Activity Based Costing
Assignment

Q. No.	Questions & Solutions

1. Family Store wants information about the profitability of individual product lines: soft drinks, Fresh produce, and Packaged food. Family store provides the following data for the year 20X1-20X2 for each product line: -

Particulars	Soft drinks	Fresh produce	Packaged food
– Revenues	₹ 39,67,500	₹ 1,05,03,000	₹ 60,49,500
– Cost of goods sold	₹ 30,00,000	₹ 75,00,000	₹ 45,00,000
– Cost of bottles returned	₹ 60,000	₹ 0	₹ 0
– Number of purchase orders placed	360	840	360
– Number of deliveries received	300	2,190	660
– Hours of shelf-stocking time	540	5,400	2,700
– Items sold	1,26,000	11,04,000	3,06,000

Family store also provides the following information for the year 20X1-20X2: -

Activity	Description of activity	Total Cost	Cost-allocation base
Bottles returns	Returning of empty bottles	₹ 60,000	Direct tracing to soft drink line
Ordering	Placing of orders for purchases	₹ 7,80,000	1,560 purchase orders
Delivery	Physical delivery and receipt of goods	₹ 12,60,000	3,150 deliveries
Shelf stocking	Stocking of goods on store shelves and 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: -

a) 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.

b) 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.

(ICAI SM, May 2020 RTP, May 2003 RTP, Nov. 2010, RTP Nov.2021, Modified December 2021, Modified MTP Nov 2019)

Ans. **a) Statement of Operating income and Operating income as a percentage of revenues for each product line**

(When support costs are allocated to product lines based on cost of goods sold of each product)

Particulars	Soft Drinks (₹)	Fresh Produce (₹)	Packaged Foods (₹)	Total (₹)
– Revenues: (A)	39,67,500	1,05,03,000	60,49,500	2,05,20,000
– Cost of Goods sold (COGS): (B)	30,00,000	75,00,000	45,00,000	1,50,00,000
– Support cost (30% of COGS): (C)	9,00,000	22,50,000	13,50,000	45,00,000
– (Refer working notes)				
– Total cost: (D) = {(B) +(C)}	39,00,000	97,50,000	58,50,000	1,95,00,000
– Operating income: E= {(A)-				

(D)}	67,500	7,53,000	1,99,500	10,20,000
– Operating income as a percentage of revenues:(E/A) × 100)	1.70%	7.17%	3.30%	4.97%

Working notes: -

1) **Total support cost: -**

Particulars	**(₹)**
– Bottles returns	60,000
– Ordering	7,80,000
– Delivery	12,60,000
– Shelf stocking	8,64,000
– Customer support	15,36,000
Total support cost	**45,00,000**

2) **Percentage of support cost to cost of goods sold (COGS): -**

$$= \frac{\text{Total Support Cost}}{\text{Total cost of Goods Sold}} \times 100$$

$$= \frac{₹45,00,000}{₹1,50,00,000} \times 100 = 30\%$$

3) **Calculation of Cost driver rate for each activity: -**

Activity (1)	**Total cost (₹) (2)**	**Cost allocation base (3)**	**Cost driver rate (4) =[(2) ÷ (3)]**
Ordering	7,80,000	1,560 purchase orders	₹ 500 per purchase order
Delivery	12,60,000	3,150 deliveries	₹ 400 per delivery
Shelf-stocking	8,64,000	8,640 hours	₹ 100 per stocking hour
Customer support	15,36,000	15,36,000 items sold	₹ 1 per item sold

b) **Statement of Operating income and Operating income as a percentage of revenues for each product line**

(When support costs are allocated to product lines using an activity-based costing system)

Particulars	**Soft drinks (₹)**	**Fresh Produce (₹)**	**Packaged Food (₹)**	**Total (₹)**
– Revenues: (A)	39,67,500	1,05,03,000	60,49,500	2,05,20,000
– Cost & Goods sold	30,00,000	75,00,000	45,00,000	1,50,00,000
– Bottle return costs	60,000	0	0	60,000
– Ordering cost* (360:840:360) X ₹ 500 Per Order	1,80,000	4,20,000	1,80,000	7,80,000
– Delivery cost* (300:2190:660) X ₹ 400 Per delivery	1,20,000	8,76,000	2,64,000	12,60,000
– Shelf stocking cost* (540:5400:2700) X ₹ 100 Per stocking hour	54,000	5,40,000	2,70,000	8,64,000
– Customer Support cost* (1,26,000:11,04,000:3,06,000) X ₹ 1 Per item sold	1,26,000	11,04,000	3,06,000	15,36,000
– Total cost: (B)	35,40,000	1,04,40,000	55,20,000	1,95,00,000
- Operating income	4,27,500	63,000	5,29,500	10,20,000
- Operating income as a % of sales	10.78%	0.60%	8.75%	4.97%

* Refer to working note 3

2. Humara - Apna' bank offers three products, viz., deposits, Loans and Credit Cards. The bank has selected 4 activities for a detailed budgeting exercise, following activity-based costing methods.

The bank wants to know the product wise total cost per unit for the selected activities, so that prices may be fixed accordingly.

The following information is made available to formulate the budget: -

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

The activity drivers and their budgeted quantities are given below: -

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

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

Required: -

a) CALCULATE the budgeted rate for each activity.
b) PREPARE the budgeted cost statement activity wise.
c) COMPUTE the budgeted product cost per account for each product using (i) and ii) above.

(ICAI SM, Nov. 2009, May 2013, Modified MTP May 2022, Modified MTP May 2019)

Ans. **a) Statement showing budgeted rate for each activity: -**

Activity	Activity Cost (Budgeted) (₹) (WN i)	Activity Driver	No. of Units of Activity Driver (Budget)	Activity Rate (₹)
– ATM services	8,00,000	No. of ATM Transaction	2,00,000	4.00

– Computer Processing	10,00,000	No. of Computer processing Transaction	20,00,000	0.50
– Issuing Statements	20,00,000	No. of Statements	5,00,000	4.00
– Computer enquiries Inquiries	3,60,000	Telephone Minutes	7,20,000	0.50

b) Budgeted cost statement activity wise: -

Activity	Activity Cost (Budgeted) (₹)	Deposits(WN ii)	Loans (WN ii)	Credit cards (WN ii)
– ATM Services	8,00,000	6,00,000	---	2,00,000
– Computer Processing	10,00,000	7,50,000	1,00,000	1,50,000
– Issuing Statements	20,00,000	14,00,000	2,00,000	4,00,000
– Computer Inquiries	3,60,000	1,80,000	90,000	90,000
– Budgeted Cost	41,60,000	29,30,000	3,90,000	8,40,000

c) Budgeted cost per unit of the product: -

Activity	Activity Cost (Budgeted) (₹)	Deposits	Loans	Credit cards
– Budgeted Cost	41,60,000	29,30,000	3,90,000	8,40,000
– Units of Product		58,600	13,000	14,000
– Budgeted Cost per unit of the product		50	30	60

Working Note i)

Activity	Budgeted Cost (₹)	Remarks
ATM Services: -		
a) Machine Maintenance	4,00,000	All fixed, no change.
b) Rents	2,00,000	Fully fixed, no change.
c) Currency Replenishment Cost	2,00,000	Doubled during budget period.
Total	**8,00,000**	
– Computer Processing	2,50,000	₹2,50,000 (half of ₹5,00,000) is fixed and nochange is expected.
	7,50,000	₹2,50,000 (variable portion) is expected to increase to three times the current level.
Total	**10,00,000**	
– Issuing Statements	18,00,000	Existing.
	2,00,000	2 lakh statements are expected to be increased in budgeted period. For every increase of one lakh statement, one lakh rupees is the budgeted increase.
Total	**20,00,000**	
– Computer Inquiries	3,60,000	Estimated to increase by 80% during the budgetperiod.
Total	**3,60,000**	(₹ 2,00,000 × 180%)

Working Note ii)

Activity	Activity Rate (a)	Deposits	Loans	Credit cards
–ATM –Services	4.00	6,00,000 (1,50,000×a)	---	2,00,000 (50,000×a)
–Computer Processing	0.50	7,50,000 (15,00,000×a)	1,00,000 (2,00,000×a)	1,50,000 (3,00,000×a)
–Issuing Statements	4.00	14,00,000 (3,50,000×a)	2,00,000 (50,000×a)	4,00,000 (1,00,000×a)
–Computer Inquiries	0.50	1,80,000 (3,60,000×a)	90,000 (1,80,000×a)	90,000 (1,80,000×a)

3. 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, 20X1 in respect of RST Limited has been reported: -

Particulars	General Supermarket Chains (₹)	Drugstore Chains (₹)	Chemist Shops
– Average revenue per delivery	84,975	28,875	5,445
– Average cost of goods sold per delivery	82,500	27,500	4,950
– Number of deliveries	330	825	2,750

- In the past, RST Limited has used gross margin percentage to evaluate the relative profitability of its distribution channels.
- The company plans to use activity –based costing for analyzing 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, 20X1 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, 20X1 are as follows: -

Activity Area	Total costs in April, 20X1 (₹)	Total Units of Cost Allocation Base used in April, 20X1
– 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, 20X1 include the following: -

Particulars	General Supermarket Chains	Drugstore Chains	Chemist Shops
– Total number of orders	385	990	4,125
– Average number of line items per order	14	12	10
– Total number of store deliveries	330	825	2,750
– Average number of cartons shipped per store delivery	300	80	16
– Average number of hours of shelf-stocking per storedelivery	3	0.6	0.1

Required: -

a) COMPUTE for April, 20X1 gross-margin percentage for each of its three distribution channels and compute RST Limited's operating income.

b) COMPUTE the April, 20X1 rate per unit of the cost-allocation base for each of the five activity areas.

c) COMPUTE the operating income of each distribution channel in April, 20X1 using the activity-based costing information. Comment on the results. What new insights are available with the activity-based cost information?

d) DESCRIBE four challenges one would face in assigning the total April, 20X1 operating costs of ₹8,27,970 to five activity areas.

