive hours worked.

There are 5 days weeks in the budgeted period and it is anticipated that sales and production will occur evenly throughout the whole period.
It is anticipated that stock at the beginning of the period will be:

Product-A	400 units
Product-B	200 units
Material-X	1,000 kg.
Material-Y	500 kg.

The anticipated closing stocks for budget period are as below:

Product-A	4 days sales
Product-B	5 days sales
Material-X	10 days consumption
Material-Y	6 days consumption

Required:

CALCULATE the Material Purchase Budget and the Wages Budget for the direct workers, showing the quantities and values, for the next month.
Hints: Production: A = 2480, B = 4300
Purchase Budget: X = ₹1,47,800, Y = ₹2,75,616
Wages (hrs): A = 11,160, B = 32,250
Total Wages = 12,67,875

Question-7

XY Co. Ltd manufactures two products viz., X and Y and sells them through two divisions, East and West. For the purpose of Sales Budget to the Budget Committee, following information has been made available for the year 2014-15:

Product	Budgeted Sales		Actual Sales	
	East Division	West Division	East Division	West Division
X	400 units at ₹ 9	600 units at ₹ 9	500 units at ₹ 9	700 units at ₹ 9
Y	300 units at ₹ 21	500 units at ₹ 21	200 units at ₹ 21	400 units at ₹ 21

Adequate market studies reveal that product X is popular but under priced. It is expected that if the price of X is increased by ₹ 1, it will, find a ready market. On the other hand, Y is overpriced and if the price of Y is reduced by ₹ 1 it will have more demand in the market. The company management has agreed for the aforesaid price changes. On the basis of these price changes and the reports of salesmen, following estimates have been prepared by the Divisional Managers:

Percentage increase in sales over budgeted sales

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

With the help of intensive advertisement campaign, following additional sales (over and above the above mentioned estimated sales by Divisional Mangers) are

possible:

Product	East Division	West Division
X	60 units	70 units
Y	40 units	50 units

You are required to prepare Sales Budget for 2015-16 after incorporating above estimates and also show the Budgeted Sales and Actual Sales of 2014-15.

Hints:

Statement Showing Sales Budget for 2015-16

Division	Product X			Product Y			Total
	Qty.	Rate (₹)	Amt. (₹)	Qty.	Rate (₹)	Amt. (₹)	Amt. (₹)
East	500[1]	10	5,000	400[3]	20	8,000	13,000
West	700[2]	10	7,000	600[4]	20	12,000	19,000
Total	1,200		12,000	1,000		20,000	32,000

Statement Showing Sales Budget for 2014-15

Division	Product X			Product Y			Total
	Qty.	Rate (₹)	Amt. (₹)	Qty.	Rate (₹)	Amt. (₹)	Amt. (₹)
East	400	9	3,600	300	21	6,300	9,900
West	600	9	5,400	500	21	10,500	15,900
Total	1,000		9,000	800		16,800	25,800

Statement Showing Actual Sales for 2014-15

Division	Product X			Product Y			Total
	Qty.	Rate (₹)	Amt. (₹)	Qty.	Rate (₹)	Amt. (₹)	Amt. (₹)
East	500	9	4,500	200	21	4,200	8,700
West	700	9	6,300	400	21	8,400	14,700
Total	1,200		10,800	600		12,600	23,400

Question-8

K Ltd. produces and markets a very popular product called 'X'. The company is interested in presenting its budget for the second quarter of 2020-21.

The following information are made available for this purpose:

(i) It expects to sell 1,50,000 bags of 'X' during the second quarter of 2020-21 at the selling price of ₹ 1,200 per bag.

(ii) Each bag of 'X' requires 2.5 mtr. of raw – material 'Y' and 7.5 mtr. of raw– material 'Z'.

(iii) Stock levels are planned as follows:

Particulars	Beginning of Quarter	End of Quarter
Finished Bags of 'X' (Nos.)	45,000	33,000
Raw – Material 'Y' (mtr)	96,000	78,000
Raw – Material 'Z' (mtr)	1,71,000	1,41,000
Empty Bag (Nos.)	1,11,000	84,000

(iv) 'Y' cost ₹160 per mtr., 'Z' costs ₹30 per mtr. and 'Empty Bag' costs ₹110 each.