(ICAI SM, May 2004, May 2014, RTP May 2022 Modified)

Ans. **a)**

RST Limited's

Statement of operating income and gross margin percentagefor each of its three-distribution channel

Particulars	General Super MarketChains	Drugstore Chains	Chemist Shops	Total
Revenues: (₹)	2,80,41,750 (330 × ₹ 84,975)	2,38,21,875 (825 × ₹ 28,875)	1,49,73,750 (2,750 × ₹ 5,445)	6,68,37,375
Less: Cost of goods sold: (₹)	2,72,25,000 (330 × ₹ 82,500)	2,26,87,500 (825 × ₹ 27,500)	1,36,12,500 (2,750 × ₹ 4,950)	635,25,000
Gross Margin:(₹)	8,16,750	11,34,375	13,61,250	33,12,375
Less: Other operating costs: (₹)				8,27,970
Operating income: (₹)				24,84,405
Gross Margin	2.91%	4.76 %	9.09%	4.96%
Operating income %				3.72

b) Computation of rate per unit of the cost allocation base for each of the five activity areas for April 20X1: -

Particulars	(₹)
– Customer purchase order processing (₹ 2,20,000/ 5,500 orders)	40 per order
– Line-item ordering (₹ 1,75,560/ 58,520-line items)	3 per line-item order
– Store delivery	50 per delivery

(₹ 1,95,250/ 3,905 store deliveries)	
– Cartons dispatched (₹2,09,000/ 2,09,000 dispatches)	1 per dispatch
– Shelf-stocking at customer store (₹) (₹ 28,160/ 1,760 hours)	16 Per hour

c) Operating Income Statement of each distribution channel in April-20X1 (Using the Activity based Costing information): -

Particulars	GeneralSuper MarketChains	Drugstore Chains	Chemist Shops
– Gross margin (₹) : (A) (Refer to (a) part of the answer)	8,16,750	11,34,375	13,61,250
– Operating cost (₹): (B) (Refer to working note)	1,62,910	1,90,410	4,74,650
– Operating income (₹): (A–B)	6,53,840	9,43,965	8,86,600
– Operating income (in %) (Operating income/ Revenue) × 100	2.33	3.96	5.92

<u>Comments and new insights:</u>

The activity-based cost information highlights, how the 'Chemist Shops' uses a larger amount of RST Ltd.'s resources per revenue than do the other two distribution channels. Ratio of operating costs to revenues, across these markets is: -

– General supermarket chains	0.58%
(₹ 1,62,910/ ₹ 2,80,41,750) × 100	
– Drug store chains	0.80%
(₹ 1,90,410/ ₹ 2,38,21,875) × 100	
– Chemist shops	3.17%
(₹ 4,74,650/ ₹ 1,49,73,750) ×100	

<u>Working note: -</u>

Computation of operating cost of each distribution channel: -

Particulars	General Super Market Chains (₹)	Drugstore Chains (₹)	Chemist Shops(₹)
Customer purchase order processing	15,400 (₹ 40 × 385 orders)	39,600 (₹ 40 × 990 orders)	1,65,000 (₹ 40 ×4125 orders)
Line-item ordering	16,170 (₹ 3 × 14 × 385)	35,640 (₹ 3 × 12 × 990)	1,23,750 (₹ 3 × 10 × 4125)
Store delivery	16,500 (₹ 50 × 330 deliveries)	41,250 (₹ 50 × 825 deliveries)	1,37,500 (₹ 50 × 2750 deliveries)
Cartons dispatched	99,000 (₹1× 300 cartons × 330 deliveries)	66,000(₹1 × 80 cartons × 825 deliveries)	44,000 (₹1 × 16 cartons × 2,750 deliveries)
Shelf stocking	15,840 (₹ 16 × 330 deliveries × 3 hours)	7,920 (₹ 16 × 825 deliveries × 0.6 hours	4,400 (₹ 16 × 2,750 deliveries × 0.1 hours)
	1,62,910	1,90,410	4,74,650

d) Challenges faced in assigning total operating cost of ₹ 8,27,970: -

- Choosing an appropriate cost driver for activity area.
- Developing a reliable data base for the chosen cost driver.

- Deciding, how to handle costs that may be common across several activities.
- Choice of the time period to compute cost rates per cost driver. Behavioral factors.

4. Woolmark Ltd. manufactures three types of products namely P, Q and R. The data relating to a period are as under: -

Particulars	(P)	(Q)	(R)
– Machine hours per unit	10	18	14
– Direct Labour hours per unit	4	12	8
– Direct Material per unit (₹)	90	80	120
– Production (units)	3,000	5,000	20,000

Currently the company uses traditional costing method and absorbs all production overheads on the basis of machine hours. The machine hour rate of overheads is ₹ 6 per hour. Direct labour hour rate is ₹ 20 per hour.

The company proposes to use activity-based costing system and the activity analysis is as under:

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

The total production overheads are analyzed as under:

Machine set up costs………………………………………	20%
Machine operation costs……………………………………	30%
Inspection costs………………………………………………	40%
Material procurement related costs………………………………………………	10%

Required: -

a) CALCULATE the cost per unit of each product using traditional method of absorbing all production overheads on the basis of machine hours.

b) CALCULATE the cost per unit of each product using activity-based costing principles.

(ICAI SM, Jan. 2021, MTP May 2022, Modified May 2022)

Ans. **a) Statement Showing "Cost per unit - Traditional Method": -**

Particulars of Costs	P (₹)	Q (₹)	R (₹)
Machine hours per unit	10	10	10
Direct Materials	90	80	120
Direct Labour [(4, 12, 8 hours) × ₹ 20]	80	240	160
Production Overheads [(10, 18, 14 hours) × ₹ 6]	60	108	84
Cost per unit	230	428	364

b) 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
Setup Costs @ ₹ 9,600 per setup			
(20, 10, 20)	1,92,000	96,000	1,92,000
Machine Operation Costs @ ₹1.80 per hour			
(30,000, 90,000, 2,80,000)	54,000	1,62,000	5,04,000
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

Working Notes: -

1) Number of Batches, Purchase Orders, and Inspections: -

	Particulars	(P)	(Q)	(R)	Total
A)	Production (units)	3,000	5,000	20,000	
B)	Batch Size (units)	150	500	1,000	
C)	Number of Batches (A÷B)	20	10	20	50
D)	Number of Purchase Order per batch	3	10	8	
E)	Total Purchase Orders [C × D]	60	100	160	320
F)	Number of Inspections per batch	5	4	3	
G)	Total Inspections [C × F]	100	40	60	200

2) Total Machine Hours: -

	Particulars	(P)	(Q)	(R)
A)	Machine Hours per unit	10	18	14
B)	Production (units)	3,000	5,000	20,000
C)	Total Machine Hours [A × B]	30,000	90,000	2,80,000

Total Machine Hours = 4,00,000

Total Production Overheads-

= 4,00,000 hrs. × ₹6 = ₹24,00,000

3) Cost Driver Rates: -

Cost Pool	%	Overheads (₹)	Cost Driver Basis	Cost Driver (Units)	Cost Driver Rate (₹)
Setup	20%	4,80,000	Number of batches	50	9,600 per Setup
Inspection	40%	9,60,000	Number of inspections	200	4,800 per Inspection
Purchases	10%	2,40,000	Number of purchases	320	750 per Purchase
Machine Hours	30%	7,20,000	Machine Hours	4,00,000	1.80 per Machine Hour

5. Alpha Limited has decided to analyse the profitability of its five new customers. It buys bottled water at ₹90 per case and sells to retail customers at a list price of ₹108 per case. The data pertaining to five customers are: -

Particulars	Customers				
	A	B	C	D	E
Cases sold	4,680	19,688	1,36,800	71,550	8,775
Listed 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
Kilo meters 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: -

a) 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.

b) STATE what insights are gained by reporting both the list selling price and the actual selling price for each customer?

(ICAI SM, Nov. 2019, Modified MTP Dec. 2021, Modified MTP Nov. 2022)

Ans. **a) Computation of Customer level operating income: -**

Particulars	Customers				
	A (₹)	**B (₹)**	**C (₹)**	**D (₹)**	**E (₹)**
Revenues (At list price) (Refer to working note)	5,05,440	21,26,304	1,47,74,400	77,27,400	9,47,700
Less: Discount (Refer to working note)	-	35,438	12,31,200	2,57,580	94,770
Revenue (At actual price)	**5,05,440**	**20,90,866**	**1,35,43,200**	**74,69,820**	**8,52,930**
Less: Cost of goods sold (Refer to working note)	4,21,200	17,71,920	1,23,12,000	64,39,500	7,89,750
Gross margin	84,240	3,18,946	12,31,200	10,30,320	63,180
Less: Customer level operating activities costs (Refer to working note)	31,150	95,415	5,40,825	2,90,563	62,906
Customer level operating income	53,090	2,23,531	6,90,375	7,39,757	274

Comment on the results: -

- ✓ Profit from D are higher where we are offering per case discount of ₹3.60, whereas profits from E are least where we are offering highest discount of ₹10.80 per case.
- ✓ C is contributing highest fraction of total sales but profits are lower than customer D. Discount of ₹9 per case is offered to customer C

b) Insight gained by reporting both the list selling price and the actual selling price for each customer: -

Separate reporting of both-the listed and actual selling prices enables Alpha Ltd. to examine which customer has received what discount per case, whether the discount received has any relationship with the sales volume. The data given below provides us with the following information;

Sales volume	**Discount per case (₹)**
C (1,36,800 cases)	9.00
D (71,550 cases)	3.60
B (19,688 cases)	1.80
E (8,775 cases)	10.80
A (4,680 cases)	0

*The above data clearly shows that the discount given to customers per case has a direct relationship with sales volume, except in the case of customer E. The reasons for ₹10.80 discount per case for customer E should be explored.

Working notes: -

Computation of revenues (at listed price), discount, cost of goods sold and customer level operating activities costs: -

Particulars	Customers				
	A	**B**	**C**	**D**	**E**
Cases sold:(a)	4,680	19,688	1,36,800	71,550	8,775
Revenues (at listed price) (₹): (b) {(a) × ₹ 108)}	5,05,440	21,26,304	1,47,74,400	77,27,400	9,47,700
Discount (₹): © {(a) × Discount per case}	-	35,438 (19,688 cases × ₹1.80)	12,31,200 (1,36,800 cases × ₹ 9)	2,57,580 (71,550 cases × ₹ 3.60)	94,770 (8,775 cases × ₹ 10.80)
Cost of goods sold (₹): (d) {(a) × ₹ 90}	4,21,200	17,71,920	1,23,12,000	64,39,500	7,89,750

Customer level operating activities costs: -

Order taking costs (₹):	11,250	18,750	22,500	18,750	22,500
(No. of purchase × ₹750)					
Customer visits costs (₹) (No. of customer visits × ₹ 600)	1,200	1,800	3,600	1,200	1,800
Delivery vehicles travel costs (₹) (₹5.75 per km) (Kms travelled by delivery vehicles × ₹ 5.75 per km.)	1,150 (5.75 × 10 × 20)	1,035 (5.75 × 30 × 6)	1,725 (5.75 × 60× 5)	2,300 (5.75 × 40 × 10)	3,450 (5.75 × 20 ×30)
Product handling costs (₹) {(a) ×₹3.75}	17,550	73,830	5,13,000	2,68,313	32,906
Cost of expediting deliveries (₹) {No. of expedited deliveries × ₹ 2,250}	-	-	-	-	2,250
Total cost of customer level operating activities (₹)	31,150	95,415	5,40,825	2,90,563	62,906

6. Traditional 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	50 ₹/u
Total production	10,000 units	20,000 units	30,000 units

Traditional 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	Associate 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 Order Executed	180	270	300
No. of Production runs	750	1,050	1,200
No. of Purchase Requisitions	300	450	500

You are required to calculate activity-based production cost of all the three products.

(May 2009 RTP, Modified RTP Nov. 2019, Modified MTP May 2020, Modified RTP May 2023)

Ans. **Statement of Activity Based Production Cost**

Activity Cost Pool	Cost Driver	Ratio	Total (₹)	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 Set ups	Set ups	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				70.49	44.25	33.67
Add: Conversion Cost (Direct material + Direct labour)				80 (50+30)	80 (40+40)	90 (40+50)
Total				**150.49**	**124.25**	**123.67**

7. ABC Ltd. is a multiproduct company, manufacturing three products A, B and C. The budgeted costs and production for the year ending 31st March, 20X1 are as follows: -

Particulars	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 the 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.

Budgeted overheads were analyzed into the following: -

Particulars	(₹)
Material handling	29,100
Storage costs	31,200
Electricity	39,150

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

Data on Cost Drivers was as follows: -

Particulars	A	B	C
For complete production:			
Batches of material	10	5	15
Per unit of production:			
Number of Machine operators	6	3	2

You are requested to: -

a) PREPARE a statement for management showing the unit costs and total costs of each product using the absorption costing method.

b) PREPARE a statement for management showing the product costs of each product using the ABC approach.

c) STATE what are the reasons for the different product costs under the two approaches?

(ICAI SM, Modified Nov 2022, Modified MTP May 2023-I, Modified May 2023)

Ans. **a) Statement showing costing as per Absorption Costing System**

Particulars	A (₹)	B (₹)	C (₹)
Direct Costs:			
Direct Material	8.00	12.00	6.00
	(4kg×₹2)	(6kg×₹2)	(3kg×₹2)
Direct Wages	5.00 $\left(\frac{30\times10}{60}\right)$	7.5.00 $\left(\frac{45\times10}{60}\right)$	10.00 $\left(\frac{60\times10}{60}\right)$
Production Overhead:	8.50	12.75	17.00
	$\left(\frac{17\times30}{60}\right)$	$\left(\frac{17\times45}{60}\right)$	$\left(\frac{17\times60}{60}\right)$
Total unit costs	21.50	32.25	33.00
Number of units	4,000	3,000	1,600
Total costs	**86,000**	**96,750**	**52,800**

Working notes –

Computation of Recovery rate for production overheads: -

Particulars	A	B	C	D
a) Quantity (units)	4,000	3,000	1,600	8,600
b) Direct labour (minutes)	30	45	60	
c) Total labour hours (a × b)/60 min.	2,000	2,250	1,600	5,850

Overhead rate per direct labour hour: -

= Budgeted overheads ÷ Budgeted labour hours

= ₹99,450 ÷ 5,850 hours

= ₹17 per direct labour hour

b) Statement showing costing as per Activity Based Costing System –

Particulars	A (₹)	B (₹)	C (₹)
Direct Costs:			
Direct Labour	5.00	7.50	10.00
Direct material	8.00	12.00	6.00
Production Overheads:			

Material Handling	3.00	4.50	2.25
	(₹0.75 × 4)	(₹0.75 × 6)	(₹0.75 × 3)
Electricity	6.49	3.24	2.16
	(₹1.081 × 6)	(₹1.081 × 3)	(₹1.081 × 2)
Storage	2.60	1.73	9.75
	(₹10 × $\frac{₹1,040}{4,000}$)	(₹5 × $\frac{₹1,040}{3,000}$)	(₹15 × $\frac{₹1,040}{1,600}$)
Total unit costs	25.09	28.97	30.16
Number of units	4,000	3,000	1,600
Total costs	**₹ 1,00,360**	**₹ 86,910**	**₹ 48,256**

Working notes -

Computation of recovery rate of overhead under Activity Based Costing:-

Particulars	A	B	C	Total
Quantity (units)	4,000	3,000	1,600	-
Material Weight per unit (Kg.)	4	6	3	-
Total material weight	16,000	18,000	4,800	38,800
Machine operations per unit	6	3	2	-
Total operations	24,000	9,000	3,200	36,200
Total batches of Material	10	5	15	30

Material handling rate per kg. =₹ 29,100 ÷ 38,800 kg. = ₹0.75 per kg.

Electricity rate per machine operations =₹ 39,150 ÷ 36,200

=₹ 1.081 per machine operations

Storage rate per batch =₹ 31,200 ÷ 30 batches

=₹ 1,040 per batch

c) Comments: -

The difference in the total costs under the two systems is due to the differences in the overheads borne by each of the products. The Activity Based Costs appear to be more precise.

8. 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, 20X1 are ₹ 12,42,500 and 20,000 hours respectively. The information about Company's products is as follows: -

Particulars	Equipment (Y)	Equipment (Z)
– Budgeted Production volume	2,500 units	3,125 units
– Direct material cost	₹ 300 per unit	₹ 450 per unit
– Direct labour cost		
– Y : 3 hours @ ₹ 150 per hour		
– 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: -

Particulars	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 eachequipment.

(ICAI SM, Modified May 2019, Modified Nov. 2022)

Ans. **i) Overheads application base: Direct labour hours: -**

Particulars	**Equipment Y (₹)**	**Equipment Z (₹)**
– Direct material cost	300	450
– Direct labour cost	450	600
– Overheads*	186.38 (3×62.125)	248.50 (4×62.125)
	936.38	**1,298.50**

$$\text{*Recovery rate} = \frac{\text{Budgeted Overheads}}{\text{Budgeted direct labour hours}} = \frac{₹12,42,500}{20,000 \text{ hours}} = ₹62.125$$

ii) Estimation of Cost-Driver rate: -

Activity	**Overhead cost (₹)**	**Cost-driver level**	**Cost driver rate (₹)**
– Order processing	2,10,000	600 Orders processed	350
– Machine processing	8,75,000	50,000 Machine hours	17.50
– Inspection	1,57,500	15,000 Inspection hours	10.50

Particulars	**Equipment Y (₹)**	**Equipment Z(₹)**
– Direct material cost	300	450
– Direct labour cost	450	600
– **Prime Cost**	750	1,050
– **Overhead Cost**		
– Order processing	49	28
– Machine processing	161	151.2
– Inspection	16.8	36.96
Total	**976.8**	**1266.16**

Working Note: -

a) Order processing: -

$$\text{Equipment Y} = \frac{350 \text{ orders} \times 350 \text{ per order}}{2500} = 49$$

$$\text{Equipment Z} = \frac{250 \text{ orders} \times 350 \text{ per order}}{3125} = 28$$

b) Machine processing:

$$\text{Equipment Y} = \frac{23000 \times 17.5}{2500} = 161$$

$$\text{Equipment Z} = \frac{27000 \times 17.5}{3125} = 151.2$$

c) Inspection: -

$$\text{Equipment Y} = \frac{4000 \times 10.5}{2500} = 16.8$$

Equipment Z = $\frac{11000\times10.5}{3125} = 36.96$

iii)

Particulars	**Equipment Y (₹)**	**Equipment Z (₹)**
– Unit manufacturing cost– using direct labour hoursas an application base	936.38	1,298.50
– Unit manufacturing cost-using activity-based costing	976.80	1,266.16
– Loss of profit	(-)40.42	+ 32.34

Low volume product – Y's total cost is less and high-volume product Z's total cost is high using direct labour hours for overhead absorption.

9. MK Ltd. Manufactures four products, namely A, B, C and D using the same plant and process. The following information relates to a production period:

Product	**A**	**B**	**C**	**D**
Output in Units	720	600	480	504

The four products are similar and are usually produced in production runs of 24 units and sold in batches of 12 units. The total overheads incurred by the company for the period are as follows:

	₹
Machine operation and maintenance cost	63,000
Setup costs	20,000
Store receiving	15,000
Inspection	10,000
Material handling and dispatch	2,592

During the period the following cost drivers are to be used for the overhead cost:

Cost	**Cost driver**
Setup cost	No. of production runs
Store receiving	Requisitions raised
Inspection	No. of production runs
Material handling and dispatch	Orders executed

It is also determined that:

a) Machine operation and maintenance cost should be apportioned between setup cost, store receiving and inspection activity in the ratio 4:3:2.

b) Number of requisitions raised on store is 50 for each product and the no. of orders executed is 192, each order being for a batch of 12 units of a product.

Calculate the total overhead cost per unit of each product using activity-based costing after finding activity wise overheads allocated to each product.

(Nov. 2013, Modified MTP July 2021, Modified Nov 2022)

Ans. **a) Computation of ABC Recovery Rates**

Activity	**Activity Cost Pool**	**Cost Driver**	**Quantity**	**ABC Rate**
Set up	20,000 + 28,000 = ₹48,000	No. of Production Runs	96	₹500 per Run
Stores Receiving	15,000 + 21,000 = ₹36,000	Requisitions raised	50 × 4 = 200	₹180 per Reqn.
Inspection	10,000 + 14,000 = ₹24,000	No. of Production Runs	96	₹250 per Run

Material Handling	Given = ₹2,592	Orders executed	192	₹13.5 per Batch

Machine Operation and Maintenance Cost of ₹63,000 is apportioned to the first three activities in the ratio 4:3:2, i.e., ₹28,000, ₹21,000, and ₹14,000.

Number of Production Runs and Number of Batches are computed as under:

	Product	A	B	C	D	Total
a)	Output Quantity	720 units	600 units	480 units	504 units	
b)	Quantity per Production Run	24 units	24 units	24 units	24 units	
c)	Number of Production Runs (a ÷ b)	30 runs	25 runs	20 runs	21 runs	96 runs
d)	Quantity per Batch Order	12 units	12 units	12 units	12 units	
e)	Number of Batches (a ÷ d)	60 batches	50 batches	40 batches	42 batches	192 batches

b) Computation of OH Costs using ABC System

Product	A	B	C	D	Total
i) Set up	500 × 30 = ₹15,000	500 × 25 = ₹12,500	500 × 20 = ₹10,000	500 × 21 = ₹10,500	₹48,000
ii) Stores Receiving	₹9,000	₹9,000	₹9,000	₹9,000	₹36,000
iii) Inspection	250 × 30 = ₹7,500	250 × 25 = ₹6,250	250 × 20 = ₹5,000	250 × 21 = ₹5,250	₹24,000
iv) Material Handling	13.50 × 60 = ₹810	13.50 × 50 = ₹675	13.50 × 40 = ₹540	13.50 × 42 = ₹567	₹2,592
a) Total OH Cost.	₹32,310	₹28,425	₹24,540	₹25,317	₹1,10,592
b) Output Quantity	720 units	600 units	480 units	504 units	
c) OH Cost p.u.	₹44.875	₹47.375	₹51.125	₹50.232	

10. 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, 20X1 are as follows: -

	BABYSOFT- Gold		**BABYSOFT- Pearl**		**BABYSOFT-Diamond**	
Production of 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
– Fork lifting 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 operators 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 1kg respectively (ii) Mass of output produced is equivalent to the mass of input materials taken together.)