(v) It requires 9 minutes of direct labour to produce and fill one bag of 'X'. Labour cost is ₹ 70 per hour.

(vi) Variable manufacturing costs are ₹ 60 per bag. Fixed manufacturing costs ₹ 40,00,000 per quarter.

(vii) Variable selling and administration expenses are 5% of sales and fixed administration and selling expenses are ₹ 3,75,000 per quarter.

Required

(i) PREPARE a production budget for the said quarter in quantity.

(ii) PREPARE a raw – material purchase budget for 'Y', 'Z' and 'Empty Bags' for the said quarter in quantity as well as in rupees.

(iii) COMPUTE the budgeted variable cost to produce one bag of 'X'.

Hints:

(i) 1,38,000

(ii)

Particulars	'Y' Mtr.	'Z' Mtr.	Empty Bags Nos.
Cost of Purchase (₹)	5,23,20,000	3,01,50,000	1,22,10,000

(iii) 805.50

B. PAST YEAR EXAM QUESTIONS

May-23. Q2(a)-10 marks

A Limited has furnished the following information for the months from 1st January to 30th April, 2023:

	January	February	March	April
Number of Working days	25	24	26	25

Production (in units) per working day	50	55	60	52
Raw Material Purchases (% by weights to total of 4 months)	21%	26%	30%	23%
Purchase price of raw material (per kg)	₹ 10	₹ 12	₹ 13	₹ 11

Quantity of raw material per unit of product: 4 kg.

Opening stock of raw material on 1stJanuary: 6,020 kg. (Cost ₹ 63, 210)

Closing stock of raw material on 30thApril: 5,100 kg.

All the purchases of material are made at the start of each month.

Required:

(i) Calculate the consumption of raw materials (in kgs) month-by- month and in total.

(ii) Calculate the month-wise quantity and value of raw materials purchased.

(iii) Prepare the priced stores ledger for each month using the FIFO method.

Solution:

(i) Calculation of consumption of Raw Material (in kgs) month by month and total

Particulars	Jan	Feb	March	April	Total
No. of working days	25	24	26	25	-
Production (Per day)	50	55	60	52	-
Production	1,250	1,320	1,560	1,300	5,430
Raw Material Consumed (in kgs)	**5,000**	**5,280**	**6,240**	**5,200**	21,720

Calculation of Raw Material Purchased

Purchased	(Kg)
Closing stock on 30th April	5,100
Add: Raw Material consumed	21,720
Less: Opening stock on 1st January	(6,020)
Raw Material purchased	20,800

(ii) Calculation of month wise quantity and value of raw material purchased

	%	Purchased (Kg)	Price (₹)	Value (₹)
January	21	4,368	10	43,680
February	26	5,408	12	64,896
March	30	6,240	13	81,120
April	23	4,784	11	52,624
Total		20,800		2,42,320

(iii) Store Price Ledger by using FIFO method.

Months	Particulars	Receipts			Issue			Balance		
		Qty	Rate	Amount (₹)	Qty	Rate	Amount (₹)	Qty	Rate	Amount (₹)
Jan	Opening							6,020	10.5	63,210
	Purchases	4,368	10	43,680				6,020	10.5	63,210
								4,368	10	43,680
	Consumption				**5,000**	**10.5**	**52,500**	**1,020**	**10.5**	**10,710**
								4,368	**10**	**43,680**
Feb	Purchases	5,408	12	64,896				1,020	10.5	10,710
								4,368	**10**	**43,680**
								5,408	**12**	**64,896**
	Consumption				**1,020**	**10.5**	**10,710**	**108**	**10**	**1,080**
					4,260	**10**	**42,600**	**5,408**	**12**	**64,896**
March	Purchase	6,240	13	81,120				**108**	**10**	**1,080**
								5,408	**12**	**64,896**
								6,240	**13**	**81,120**
	Consumption				**108**	**10**	**1,080**			
					5,408	**12**	**64,896**			
					724	**13**	**9,412**	**5,516**	**13**	**71,708**
April	Purchases	4,784	11	52,624				**5,516**	**13**	**71,708**
								4,784	**11**	**52,624**
	Consumption				**5,200**	**13**	**67,600**	**316**	**13**	**4,108**
								4,784	**11**	**52,624**
										56,732

Nov-18. Q5(a)-10 marks

An electronic gadget manufacturer has prepared sales budget for the next few months. In this respect, following figures are available:

Months	Electronic gadgets' sales
January	5000 units
February	6000 units
March	7000 units
April	7500 units
May	8000 units

To manufacture an electronic gadget, a standard cost of ₹ 1,500 is incurred and it is sold through dealers at an uniform price of ₹ 2,000 per gadget to customers. Dealers are given a discount of 15% on selling price.