You are requested to: -

a) PREPARE a statement showing the unit costs and total costs of each product using the absorption costing method.
b) PREPARE a statement showing the product costs of each product using the ABC approach.
c) STATE what are the reasons for the different product costs under the two approaches?

(ICAI SM, May 2005Modified MTP Nov. 2020)

Ans. **a) Computation of Recovery Rate for production overheads**

Particulars	BABYSOFT- Gold	BABYSOFT - Pearl	BABYSOFT - Diamond	Total
a) Production of soaps (Units)	4,000	3,000	2,000	9,000
b) Direct labour(minutes)	30	40	60	-
c) Direct labour hours (a × b)/60 minutes	2,000	2,000	2,000	6,000

Recovery Rate = Budgeted overheads ÷ Budgeted labour hours
- = ₹ 1,98,000 ÷ 6,000 hours
- = ₹ 33 per direct labour hour

Statement Showing costing as per Absorption Costing System

Particulars	BABYSOFT- Gold (₹)	BABYSOFT- Pearl (₹)	BABYSOFT- Diamond (₹)
Direct Costs: -			
Direct Labour	5.00	6.67	10.00
	$\left(\frac{10\times30}{60}\right)$	$\left(\frac{10\times40}{60}\right)$	$\left(\frac{10\times60}{60}\right)$
Direct Material	167.50	215.50	248.50
(Refer working note1)			
Production Overhead:	16.50	22.00	33.00
	$\left(\frac{33\times30}{60}\right)$	$\left(\frac{33\times40}{60}\right)$	$\left(\frac{33\times60}{60}\right)$
Total unit costs	189.00	244.17	291.50
Number of units	4,000	3,000	2,000
Total costs	**7,56,000**	**7,32,510**	**5,83,000**

Working note-1
Calculation of Direct material cost

Particulars	BABYSOFT- Gold (₹)	BABYSOFT- Pearl (₹)	BABYSOFT- Diamond (₹)
Essential oils	120.00	165.00	195.00

	$\left(\frac{200\times60}{100}\right)$	$\left(\frac{300\times55}{100}\right)$	$\left(\frac{300\times65}{100}\right)$
Cocoa Butter	40.00	40.00	40.00
	$\left(\frac{200\times20}{100}\right)$	$\left(\frac{200\times20}{100}\right)$	$\left(\frac{200\times20}{100}\right)$
Filtered water	4.50	4.50	4.50
	$\left(\frac{15\times30}{100}\right)$	$\left(\frac{15\times30}{100}\right)$	$\left(\frac{15\times30}{100}\right)$
Chemicals	3.00	6.00	9.00
	$\left(\frac{30\times10}{100}\right)$	$\left(\frac{50\times12}{100}\right)$	$\left(\frac{60\times15}{100}\right)$
Total costs	**167.50**	**215.50**	**248.50**

b) <u>Computation of Recovery overhead under Activity Based Costing: -</u>

Particulars	BABYSOFT- Gold	BABYSOFT- Pearl	BABYSOFT- Diamond	Total
Quantity (units)	4,000	3,000	2,000	-
Weight per unit (grams)	108 {(60×0.8) +20+30+ 10}	106 {(55×0.8) + 20+30+ 12}	117 {(65×0.8) +20+30+ 15}	-
Total weight(grams)	4,32,000	3,18,000	2,34,000	9,84,000
Direct labour(minutes)	30	40	60	-
Direct labour hours	2,000 $\left(\frac{4,000\ \times 30}{60}\right)$	2,000 $\left(\frac{3,000\ \times 40}{60}\right)$	2,000 $\left(\frac{2,000\ \times 600}{60}\right)$	6,000
Machine operations per unit	5	5	6	-
Total operations	**20,000**	**15,000**	**12,000**	**47,000**

- Forklifting rate per gram =₹ 58,000 ÷ 9,84,000 grams
  = ₹ 0.06 per gram
- Supervising rate per direct = ₹ 60,000 ÷ 6,000 hours
- labour hour = ₹ 10 per labour hour
- Utilities rate per machine operations = ₹ 80,000 ÷ 47,000 machine operations
  = ₹ 1.70 per machine operations

<u>Statement showing costing as per Activity Based Costing: -</u>

Particulars	BABYSOFT- Gold(₹)	BABYSOFT- Pearl(₹)	BABYSOFT- Diamond(₹)
Direct Costs:			
- Direct Labour	5.00	6.67	10.00
- Direct material	167.50	215.50	248.50
Production Overheads:			
Forklifting cost	6.48 (0.06 × 108)	6.36 (0.06 × 106)	7.02 (0.06 × 117)
Supervising cost	5.00 $\left(\frac{10\times30}{60}\right)$	6.67 $\left(\frac{10\times40}{60}\right)$	10.00 $\left(\frac{10\times60}{60}\right)$
Utilities	8.50 (1.70 × 5)	8.50 (1.70 × 5)	10.20 (1.70 × 6)
Total unit costs	192.48	243.70	285.72
Number of units	4,000	3,000	2,000
Total costs	**7,69,920**	**7,31,100**	**5,71,440**

Comments: -

The difference in the total costs under the two systems is due to the differences in the overheads borne by each of the products. The Activity Based Costs appear to be more accurate.

11. KD Ltd. is following Activity based costing. Budgeted overheads, cost drivers and volume areas 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 andwages ₹4,68,500. Usage activities of the said batch are as follows: -
(Activity Based Question)

Material orders	56
Material movements	84
Maintenance hours	1,420 hours
Set-ups	60
No. of inspections	18

Required: -

a) CALCULATE cost driver rates.
b) CALCULATE the total and unit cost for the batch.

(Nov. 2020 RTP, ICAI SM, MTP May 2023-II)

Ans. **a) 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

b) 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 Cost per units		7,600 436.17

12. The following budgeted information relates to N Ltd. For the year 20X1:-

Particulars	Products		
	X	**Y**	**Z**
Production and Sales (units)	1,00,000	80,000	60,000
	(₹)	**(₹)**	**(₹)**
Selling price per unit	90	180	140

Direct cost per unit	50	90	95
	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 20X1 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	(₹)	Cost Driver	Quantity
Machining services	64,40,000	Machine hours	9,20,000 hours
Assembly services	44,00,000	Direct labour hours	11,00,000 hours
Set-up costs	9,00,000	Machine set-ups	9,000 set-ups
Order processing	7,20,000	Customer orders	7,200 orders
Purchasing	4,00,000	Purchase orders	800 orders

As per an estimate the activities will be used by the three products:

Particulars	Products		
	X	Y	Z
Machine set-ups	4,500	3,000	1,500
Customer orders	2,200	2,400	2,600
Purchase orders	300	350	150

You are required to PREPARE a product-wise profit statement using: -

i) Absorption costing method;
ii) Activity-based method.

(May 2021 RTP, Modified MTP Dec. 2021)

Ans. **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)

Particulars		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 = $\frac{₹73,60,000}{9,20,000\ hhours}$ = ₹8

Labour hour rate = $\frac{₹55,00,000}{11,00,000\ hours}$ = ₹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 –

	Particulars	Products			
		X	Y	Z	Total
A)	Machining house (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 services cost (₹) [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**

13. 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, 20X1, the following consumption of cost drivers was reported: -

Product	Kilowatt hours	Quality Inspections
M	10,000	3,500
S	20,000	2,500
T	15,000	3,000

Required: -

a) COMPUTE the costs allocated to each product from each activity.

b) CALCULATE the cost of unused capacity for each activity.

c) DISCUSS the factors the management considers in choosing a capacity level to compute the budgeted fixed overhead cost rate.

(ICAI SM, May 2004 RTP)

Ans. **a) Statement of cost allocation to each product from each activity**

	Product			
Particulars	**M (₹)**	**S (₹)**	**T (₹)**	**Total (₹)**
Power (Refer to working note)	40,000 (10,000 kWh × ₹4)	80,000 (20,000 kWh ×₹4)	60,000 (15,000 kWh ×₹4)	1,80,000
Quality Inspections (Refer to working note)	1,05,000 (3,500 inspections × ₹30)	75,000 (2,500 inspections × ₹ 30)	90,000 (3,000 inspections × ₹ 30)	2,70,000

Working note: -

Rate per unit of cost driver: -

Power	(₹ 2,00,000 / 50,000 kWh)	₹ 4/kWh
Quality Inspection	(₹ 3,00,000 / 10,000 inspections)	₹ 30 per inspection

b) Computation of cost of unused capacity for each activity: -

Particulars	(₹)
Power (50,000 – *45,000) × 4	20,000
Quality Inspections (10,000 – *9,000) × 30	30,000
Total cost of unused capacity	**50,000**

***Power consumption = (10,000+20,000+15,000) = 45,000**
***Quality inspection = (3500+2500+3000) = 9000**

c) 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.

14. 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 20X1 are as under: -

Particulars	Apple	Orange	Mixed Fruit
– Units produced and sold	10,000	15,000	20,000
– Material per unit (₹)	8	6	5
– Direct Labour per unit (₹)	5	4	3
– No. of Purchase Orders	34	32	14
– No. of Deliveries	110	64	52
– Shelf Stocking Hours	110	160	170

Overheads incurred by the company during the month are as under: -

Particulars	(₹)
– Ordering costs	64,000
– Delivery costs	1,58,200
– Shelf Stocking costs	87,560

Required: -

i) Calculate cost driver's rate.
ii) Calculate total cost of each product using Activity Based Costing.

(Nov 2020, ICAI SM)

Ans. **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 products using Activity Based Costing: -

Particulars	Fruits		
	Apple (₹)	Orange (₹)	Mixed Fruit (₹)
– Material cost	80,000 (10,000 × ₹8)	90,000 (15,000 × ₹6)	1,00,000 (20,000 × ₹5)
	50,000	60,000	60,000

– Direct labour Cost	(10,000 × ₹5)	(15,000 × ₹4)	(20,000 × ₹3)
Prime Cost (A)	**1,30,000**	**1,50,000**	**1,60,000**
– **Ordering Cost**	27,200 (800 × 34)	25,600 (800 × 32)	11,200 (800 × 14)
– **Delivery Cost**	**77,000** (700 × 110)	**44,800** (700 × 64)	**36,400** (700 × 52)
– **Shelf stocking cost**	21,890 (199 × 110)	31,840 (199 × 160)	33,830 (199 × 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**

15. Linex Limited manufactures three products P, Q and R which are similar in nature and are usually produced runs of 100 units. Product P and R require both machine hours and assembly hours, whereas product Q requires only machine hours. The overheads incurred by the company during the first quarter are as under:

Particulars	(₹)
Machine Department expenses	18,48,000
Assembly Department expenses	6,72,000
Setup costs	90,000
Stores receiving cost	1,20,000
Order processing and dispatch	1,80,000
Inspection and Quality control cost	36000

Particulars	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	15,000 hrs	--	27,000 hrs
(Direct labour hours)			
Customers’ orders executed	1,250	1,000	1,500
(In numbers)			
Number of requisitions raised	40	30	50
on the stores			

Prepare a statement showing details of overhead costs allocated to each product type using activity-based costing.

(May 2015, MTP May 2019)

Ans.

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

Working note –

*Number of Production Run is 450

P = 15,000/100 = 150

Q = 12,000/100 = 120

R = 18,000/100 = 180

450

Computation 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
Assembly Department Expenses	6,72,000	Assembly Hours (42,000 hrs.)	16.00
Setup Cost	90,000	No. of Production Runs (450*)	200
Stores Receiving Cost	1,20,000	No. of Requisition Raised on the Stores (120)	1,000
Order Processing and Dispatch	1,80,000	No. of Customers Orders Executed (3,750)	48
Inspection and Quality Control	36,000	No. of Production Runs (450*)	80
Total (₹)	**29,46,000**		

16. AML Ltd. is engaged in production of three types of ice-cream products: Coco, Strawberry and Vanilla. The company presently sells 50,000 units of Coco @₹25 per unit, Strawberry 20,000 @₹20 per unit Vanilla 60,000 units @15 per unit. The demand is sensitive to selling price and it has been demand that every reduction of ₹1 per unit in selling price, increases the demand for each product by 10% to the previous level. The company has the production capacity of 60,500 units of Coco, 24,200 units of Strawberry and 72,600 units of Vanilla. The company marks up 25% on cost of the product.

The Company management decides to apply ABC analysis. For this purpose it identifies four activities and the rates as follows:

Activity	**Cost Rate**
Ordering	₹800 per purchase order
Delivery	₹700 per delivery
Shelf stocking	₹199 per hour

Customer support and assistance of ₹1.10 p.u. sold.

The other relevant information for the products are as follows:

Particulars	Coco	Strawberry	Vanilla
Direct Material p. u. (₹)	8	6	5

Direct Labour p.u. (₹)	5	4	3
No. of purchase orders	35	30	15
No. of deliveries	112	66	48
Shelf stocking hours	130	150	160

Under the traditional cost system, support costs are charged @ 30% of prime cost as customer support and assistance.

Required: -

a) Calculation target cost for each product after a reduction of selling price required to achieve the sales equal to the production capacity.
b) Calculate the total cost and unit cost of each product at the maximum level using traditional costing.
c) Calculate the total cost and unit cost of each product at the maximum level using activity-based costing.
d) Compare the cost of each product calculated in (i) and (ii) with (iii) and comment on it.

(May 2010)

Ans. **a)** **Cost of products under target costing**

Demand unit and selling

Coco		Strawberry		Vanilla	
Selling Price	**Demand**	**Selling Price**	**Demand**	**Selling Price**	**Demand**
25	50,000	20	20,000	15	60,000
24	55,000	19	22,000	14	66,000
23	60,500	18	24,200	13	72,600

Target cost of each product after reduction in selling price: -

Particulars	Coco	Strawberry	Vanilla
Selling price after reduction	23.00	18.00	13.00
Less: Profit marks up 25% on cost i.e., 20% on selling price	4.60	3.60	2.60
Target cost of production (per unit)	18.40	14.40	10.40

b) **Cost of product under traditional costing:** -

Particulars	Coco	Strawberry	Vanilla
Units	60,500	24,200	72,600
Material cost (8,6,5, per unit)	8	6	5
Labour cost (5,4,3 per unit)	5	4	3
Prime cost	13	10	8
Store support costs (30% of prime)	3.90	3	2.40
Cost per unit	16.90	13.00	10.40

c) **Cost of product under activity-based costing:** -

Particulars	Coco (₹)	Strawberry (₹)	Vanilla (₹)
Units (A)	**60,500**	**24,200**	**72,600**
Material cost	4,84,000	1,45,200	3,63,000
	(60,500 X 8)	(24,200 X 6)	(72,600 X 5)
Labour cost	3,02,500	96,800	2,17,800
	(60,500 X 5)	(24,200 X 4)	(72,600X3)
Prime cost	7,86,500	2,42,000	5,80,800
Ordering cost @ 800 (35, 30, 15)	28,000	24,000	12,000

Delivery cost @ 700 (112, 66, 48)	78,400	46,200	33,600
Shelf stocking @₹199, (130, 150, 160)	25,870	29,850	31, 840
Customer Support @ ₹1.10 Per unit (60,500, 24200, 72600)	66,550	26, 620	79,860
Total cost (B)	**9,85,320**	**3,68,670**	**7,38,100**
Cost Per unit (B ÷ A)	16.29	15.23	10.17

d) <u>Comparative Analysis of cost of production (₹)</u>

Particulars	Coco (₹)	Strawberry (₹)	Vanilla (₹)
a) As per Target Costing	18.40	14.40	10.40
b) As per traditional Costing	16.90	13.00	10.40
c) As per Activity Based Costing	16.29	15.23	10.17

<u>Note:</u> -

Cost of product of strawberry is higher in ABC method in comparison to activity based costing and traditional methods. It indicated that actual profit under target costing is less than targeted. For remaining two products ABC is most suitable.

17. MNP suits is ready to – wear suit manufacturer. It has two wholesale channel customers, and two retail-channel customers.

MNP suits has developed the following activity-based costing system:

Activity	Cost Driver	Rate in 20X2
Order processing	Number of purchase orders	₹ 1,225 per orders
Sales visits	Number of customer visits	₹ 7,150 per visit
Delivery – regular	Number of regular deliveries	₹ 1,500 per delivery
Delivery-rushed	Number of rushed deliveries	₹ 4,250 per delivery

List selling price per suit is ₹1,000 and average cost per suit ₹550.

The CEO of MNP suits wants to evaluate the profitability of each of the four customers in 20X1 to explore opportunities for increasing profitability of his company in 20X2. The following data are available for 20X1:

Particulars Item	Wholesale customers		Retail Customers	
	W	H	R	T
Total number of orders	44	62	212	250
Total number of sales visits	8	12	22	20
Regular deliveries	41	48	166	190
Rush deliveries	3	14	46	60
Average number of suits per order	400	200	30	25
Average selling price per suit	₹700	₹ 800	₹ 850	₹ 900

<u>Required:</u> -

a) Calculate the customers-level operating income in 20X1.

b) What do you recommend to CEO of MNP suits to do to increase the Company's' operating income in 20X2?

c) Assume MNP suits distribution channel costs are ₹17,50,000 for its wholesale customers and ₹10,50,000 for the retail customers. Also, assume that its corporate sustaining costs are ₹12,50,000. Prepare income statement of MNP suits for 20X1.

(Nov. 2004)

Ans.

a) Computation of Customer level operating income in 20X1: -

	Whole Sale Customer		Retail Customer	
Particulars	**W (₹)**	**H (₹)**	**R (₹)**	**T (₹)**
a) Revenues (at price list)	44 × 400 × 1,000 = 1,76,00,000	62 × 200 × 1,000 = 1,24,00,000	212 × 30 = 1,000 = 63,60,000	250 × 25 × 1,000 = 62,50,000
b) Discount	44 × 400 × 300 (i.e. 1,000 – 700) = 52,80,000	62 × 200 × 200 (i.e. 1000 – 800) = 24,80,000	212 × 30 × 150 (i.e. 100 – 850) = 9,54,000	250 × 25 × 100 (i.e. 1,000 – 900) = 6,25,000
c) Revenue at actual price (A – B)	1,23,20,000	99,20,000	54,06,000	56,25,000
d) Cost of goods sold	44 × 400 × 550 = 96,80,000	62 × 200 × 550 = 68,20,000	212 × 30 × 550 = 34,98,000	250 × 25 × 550 = 34,37,500
e) Gross Margin (C-D)	26,40,000	31,00,000	19,08,000	21,87,500
f) Operating cost at customer level				
i) Order processing	44 × ₹1,225 = 53,900	62 × ₹1,225 = 75,950	212 × × ₹1,225 = 2,59,700	250 × ₹1,225= 306250
ii) Expense Sales visit	8 × ₹7,150 = 57,200	12 × ₹7150 = 85,800	22 × ₹7,150 = 1,57,300	20 × ₹7,150 = 1,43,0 00
iii) Expense on regular's delivery	41 × ₹1,500 = 61,500	48 × ₹1,500 = 72,000	166 × ₹1,500 = 2,49,000	190 × ₹1,500 = 2,85,000
iv) Expense on rushed delivery	3× ₹4,250 = 12,750	14 × ₹4,250 = 59,500	46 × ₹4,250 = 1,95,500	60 × ₹4,250 = 2,55,000
g) Total operating cost at customer level	1,85,350	2,93,250	8,61,500	9,89,250
h) Operating income at customer level (E-G)	24,54,650	28,06,750	10,46,500	11,98,250
i) Operating Income as percentage of revenue income at customer level (H/C × 100)	19.92%	28.29%	19.35%	21.30%

b) Before giving our opinion to CEO of MNP suits for increasing the company's operating income in 20X2, we first see the key challenges faced by the CEO.

1) Reduce level of price discounting, especially by the wholesale customer 'W'.
2) Reduce level of 'Customer level costs', especially by retail customers R & T.

ABC analysis highlights some to problem areas regarding the customers R & T. Such as:

a) High number of customer visits.
b) High number of orders.
c) High number of regular and rushed deliveries.

So, our opinion is – CEO should reduce such high level of activities without reducing customer revenues.

c) Income Statement of MNP SUITS FOR 20X1: -

Particulars	Whole State Customer (₹)	Retail Customers (₹)	Total (₹)
a) Operating income at customer level	24,54,650 +28,06,750 = 52,61,400	10,46,500+11,98,250 = 22,44,750	75,06,150
b) Distribution channel cost	17,50,000	10,50,000	28,00,000

c) Operating income at distribution channel level (A-B)	35,11,400	11,94,750	47,06,150
d) corporate sustaining cost	—	—	12,50,000
e) Operating Income [C-D]	—	—	34,56,150

18. Speedo Limited is a specialist car manufacturer that produces various models of cars. The organization is due to celebrate its 100th anniversary next year. To mark the occasion, Speedo Limited intends to produce a sports car; the Model Royal. As this will be a special edition, production will be limited to 1,000 numbers of Model Royal Cars.

Speedo Limited is considering using a target costing approach and has conducted market research to determine the features that consumers require in a sports car. Based on this market research and knowledge of competitor's products, company has decided to price the Model Royal at ₹9.75 Lacs. Company requires an operating profit margin of 25% of the selling price of the car.