Apart from other materials, two units of batteries are required to manufacture a gadget. The company wants to hold stock of batteries at the end of each month to cover 30% of next month's production and to hold stock of manufactured gadgets to cover 25% of the next month's sale.

3250 units of batteries and 1200 units of manufactured gadgets were in stock on 1st January.

Required:

(i) Prepare production budget (in units) for the month of January, February, March and April.

(ii) Prepare purchase budget for batteries (in units) for the month of January, February and March and calculate profit for the quarter ending on March.

Solution:

(i) Preparation of Production Budget (in Units)

	January	February	March	April	May
Sales	5,000	6,000	7,000	7,500	8,000
Add: Closing stock (25% of next month's sales)	1,500	1,750	1,875	2,000	
Less: Opening Stock	(1200)	(1500)	(1750)	(1875)	
Production of electronic Gadgets	5,300	6,250	7,125	7,625	

(ii) Preparation of Purchase budget

	January	February	March	April
Consumption/production of Batteries (@ 2 per Gadget)	10,600	12,500	14,250	15,250
Add: Closing Stock (30% of next month's production)	3750	4275	4575	
Less: Opening Stock	3,250	3,750	4275	
Purchase of Batteries	11,100	13,025	14,550	

Statement Showing Profit

	Jan.	Feb.	March	Total
Sales (A)	5,000	6,000	7,000	18,000
Selling Price per unit*	₹. 2,000	₹. 2,000	₹. 2,000	₹. 2,000
Less: Discount @15% of selling price	300	300	300	300
Less: Standard cost of Manufacturing per gadget Cost	1500	1500	1500	1500
Profit (B) (selling Price-discount-cost)	200	200	200	200
Total Profit (A × B)	₹.10,00,000	₹.12,00,000	₹.14,00,000	₹.36,00,000

July-21. Q5(b)-10 marks

PSV Ltd. manufactures and sells a single product and estimated the following related information for the period November, 2020 to March, 2021.

Particulars	November, 2020	December, 2020	January, 2021	February, 2021	March, 2021
Opening Stock of Finished Goods (in Units)	7,500	3,000	9,000	8,000	6,000
Sales (in Units)	30,000	35,000	38,000	25,000	40,000
Selling Price per unit(in₹)	10	12	15	15	20

Additional Information:

- Closing stock of finished goods at the end of March, 2021 is 10,000 units.
- Each unit of finished output requires 2 kg of Raw Material 'A' and 3 kg of Raw Material 'B'.

You are required to prepare the following budgets for the period November, 2020 to March, 2021 on monthly basis:

(i) Sales Budget (in ₹)
(ii) Production budget (in units) and
(iii) Raw material Budget for Raw material 'A' and 'B' separately (in units)

Solution:

(i) Sales Budget **(in ₹)**

Particulars	Nov, 20	Dec, 20	Jan, 21	Feb, 21	Mar, 21	Total
Sales (in Units)	30,000	35,000	38,000	25,000	40,000	1,68,000
Selling Price per unit (₹)	10	12	15	15	20	-
Total Sales (₹)	3,00,000	4,20,000	5,70,000	3,75,000	8,00,000	24,65,000

(ii) Production Budget (in units)

Particulars	Nov, 20	Dec, 20	Jan, 21	Feb, 21	Mar, 21	Total
Sales	30,000	35,000	38,000	25,000	40,000	1,68,000
Add: Closing stock of finished goods	3,000	9,000	8,000	6,000	10,000	36,000
Total quantity required	33,000	44,000	46,000	31,000	50,000	2,04,000
Less: Opening stock of finished goods	7,500	3,000	9,000	8,000	6,000	33,500
Units to be produced	**25,500**	**41,000**	**37,000**	**23,000**	**44,000**	1,70,500

(iii) Raw material budget (in units)

For Raw material 'A'