Details for the forthcoming year are as follows:

Forecast of direct costs for a Model Royal Car –

Labour	₹ 2,50,000
Material	₹ 4,75,000

Forecast of annual overhead costs-

Particulars	₹ in lacs	Cost driver
Production line cost	2,310	See note 1
Transportation costs	900	See not 2

<u>Note: 1:</u> -

The production line that would be used for Model Royal has a capacity of 60,000 machine hours per year. The production line time required for Model Royal is 6 machine hours per car. This production line will also be used to make other cars and will be working at full capacity.

<u>Note 2:</u> -

Some models of cars are delivered to showrooms using car transporters. 60% of the transportation costs are related to the number of deliveries made. 40% of the transportation costs are related to the distance travelled. The car transporters have forecast to make a total of 640 deliveries in the year and carry 10 cars each time. The car transporter will always carry its maximum capacity of 10 cars.

The total annual distance travelled by car transporters is expected to be 2,25,000 kms. 50,000 kms of this is for the delivery of Model Royal cars only. All 1,000 Model Royal cars that will be produced will be delivered in the year using the car transporters.

<u>Required:</u> -

- **a)** Calculate the forecast total cost of producing and delivering a Model Royal car using Activity Based Costing principles to assign the overhead costs.
- **b)** Calculate the cost gap that currently exists between the forecast total cost and the target total cost of a Model Royal car.

(Nov 2016)

Ans. **a) <u>Target cost, forecast total cost and cost Gap:</u>** -

Particulars	(₹) per Car
Target selling price per car	9,75,000.00
Less: Target profit on the above selling price (9,75,000 × 25%)	2,43,750.00
1) Target Total Cost	7,31,250.00

2) Forecast total costs:		
Material	4,75,000.00	
Labour	2,50,000.00	
OH (WN 1)	39,537.50	7,64,537.50
b) Cost Gap. Between forecast total cost and the target cost (1-2) (cost reduction required)		(33,287.50)

Working notes-

1) Allocation of production line cost

Total Cost = 23,10,00,000

Total Machine hours = 60,000 machine hours

i) Per machine hour cost = $\frac{23,10,00,000}{60,000}$ = ₹ 3,850 Per machine hours

ii) Machine hour for Model Royal = 6 hours per car × 1000 cars = 6000 machine hours A×B)
Production line cost for new model = 6000×₹ 3850 = 2,31,00,000

2) Transportation

i) Transportation cost = 9,00,00,000
60% of transportation cost = 9,00,00,000×60% = 5,40,00,000
Total number of deliveries = 640×10 = 6400
Overhead cost = $\frac{54000000}{6400}$ ×1000 = 84,37,500

ii) Transportation cost = 9,00,00,000
40% of transportation cost = 9,00,00,000×40% = 3,60,00,000
Total distance travelled = 2,25,000 kms
Overhead cost = $\frac{3,60,00,000}{225000}$ × 50000 = 80,00,000

Total overhead for 1,000 cars of model Royal = 2,31,00,000 + 84,37,500 + 80,00,000 = 3,95,37,500

∴, Overhead cost per car = Total Overhead Cost ÷ 1,000 cars = 39,537.5

19. M/s. HMB Limited is producing a product in 10 batches each of 15,000 units in a year and incurring following overheads their on: -

Particulars	(₹)
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	(₹)
No. of purchase orders	1,500
Maintenance hours	9,080
No. of set-ups	2,250
No. of inspections	2,710

The company has produced a batch of 15,000 units and has incurred ₹26,38,700 and ₹3,75,200 on materials and wages respectively.

The usage of activities of the said batch are as follows:

Material orders	48 orders
Maintenance hours	810 hours
No. of set-ups	40
No. of inspections	25

You are required to: -

a) Find out cost of product per unit on absorption costing basis for the said batch.

b) Determine cost driver rate, total cost and cost per unit of output of the said batch on the basis of activity-based costing.

(Nov. 2018)

Ans.

Overhead Absorption Rate $=\frac{51,79,300}{3,01,39,000} \times 100 = \mathbf{17.18}\%$

a) Cost of Product Under Absorption Costing: -

Item of Cost	Amount (₹)
Material	26,38,700
Wages	3,75,200
Prime Cost	30,13,900
Overheads: 30,13,900X 17.18%	5,17,788
Total Cost	**35,31,688**
Units	15,000
Cost per unit	**235.44**

b) Cost driver rate, total cost and cost per unit on the basis of activity-based costing method Absorption Costing: -

Activity	(₹)	Activity	Cost Driver Volume
Material Procurement	22,50,000	1,500	1,500
Maintenance	17,30,000	9,080	190.53
Setup	6,84,500	2,250	304.22
Quality Control	5,14,800	2,710	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 $\left(\frac{22,50,000}{1,500} \times 48\right)$	72,000
Maintenance $\left(\frac{17,30,000}{19,080} \times 810\right)$	1,54,328
Set up $\left(\frac{6,84,500}{2,250} \times 40\right)$	12,169
Quality Control $\left(\frac{5,14,800}{2,710} \times 25\right)$	4,749
Total Cost	**32,57,146**
Unit	15,000
Cost per unit	**217.14**

20. PQR Ltd. is engaged in the production of three products P. Q, 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	8,000 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 Activity.

ii) Calculate the cost of unused capacity for each Activity.

iii) A potential customer has approached the company for supply of 12,000 units of new product 'S' to be delivered in lots of 1,500 units per quarter. This will involve an initial design cost of ₹30,000 and per quarter production will involve the following:

Direct Material	₹18,000
Direct Labour hours	1,500 hours
No. of Production runs	15
No. of Quality 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.

(July 2021)

Ans. **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 to working note)	60,000 (200 Production runs × ₹ 300)	54,000 (180 Production runs × ₹ 300)	48,000 (160 Production runs × ₹ 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)] Production runs [(₹ 1,80,000 – ₹ 1,62,000) or (60 x ₹ 300)]	60,000 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

21. ABC Limited manufactures two radio models, the Nova which has been produced for five years and sells for ₹900, and the Royal, a new model introduced in early 20X1, which sells for ₹1,140. Based on the toy, income statement for the year 20X1-X2, a decision has been made to concentrate ABC Limited's marketing resources on the Royal model and to begin phase out the Nova model.

ABC Limited Income statement
for the year ending March 31,20X2

	Royal Model	Nova Model	Total
Sales	45,60,000	1,98,00,000	2,43,60,000
Cost of Goods sold	31,92,000	1,25,40.000	1,57,32,000
Gross margin	13,68,000	72,60,000	86,28,000
Selling & Administrative Expenses	9,78,000	58,30,000	68,08,000
Net income	3.90,000	14,30,000	18,20,000
Unit Produced and sold	4,000	22,000	
Net income per unit sold	97.50	65	

The standard unit costs for the Royal and Nova models are as follows:

	Royal Model	Nova Model
	₹	₹
Direct materials	584	208
Direct Labour		
Royal (3.5 hrs x ₹12)	42	
Nova (1.5 hrs x ₹12)		18
Machine usage		
Royal (4 hrs x ₹18)	72	
Nova (8 hrs x ₹18)		144
Manufacturing overheads (Applied on the basis of machine hours at a pre-determined rate of ₹25 per hour)	100	200
Standard cost	798	570

ABC Ltd.'s Controller is advocating the use of activity-based costing and - sed cost Management and has gathered the following information the company's manufacturing overheads cost for the year ending March 31, 20X2.

Activity centre (Cost driver)	Traceable costs ₹	Number of Events		
		Royal	Nova	Total
Soldering (Number of solder joints)	9,42,000	3,85,000	11,85,000	15,70,000
shipments (Number of shipments)	8,60,000	3,800	16,200	20,000
Quality control (Number inspections)	12,40,000	21,300	56,200	77,5000
Purchase orders				
(Number of orders)	9,50,400	1,09,900	80,100	1,90,000
Machine Power				
(Machine hours)	57,600	16,000	1,76,000	1,92,000
Machine setups				
(Number of setups)	7,50,000	14,000	16,000	30,000
Total Traceable costs	48,00,000			

Required:

i) Prepare a statement showing allocation of manufacturing overheads using the principles of activity-based costing.

ii) Prepare a statement showing product cost and profitability using activity-based costing.

iii) Should ABC Ltd. continue to emphasize the Royal model and phase out the Nova model? Discuss.

(Nov. 2005)

Ans.

i) Statement showing allocation of manufacturing overheads using the principles of Activity Based Costing:

Particulars	Cost allocation basis Royal	Royal	Nova	Total
Soldering	385:1185	2,31,000	7,11,000	9,42,000
Shipments	38:162	1,63,400	6,96,600	8,60,000
Quality control	213:562	3,40,800	8,99,200	12,40,000
Purchase orders	109900:80100	5,49,731	4,00,669	9,50,400
Machine power	16:176	4,800	52,800	57,600
Machine setups	14:16	3,50,000	4,00,000	7,50,000
		16,39,731	**31,60,269**	**48,00,000**
Unit produced & sold		4,000	22,000	
Manufacturing Overheads cost p.u.		409.93	143.65	

ii) Statement showing product cost and profitability using Activity Based Costing:

Particulars	Royal	Nova
Direct Materials	584.000	208.000
Direct Labour	42.000	18.000
Machine Usage	72.000	144.000
Manufacturing Overheads (as per ABC)	409.975	143.640
Cost	1107.975	513.64
Selling and Dist. Ohs	244.50	265.00
Cost of Sales	1,352.475	778.640
Profit	(212.475)	121.36
Sales	1,140.00	900.00

iii) Statement showing Net Income

Particulars	Royal	Nova	Total
Gross margin/unit	32.02	386.36	
Gross Margin	1,28,080	84,99,920	86,28,000
Selling Adm. Expenses	9,78,000	58,30,000	68,08,000
Net Income	(8,49,920)	26,69,920	18,20,000

iv) Company should not emphasise the royal model and should emphasise more on Nova Model and phase out the Royal Model gradually. Rather, the pricing of Royal Model is required to be corrected.

22. The profit margin of BABY Hairclips Company were over 20% of sales producing BROWN and BLACK hairclips.

During the last year, GREEN hairclips had been introduced at 10% premium in selling price after the introduction of YELLOW hairclips earlier five years back at 10/3% premium. However, the manager of the company is disheartened with the sales figure for the current financial year as follows:

Traditional Income Statement **(in ₹)**

	Brown	Black	Yellow	Green	Total
Sales	1,50,00,000	1,20,00,000	27,90,000	3,30,000	3,01,20,000
Material Costs	50,00,000	40,00,000	9,36,000	1,10,000	1,00,46,000
Direct Labour	20,00,000	16,00,000	3,60,000	40,000	40,00,000
Overhead (3 times of direct labour)	60,00,000	48,00,000	10,80,000	1,20,000	1,20,00,000
Total Operating Income	20,00,000	16,00,000	4,14,000	60,000	40,74,000
Return on Sales (in %)	13.3%	13.3%	14.8%	18.2%	13.5%

It is a known fact that customers are ready to pay premium amount for YELLOW and GREEN hairclips for their attractiveness; and the percentage returns are also high on new products.

At present, all of the Plant's indirect expenses are allocated to the products at 3 times of the direct labour expenses. However, the manager is interested in allocating indirect expenses on the basis of activity cost to reveal real earner.

He provides support expenses category-wise as follows:

Support Expenses	**(₹)**
Indirect Labour	40,00,000
Labour Incentives	32,00,000
Computer Systems	20,00,000
Machinery depreciation	16,00,000
Machine maintenance	8,00,000
Energy for machinery	4,00,000
Total	**1,20,00,000**

He provides following **additional information** for accomplishment of his interest: Incentives to be allocated @ 40% of labour expenses (both direct and indirect).

Indirect labours are involved mainly in three activities. About half of indirect labour is involved in handling production runs. Another 40% is required just for the physical changeover from one color hairclip to another because YELLOW hairclips require substantial labour for preparing the machine as compared to other colour hairclips. Remaining 10% of the time is spend for maintaining records of the products in four parts.

Another amount spent on computer system of ₹20,00,000 is for maintenance of documents relating to production runs and record keeping of the four products. In aggregate, approx. 80% of the amount expend is involved in the production run activity and approx. 20% is used to keep records of the products in four parts.

Other overhead expenses i.e. machinery depreciation, machine maintenance and energy for machinery are incurred to supply machine capacity to produce all the hairclips (practical capability of 20,000 hours).

Activity Cost Drivers:

Particulars	Brown	Black	Yellow	Green	Total
Sales Volume (units)	1,00,000	80,000	18,000	2,000	2,00,000
Selling Price (₹)	150	150	155	165	
Material cost (₹)	50	50	52	55	
Machine hours per unit (Hrs)	0.10	0.10	0.10	0.10	20,000
Production runs	100	100	76	24	300
Setup time per run (Hrs)	4	1	6	4	

You are required to –

i) CALCULATE operating income and operating income as per percentage of sales using activity-based costing system.

ii) STATE the reasons for different operating income under traditional income system and activity-based costing system.

(RTP Nov 2022)

Ans. **i) Calculation of operating income using Activity Based Costing**

Calculation of Cost-Driver rate

Activity	Overhead cost	Allocation	Overhead cost	Cost-driver level	Cost driver rate
	(₹)		(₹)		(₹)
Indirect labour + 40% for incentives	56,00,000	50%	28,00,000	300 Production runs	9,333.33
		40%	22,40,000	1052* Setup hours	2,129.28
		10%	5,60,000	4 Number of parts	1,40,000
Computer Systems	20,00,000	80%	16,00,000	300 Production runs	5,333.33
		20%	4,00,000	4 Number of parts	1,00,000
Machinery depreciation	16,00,000	100%	16,00,000	20,000 Machine hours	80
Machine Maintenance	8,00,000	100%	8,00,000	20,000 Machine hours	40
Energy for Machinery	4,00,000	100%	4,00,000	20,000 Machine hours	20

* (100 x 4) + (100 x 1) + (76 x 6) + (24 x 4)

= (400 + 100 + 456 + 96)

= 1052 setup hours

Activity Based Costing

	Brown	Black	Red	Green	Total
Quantity (units)	1,00,000	80,000	18,000	2,000	2,00,000
	(₹)	**(₹)**	**(₹)**	**(₹)**	**(₹)**
Sales	1,50,00,000	1,20,00,000	27,90,000	3,30,000	3,01,20,000
Less: Material Costs	50,00,000	40,00,000	9,36,000	1,10,000	1,00,46,000
Less: Direct labour	20,00,000	16,00,000	3,60,000	40,000	40,00,000
Less: 40% incentives on direct labour	8,00,000	6,40,000	1,44,000	16,000	16,00,000

(A)	**72,00,000**	**57,60,000**	**13,50,000**	**1,64,000**	**1,44,74,000**
Overheads					
Indirect labour + incentives					
- 50% based on Production runs	9,33,333 (9,333.33 x 100)	9,33,333 (9,333.33 x 100)	7,09,334 (9,333.33 x 76)	2,24,000 (9,333.33 x 24)	28,00,000
- 40% based on Setup hours	8,51,711 (2,129.28 x 400)	2,12,928 (2,129.28 x 100)	9,70,951 (2,129.28 x 456)	2,04,410 (2,129.28 x 96)	22,40,000
- 10% based on number of parts	1,40,000 (1,40,000 x 1)	1,40,000	1,40,000	1,40,000	5,60,000
Computer Systems					
- 80% based on Production runs	5,33,333 (5,333.33 x 100)	5,33,333 (5,333.33 x 100)	4,05,334 (5,333.33 x 76)	1,28,000 (5,333.33 x 24)	16,00,000
- 20% based on number of parts	1,00,000 (1,00,000 x 1)	1,00,000	1,00,000	1,00,000	4,00,000
Machinery depreciation	8,00,000 (80 x 0.1 x 1,00,000)	6,40,000 (80 x 0.1 x 80,000)	1,44,000 (80 x 0.1 x 18,000)	16,000 (80 x 0.1 x 2,000)	16,00,000
Machine Maintenance	4,00,000 (40 x 0.1 x 1,00,000)	3,20,000 (40 x 0.1 x 80,000)	72,000 (40 x 0.1 x 18,000)	8,000 (40 x 0.1 x 2,000)	8,00,000
Energy for Machinery	2,00,000 (20 x 0.1 x 1,00,000)	1,60,000 (20 x 0.1 x 80,000)	36,000 (20 x 0.1 x 18,000)	4,000 (20 x 0.1 x 2,000)	4,00,000
Total Overheads (B)	**39,58,377**	**30,39,594**	**25,77,619**	**8,24,410**	**1,04,00,000**
Operating Income (A-B)	**32,41,623**	**27,20,406**	**(12,27,619)**	**(6,60,410)**	**40,74,000**
Return on Sales (%)	**21.61**	**22.67**	**(44.00)**	**(200.12)**	**13.53**

ii) The difference in the operating income 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.

Budgets and Budgetary Control
Assignment

Q. No.	Question / Answers
1.	During the FY 20X1-X2, P Limited has produced 60,000 units operating at 50% capacity level. The cost structure at the 50% level of activity is as under: -

Particulars	(₹)
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 Expense (80% Variable)	40 per unit
Office and Administrative Expenses (100% fixed)	20 per unit

The company anticipates that in FY 20X2-X3, 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 20X1-X2.

ii) Prepare an Expenses budget on marginal cost basis for the FY 20X2-X3 for the company at 50% and 60% level of activity and. Find out the profits at respective levels.

(ICAI SM, May 2013 RTP, Nov. 2014, Modified Nov 2019 RTP & Nov 2020, Modified MTP May 2020, Modified MTP May 2023)

Ans. **i)** **Calculation of Budgeted profit for the FY 20X1-X2: -**

Particulars	**60,000 units**	
	Per unit (₹)	**(₹)**
Sales (A)	800.00	4,80,00,000
Variable Costs: -		
✓ Direct Material	300.00	1,80,00,000
✓ Direct Wages	100.00	60,00,000
✓ Variable Overheads	100.00	60,00,000
✓ Direct Expenses	60.00	36,00,000
✓ Variable Factory expenses (75% of ₹ 80 p.u)	60.00	36,00,000
✓ Variable Selling & Dist. exp (80% of ₹ 40 p.u.)	32.00	19,20,000
✓ **Total Variable Cost (B)**	652.00	3,91,20,000
✓ Contribution **(C)=(A−B)**	148.00	88,80,000
Fixed Costs: -		
✓ Office and Admin. Exp. (100%)	---	12,00,000
✓ Fixed Factory exp. (25%)	---	12,00,000
✓ Fixed Selling & Dis. Exp. (20%)	---	4,80,000
✓ **Total Fixed Costs (D)**	---	28,80,000
✓ Profit **(C−D)**	---	60,00,000

ii) Expense Budget of P Ltd. for the FY 20X2-X3 at 50% & 60% level: -

Particulars	60,000 units		72,000 units	
	Per unit (₹)	(₹)	Per unit (₹)	(₹)
Sales (A)	880.00	5,28,00,000	880.00	6,33,60,000
Variable Costs: -				
✓ Direct Materials	360.00	2,16,00,000	360.00	2,59,20,000
✓ Direct Wages	120.00	72,00,000	120.00	86,40,000
✓ Variable Overheads	120.00	72,00,000	120.00	86,40,000
✓ Direct Expenses	72.00	43,20,000	72.00	51,84,000
✓ Variable Factory Expenses	72.00	43,20,000	72.00	51,84,000
✓ Variable Selling & Dist. exp.	38.40	23,04,000	38.40	27,64,800
✓ Total Variable Cost (B)	782.40	4,69,44,000	782.40	5,63,32,800
✓ **Contribution (C)=(A–B)**	**97.60**	**58,56,000**	**97.60**	**70,27,200**
Fixed Costs: -				
✓ Office and Admin. Exp (100%)	---	13,80,000	---	13,80,000
✓ Fixed Factory exp (25%)	---	13,80,000	---	13,80,000
✓ Fixed Selling & Dist. exp. (20%)	---	5,52,000	---	5,52,000
✓ Total Fixed Costs **(D)**	---	33,12,000	---	33,12,000
✓ **Profit (C–D)**	**---**	**25,44,000**	**---**	**37,15,200**

2. 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	5,000 units
February	6,000 units
March	7,000 units
April	7,500 units
May	8,000 units

To manufacture an electronic gadget, a standard cost of ₹1,500 is incurred and it is sold through dealers at a 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.

3,250 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.

(Nov. 2018, RTP May 2020, Modified July 2021, Modified MTP May 2019, Modified MTP Nov 2022)

Ans.

i) Preparation of Production Budget (in units);

Particulars	January	February	March	April
Demand for the month (units)	5000	6000	7000	7500
Add: 25% of next month's demand	1500	1,750	1,875	2,000
Less: Opening Stock	(1,200)	(1,500)	(1,750)	(1,875)
Gadgets to be produced	5,300	6,250	7,125	7,625

ii) Preparation of Purchase budget for batteries;

Particulars	January	February	March
Production for the month (units)	5,300	6,250	7,125
Add: 30% of next month's Production	1,875	2,137.5	2,287.5
	(30% of 6,250)	(30% of 7,125)	(30% of 7,625)
Gadgets to be produced	7,175	8,387.5	9,412.5
No. of units required for production	14,350	16,775	18,825
	(7,175×2 units)	(8,387.5×2 units)	(9,412.5×2 units)
Less: Opening stock	(3,250)	(3,750)	(4,,275)
		(1,875 ×2 units)	(2137.5 × 2 units)
No. of units to be purchased	**11,100**	**13,025**	**14,550**

Budgeted Gross Profit for the Quarter January to March

	Particulars	January	February	March	Total
✓	Sales in units	5000	6000	7000	18000
✓	Net selling price per unit[1]	₹1,700	₹1,700	₹1,700	
✓	Sales Revenue	85,00,000	1,02,0 ,000	1,19,00,000	3,06,00,000
✓	**Less:** Cost of sales				
✓	(Sales unit × Cost per unit)	75,00,000	90,00,000	1,05,00,000	2,70,00,000
✓	Gross Profit	**10,00,000**	**12,00,000**	**14,00,000**	**36,00,000**

3.