Particulars	Nov, 20	Dec, 20	Jan, 21	Feb, 21	Mar, 21	Total
Units to be produced: (a)	25,500	41,000	37,000	23,000	44,000	1,70,500
Raw material consumption p.u. (kg.): (b)	2	2	2	2	2	-

Total raw material consumption (Kg.): (a × b)	51,000	82,000	74,000	46,000	88,000	3,41,000

For Raw material 'B'

Particulars	Nov, 20	Dec, 20	Jan, 21	Feb, 21	Mar, 21	Total
Units to be produced: (a)	25,500	41,000	37,000	23,000	44,000	1,70,500
Raw material consumption p.u. (kg.): (b)	3	3	3	3	3	-
Total raw material consumption (Kg.):(a × b)	**76,500**	**1,23,000**	**1,11,000**	**69,000**	**1,32,000**	5,11,500

May-22. Q3(a)-10 marks

SR Ltd. is a manufacturer of Garments. For the first three months of financial year 2022-23 commencing on 1st April 2022, production will be constrained by direct labour. It is estimated that only 12,000 hours of direct labour hours will be available in each month.

For market reasons, production of either of the two garments must be at least 25% of the production of the other. Estimated cost and revenue per garment are as follows:

	Shirt (₹)	Short (₹)
Sales price	60	44
Raw Materials		
Fabric @12 per metre	24	12
Dyes and cotton	6	4
Direct labour @ 8 per hour	8	4
Fixed Overhead @ 4 per hour	4	2
Profit	18	22

From the month of July 2022 direct labour will no longer be a constraint. The company expects to be able to sell 15,000 shirts and 20,000 shorts in July, 2022. There will be no opening stock at the beginning of July 2022.

Sales volumes are expected to grow at 10% per month cumulatively thereafter throughout the year. Following additional information is available:

- The company intends to carry stock of finished garments sufficient to meet 40% of the next month's sale from July 2022 onwards.
- The estimated selling price will be same as above.

Required:

I. Calculate the number of shirts and shorts to be produced per month in the first quarter of financial year 2022-2023 to maximize company's profit.

II. Prepare the following budgets on a monthly basis for July, August and September 2022:
   (i) Sales budget showing sales units and sales revenue for each product.

(ii) Production budget (in units) for each product.

Solution:

I. Calculation of number of shirts & shorts to be produced per month:

Contribution per labour hour:

		Shirts (₹)	Shorts (₹)
A	Sales Price per unit	60	44
B	Variable Cost:		
	- Raw materials	30	16
	- Direct labour	8	4
		38	20
C	Contribution per unit [A-B]	22	24
D	Labour hour per unit	1 hour	0.5 hour
E	Contribution per labour hour [C÷D]	**22**	**48**

Production plan for the first three months:
Since, Shorts has the higher Contribution per labour hour, it will be made first. Shirts will be 25% of Shorts. The quantity will be determined as below:

Let the Quantity of Shorts be X and Shirts will be 0.25 X, then
(Qty. of Shorts × labour hour per unit) + (Qty. of Shirts × labour hour per unit) = Total labour hours available
Or, (X × 0.5 hour) + (0.25X × 1 hour) = 12,000 hours
Or, 0.5X + 0.25X = 12,000 Or, 0.75X = 12,000
Or, X = 12,000÷0.75
= 16,000 units of Shorts

Therefore, for Shirts = 25% of 16,000 units = 4,000 units
Production per month for the first quarter will be:
Shorts- 16,000 units & Shirts- 4,000 units

II. (i) Sales Budget for the month of July, August & September 2022:

		July 2022		August 2022		September 2022	
		Shirts	Shorts	Shirts	Shorts	Shirts	Shorts
A	Sales demand	15,000	20,000	16,500	22,000	18,150	24,200
B	Selling price per unit (₹)	60	44	60	44	60	44
C	Sales Revenue (₹)	9,00,000	8,80,000	9,90,000	9,68,000	10,89,000	10,64,800

(ii) Production budget for the month of July, August & September 2022:

		July 2022		August 2022		September 2022		October 2022	
		Shirts	Shorts	Shirts	Shorts	Shirts	Shorts	Shirts	Shorts
A	Opening stock	0	0	6,600	8,800	7,260	9,680		
B	Sales demand	15,000	20,000	16,500	22,000	18,150	24,200	19,965	26,620
C	Closing stock	6,600	8,800	7,260	9,680	7,986	10,648		
D	Production [B+C-A]	21,600	28,800	17,160	22,880	18,876	25,168		

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS

Question-1

AK Limited produces and sells a single product. Sales budget for calendar year 2013 by a quarters is as under:

Quarters	I	II	III	IV
No. of units to be sold	18,000	22,000	25,000	27,000

The year is expected to open with an inventory of 6,000 units of finished products and close with inventory of 8,000 units. Production is customarily scheduled to provide for 70% of the current quarter's sales demand plus 30% of the following quarter demand. The budgeted selling price per unit is ₹ 40. The standard cost details for one unit of the product are as follows:

Variable Cost ₹ 34.50 per unit

Fixed Overheads 2 hours 30 minutes @₹ 2 per hour based on a budgeted production volume of 1,10,000 direct labour hours for the year. Fixed overheads are evenly distributed through- out the year.

You are required to:

(i) Prepare Quarterly Production Budget for the year.

(ii) In which quarter of the year, company expected to achieve bread-even point.

Solution:

(i) Production Budget for the year 2013 by Quarters

		I	II	III	IV	Total
	Sales demand(Unit)	18,000	22,000	25,000	27,000	92,000
I	Opening Stock	6,000	7,200	8,100	8,700	30,000
II	70% of Current Quarter 's	12,600	15,400	17,500	18,900	64,400

	Demand					
III	30% of Following Quarter's Demand	6,600	7,500	8,100	7,400*	29,600
IV	Total Production(II &III)	19,200	22,900	25,600	26,300	94,000
V	Closing Stock (I+IV-Sales)	7,200	8,100	8,700	8,000	32,000

*Balancing Figure

(ii) Break Even Point = Fixed Cost ÷ PV Ratio

= ₹ 2,20,000 ÷ 13.75% = ₹16,00,000 or 40,000 units.

P/V Ratio = (₹40 - ₹34.50 = ₹ 5.50) ÷ 40 × 100 =13.75%

(Or, Break Even Point = Fixed Cost ÷ Contribution = ₹ 2,20,000 ÷ ₹ 5.50 = 40,000 Units) Total sales in the quarter II is 40,000 equal to BEP means BEP achieved in II quarter.

Question-2

A Light Motor Vehicle manufacturer has prepared sales budget for the next few months, and the following draft figures are available:

Month	No. of vehicles
October	4,000
November	3,500
December	4,500
January	6,000
February	6,500

To manufacture a vehicle a standard cost of ₹ 2,85,700 is incurred and sold through dealers at an uniform selling price of ₹ 3,95,600 to customers. Dealers are paid 12.5% commission on selling price on sale of a vehicle.

Apart from other materials four units of Part-X are required to manufacture a vehicle. It is a policy of the company to hold stocks of Part-X at the end of the each month to cover 40% of next month's production. 4,800 units of Part-X are in stock as on 1st October.

There are 950 nos. of completed vehicles are in stock as on 1st October and it is policy to have stocks at the end of each month to cover 20% of the next month's sales.

You are required to

(a) Prepare Production budget (in nos.) for the month of October, November, December and January.

(b) Prepare a Purchase budget for Part-X (in units) for the months of October, November and December.

(c) Calculate the budgeted gross profit for the quarter October to December.

Solution:

(a) Preparation of Production Budget (in nos.)

	October	November	December	January
Demand for the month (Nos.)	4,000	3,500	4,500	6,000
Add: 20% of next month's demand	700	900	1,200	1,300
Less: Opening Stock	(950)	(700)	(900)	(1,200)
Vehicles to be produced	3,750	3,700	4,800	6,100

(b) Preparation of Purchase budget for Part-X

	October	November	December
Production for the month (Nos.)	3,750	3,700	4,800
Add: 40% of next month's production	1,480 (40% of 3,700)	1,920 (40% of 4,800)	2,440 (40% of 6,100)
	5,230	5,620	7,240
No. of units required for production	20,920 (5,230 × 4 units)	22,480 (5,620 × 4 units)	28,960 (7,240 × 4 units)
Less: Opening Stock	(4,800)	(5,920) (1,480 × 4 units)	(7,680) (1,920 × 4 units)
No. of units to be purchased	16,120	16,560	21,280

(c) Budgeted Gross Profit for the Quarter October to December

	October	November	December	Total
Sales in nos.	4,000	3,500	4,500	12,000
Net Selling Price per unit*	₹ 3,46,150	₹ 3,46,150	₹ 3,46,150	
Sales Revenue (₹ in lakh)	13,846	12,115.25	15,576.75	41,538
Less: Cost of Sales (₹ in lakh) (Sales unit × Cost per unit)	11,428	9,999.50	12,856.50	34,284
Gross Profit (₹ in lakh)	2,418	2,115.75	2,720.25	7,254

* Net Selling price unit = ₹ 3,95,600 – 12.5% commission on ₹ 3,95,600 = ₹ 3,46,150

Question-4

G Ltd. manufactures two products called 'M' and 'N'. Both products use a common raw material Z. The raw material Z is purchased @ ₹ 36 per kg from the market. The company has decided to review inventory management policies for the forthcoming year.

The following forecast information has been extracted from departmental estimates for the year ended 31st March 2016 (the budget period):

	Product M	Product N
Sales (units)	28,000	13,000
Finished goods stock increase by year-end	320	160
Post-production rejection rate (%)	4	6
Material Z usage (per completed unit, net of wastage)	5 kg	6 kg
Material Z wastage (%)	10	5

Additional information:

- Usage of raw material Z is expected to be at a constant rate over the period.
- Annual cost of holding one unit of raw material in stock is 11% of the material cost.
- The cost of placing an orders is ₹ 320 per order.

The management of G Ltd. has decided that there should not be more than 40 orders in a year for the raw material Z.

Required:

(a) Prepare functional budgets for the year ended 31st March 2016 under the following headings:

(i) Production budget for Products M and N (in units).

(ii) Purchases budget for Material Z (in kgs and value).

(b) Calculate the Economic Order Quantity for Material Z (in kgs).

(c) If there is a sole supplier for the raw material Z in the market and the supplier do not sale more than 4,000 kg. of material Z at a time. Keeping the management purchase policy and production quantity mix into consideration, calculate the maximum number of units of Product M and N that could be produced.

Solution:

(a) (i) Production Budget (in units) for the year ended 31st March 2016

	Product M	Product N
Budgeted sales (units)	28,000	13,000
Add: Increase in closing stock	320	160
No. good units to be produced	28,320	13,160
Post production rejection rate	4%	6%
No. of units to be produced	29,500 [28,320 / 0.96]	14,000 [13,160 / 0.94]

(ii) Purchase budget (in kgs and value) for Material Z

	Product M	Product N
No. of units to be produced	29,500	14,000
Usage of Material Z per unit of production	5 kg.	6 kg.
Material needed for production	1,47,500 kg.	84,000 kg.
Materials to be purchased	1,63,889 kg. [1,47,500 / 0.90]	88,421 kg. [84,000 / 0.95]
Total quantity to be purchased	2,52,310 kg.	
Rate per kg. of Material Z	₹36	
Total purchase price	₹90,83,160	

(b) Calculation of Economic Order Quantity for Material Z

$$EOQ = \sqrt{\frac{2 \times 2,52,310kg \times ₹320}{₹36 \times 11\%}}$$

$$= \sqrt{\frac{₹16,14,78,400}{₹3.96}}$$

₹

= 6,385.72 kg.

(c) Since, the maximum number of order per year can not be more than 40 orders and the maximum quantity per order that can be purchased is 4,000 kg. Hence, the total quantity of Material Z that can be available for production:
= 4,000 kg. × 40 orders = 1,60,000 kg.

	Product M	Product N

Material needed for production to maintain the same production mix	1,03,929 kg. 1,60,000 x $\frac{1,63,889}{2,52,310}$	56,071 kg. 1,60,000 x $\frac{88,421}{2,52,310}$
Less: Process wastage	10,393 kg.	2,804 kg.
Net Material available for production	93,536 kg.	53,267 kg.
Units to be produced	18,707 units $\left[\frac{93,536\,kg.}{5kg.}\right]$	8,878 units $\left[\frac{53,267\,kg.}{6kg.}\right]$

Part-C: Master Budget

A. QUESTION FROM STUDY MATERIAL

Question-6

Float glass Manufacturing Company requires you to PREPARE the Master budget for the next year from the following information:

Sales:	
Toughened Glass	₹ 6,00,000
Bent Glass	₹ 2,00,000
Direct material cost	60% of sales
Direct wages	20 workers @ ₹ 150 per month
Factory overheads:	
Indirect labour –	
Works manager	₹ 500 per month
Foreman	₹ 400 per month
Stores and spares	2.5% on sales
Depreciation on machinery	₹ 12,600
Light and power	₹ 3,000
Repairs and maintenance	₹ 8,000
Others sundries	10% on direct wages
Administration, selling and distribution expenses	₹ 36,000 per year

Hints: Net Profit = ₹1,90,000

TEST YOUR KNOWLEDGE

Question-9

The accountant manufacturing company provides you the following details for years 20x9:

	(₹)		(₹)
Direct Material	1,75,000	Other variable cost	80,000
Direct wages	1,00,000	Other fixed cost	80,000
Fixed factort overheads	1,00,000	Profit	1,15,000
Variable factory overheads	1,00,000	Sales	7,50,000

During the year, the company manufactured two products A and B and the output and costs were:

	A	B
Output (units)	2,00,000	1,00,000
Selling price per unit	₹ 2.00	₹ 3.50
Direct materials per unit	₹ 0.50	₹ 0.75
Direct wages per unit	₹ 0.25	₹ 0.50

Variable factory overhead is absorbed as a percentage of direct wages. Other variable costs have been computed as: Product A ₹0.25 per unit; and B ₹0.30 per unit.
During 20x0 it is expected that the demand for product A will fall by 25% and for B by 50%. It is decided to manufacturing a further product C , the cost for which are estimated as follows:

	Product C
Output (units)	2,00,000
Selling price per unit	₹1.75
Direct material per unit	₹0.40
Direct wages per unit	₹0.25

It is anticipated that the other variable costs per unit will be the same as for product A.
PREPARE a budget to present to the management, showing the current position and the position for 20X0 . Comment on the comparative results.

Hints:

Particulars	Current Position	20x0
Profit	1,15,000	1,25,000

Part-D: Budgeted Ratio

A. QUESTION FROM STUDY MATERIAL

Question-7

Following data is available for DKG and Co:

Standard working hours	8 hours per day of 5 days per week
Maximum capacity	50 employees
Actual working	40 employees
Actual hours expected to be worked per four week	6,400 hours
Std. hours expected to be earned per four weeks	8,000 hours
Actual hours worked in the four- week period.	6,000 hours
Standard hours earned in the four- week period	7,000 hours.

The related period is of 4 weeks. In this period there was a one special day holiday due to national event. CALCULATE the following ratios:

(1) Efficiency Ratio, (2) Activity Ratio, (3) Calendar Ratio, (4) Standard Capacity Usage Ratio, (5) Actual Capacity Usage Ratio. (6) Actual Usage of Budgeted Capacity Ratio.

Hints: (i) 116.67%, (ii) 109.375%, (iii) 95%, (iv) 80%, (v) 75%, (vi) 93.75%

B. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM QUESTIONS

Question-1

Calculate efficiency and activity ratio from the following data:

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

Solution:

Capacity Ratio= Actual Hours x 100
Budgeted Hours

$$75\% = \frac{\text{Actual Hours}}{\text{6,000 units x 4 hour per unit}}$$

$$0.75 = \frac{\text{Actual Hours}}{\text{6,000 units x 4 hour per unit}}$$

$$0.75 = \frac{\text{Actual Hours}}{\text{24,000 Hours}}$$

AH = 18,000 Hours

$$\text{Efficiency Ratio} = \frac{\text{Actual Output in term of Standard Hours}}{\text{Actual Hours worked}} \times 100$$

$$= \frac{\text{5,000 units x 4 hours per unit}}{\text{18,000 units}} \times 100$$

$$= \frac{\text{20,000 hours}}{\text{18,000 hours}} \times 100 = 111.11\ \%$$

$$\text{Activity Ratio} = \frac{\text{Actual output in term of Standard Hours}}{\text{Budgeted output in term of standard hours}} \times 100$$

$$= \frac{\text{20,000 units}}{\text{6,000 units x 4 hour per unit}} \times 100$$

$$= \frac{\text{20,000 units}}{\text{24,000 units}} \times 100$$

$$= 83.33\%$$