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 weeks	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: -

a) Efficiency Ratio
b) Activity Ratio
c) Calendar Ratio

d) Standard Capacity Usage Ratio

e) Actual Capacity Usage Ratio.

f) Actual Usage of Budgeted Capacity Ratio.

(ICAI SM, May 2019, Modified Nov. 2019, Modified RTP Nov 2022)

Ans.

a) Efficiency Ratio $= \frac{\text{Standard Hours}}{\text{Actual Hours}} \times 100 = \frac{7{,}000 \text{ Hours}}{6{,}000 \text{ Hours}} \times 100 = 116.67\%$

b) Activity Ratio $= \frac{\text{Standard Hours}}{\text{Budgeted Hours}} \times 100 = \frac{7{,}000 \text{ Hours}}{6{,}400 \text{ Hours}} \times 100 = 109.375\%$

c) Calendar Ratio$= \frac{\text{Available working days}}{\text{Budgeted working days}} \times 100 = \frac{19 \text{ Days}}{20 \text{ Days}} \times 100 = 95\%$

d) Standard Capacity Usage Ratio$= \frac{\text{Budgeted Hours}}{\text{Max.Possible hours in the budgeted period}} \times 100$

$$= \frac{6{,}400 \text{ Hours}}{8{,}000 \text{ Hours}} \times 100 = 80\%$$

e) Actual Capacity Usage Ratio $= \frac{\text{Actual Hours worked}}{\text{Max. Possible Working Hours in a period}} \times 100$

$$= \frac{6{,}000 \text{ Hours}}{8{,}000 \text{ Hours}} \times 100 = 75\%$$

f) Actual Usage of Budgeted Capacity Ratio $= \frac{\text{Actual working Hours}}{\text{Budgeted Hours}} \times 100$

$$= \frac{6{,}000 \text{ Hours}}{6{,}400 \text{ Hours}} \times 100 = 93.75\%$$

Workings Notes –

- ✓ Maximum Capacity in a budget period
  = 50 Employees × 8 Hours × 5 Days × 4 Weeks = 8,000 Hours.
- ✓ Budgeted Hours
  40 Employees × 8 Hours × 5Days × 4 Weeks = 6,400 Hours.
- ✓ Actual Hours = 6,000 Hours (given)
- ✓ Standard Hours. For Actual Output = 7,000 Hours.
- ✓ Budget No. of Days= 20 Days = 20 Days (4 Weeks × 5 Days)
- ✓ Actual No. of Days = 20 − 1 = 19 Days

4. **S Ltd. has prepared budget for the coming year for its two products A and B.**

Particulars	Product A (₹)	Product B (₹)
Production & Sales unit	6,000 units	9,000 units
Raw material cost per unit	60.00	42.00
Direct labor 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 products:

a) Before marketing efforts

b) After marketing efforts.

(Nov. 2012 RTP, Modified MTP May 2019, Modified Dec 2021, Modified MTP May 2023–II)

Ans.

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 labor 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	37,810
Total cost	109.92	8,24,400	70.58	6,70,510
Profit	10.08	75,600	7.42	70,490

5.

A Company manufactures two Products A and B by making use of two types of materials, viz., X and Y. Product A requires 10 units of X and 3 units of Y. Product B requires 5 unit of X and 2 units of Y. The price of X is ₹2 per unit and that of Y is ₹3 per unit. Standard hours allowed per product are 4 and 3, respectively. Budgeted wages rate is ₹8 per hour. Overtime premium is 50% and is payable, if a worker works for more than 40 hours a week. Three are 150 workers. The Sales Manager has estimated the sale of Product A to be 5,000 units and Product B 10,000 units. The target productivity ratio (or efficiency ratio) for the productive hours worked by the direct worker in actually manufacturing the product is 80%, in addition, the non-productive downtime is budgeted at 20% of the productive hours worked. There are twelve 5-day weeks in the budget 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 800 units; Product B 1,680 units. The targeted closing stock expressed in terms of anticipated activity during the budget period are Product A 12 days sales; Product B 18 days sales. The opening and closing stock of raw material of X and Y will be maintained according to requirement to stock position for Product A and B.

You are required to prepare the following for the next period:

- **a)** Material usage and Material purchase budget in terms of quantities and values.
- **b)** Production budget.
- **c)** Wages budget for the direct workers.

(Nov. 2004, Modified May 2006 Modified RTP May 2023)

Ans.

Product	Product Units	Material X		Material Y		Total
		Material usage per unit	Total usage	Material usage per unit	Total usage	
A	5,000	10	50,000	3	15,000	65,000
B	10,000	5	50,000	2	20,000	70,000
			1,00,000		**35,000**	**1,35,000**

a) Material Purchase Budget;

Particulars	Material X	Material Y	Total
✓ Material usage as per budget	1,00,000	35,000	
✓ **Add:** Closing Stock of material			
✓ Material X:			
✓ 1,000 × 10 = 10,000(Note-2)			
✓ 3,000 × 5 = 15,000	25,000		
✓ Material Y:			
✓ 1,000 × 3 = 3,000(Note-2)			
✓ 3,000 × 2 = 6,000		9,000	
	1,25,000	44,000	
✓ **Less:** Opening Stock			
✓ Material X:			
✓ 800 × 10 = 8,000			
✓ 1,680 × 5 = 8,400	16,400		
✓ Material Y:			
✓ 800 × 3 = 2,400			
✓ 1,680 × 2 = 3,360		5,760	
✓ Material Purchase in Quantity	1,08,600	38,240	1,46,840
✓ Cost/Unit	₹2	₹3	
✓ **Cost of purchase**	**2,17,200**	**1,14,720**	**3,31,920**

Note:

1) Opening stock is based on the quantity of product A and B.

2) Closing stock:

Product A= (5,000/12*5*12) = 1000

Product B= (10,000/12*5*18) = 3000

b) Production Budget;

Particulars	Product A (Units)	Product B (Units)
✓ Sales	5,000	10,000
✓ **Add:** Closing Stock	1,000	3,000
	6,000	13,000
✓ **Less:** Opening Stock	800	1,680
✓ Production	5,200	11,320

c) **Wages budget**

Wages Budget	**Product A (hrs.)**	**Product B (hrs.)**	**Total (hrs.)**
Std. hours			
	20,800	33,960	54,760
	(5,200 × 4)	(11,320 × 3)	
Std. hour at 100% $\left(54,760 \times \frac{100}{80}\right)$			68,450
Add: non-productive time			13,690
(68,450 × 20%)			
Labor hours required for production			82,140
(150 workers × 8 hours × 60 days)			72,000
Overtime			10,140
Wages for normal hours (72,000 × 8) = ₹			5,76,000
Wages for overtime (10,140 × 8 × 1.5) =₹			1,21,680
Total Wages = ₹			**6,97,680**

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
Other Sundries	10% on direct wages
Administration, Selling and distribution expenses	₹ 36,000 per year

(ICAI SM, Modified MTP Nov. 2020, MTP May 2022)

Ans.

Master Budget for the year ending

Particulars	**(₹)**		
✓ **Sales;**			
✓ Toughened Glass			6,00,000
✓ Bent Glass			2,00,000
✓ **Total Sales**			**8,00,000**
✓ **Less:** Cost of production:			
✓ Direct materials (60% of ₹ 8,00,000)		4,80,000	
✓ Direct wages (20 workers × ₹ 150 × 12 Months)		36,000	
✓ **Prime Cost**		**5,16,000**	
✓ **Fixed Factory Overhead:**			
✓ Works Manager's salary (500×12)	6,000		
✓ Foreman's Salary (400×12)	4,800		
✓ Depreciation	12,600		
✓ Light and power (assumed fixed)	3,000	26,400	

✓ **Variable Factory Overhead:**			
✓ Stores and spares	20,000		
✓ Repairs and maintenance	8,000		
✓ Sundry expenses	3,600	31,600	
✓ **Works Cost**			**5,74,000**
✓ Gross Profit (Sales–Works' cost)			2,26,000
✓ **Less:** Administration, Selling and distribution expenses			36,000
✓ **Net Profit**			**1,90,000**

7. The accountant of manufacturing company provides you the following details for year 20X1-X2:

Particulars	**Amount (₹)**
Direct materials	28,00,000
Direct Wages	16,00,000
Fixed factory overheads	16,00,000
Variable factory overheads	16,00,000
Other variable costs	12,80,000
Other fixed costs	12,80,000
Profit	18,40,000
Sales	1,20,00,000

During the year, the company manufactured two products A and B and the output and costs were:

Particulars	**A**	**B**
Output (units)	2,00,000	1,00,000
Selling price per unit	₹ 32.00	₹ 56.00
Direct materials per unit	₹ 8.00	₹ 12.00
Direct wages per unit	₹ 4.00	₹ 8.00

Variable factory overhead is absorbed as a percentage of direct wages. Other variable costs have been computed as: Product A ₹ 4.00 per unit; and B ₹ 4.80 per unit.

During 20X2-X3, it is expected that the demand for product A will fall by 25% and for B by 50%. It is decided to manufacture a new product C, the cost for which is estimated as follows:

Particulars	**A**
Output (units)	2,00,000
Selling price per unit	₹ 28.00
Direct materials per unit	₹ 6.40
Direct wages per unit	₹ 4.00

It is anticipated that the other variable costs per unit of Product C will be same as for product A.

PREPARE a budget to present to the management, showing the current position and the position for 20X2-X3. COMMENT on the comparative results.

(RTP Nov. 2021, RTP Nov. 2020 Modified, Modified ICAI SM)

Ans. Budget Showing Current Position and Position for 20X2-X3

	Position for 20X1-X2			**Position for 20X2-X3**			
	A	**B**	**Total (A+B)**	**A**	**B**	**C**	**Total (A+B+C)**
Sales (units)	2,00,000	1,00,000	-	1,50,000	50,000	2,00,000	-
	(₹)	**(₹)**	**(₹)**	**(₹)**	**(₹)**	**(₹)**	**(₹)**
(A) Sales	**64,00,000**	**56,00,000**	**1,20,00,000**	**48,00,000**	**28,00,000**	**56,00,000**	**1,32,00,000**

Direct Material	16,00,000	12,00,000	28,00,000	12,00,000	6,00,000	12,80,000	30,80,000
Direct wages	8,00,000	8,00,000	16,00,000	6,00,000	4,00,000	8,00,000	18,00,000
Factory overhead (variable)	8,00,000	8,00,000	16,00,000	6,00,000	4,00,000	8,00,000	18,00,000
Other variable costs	8,00,000	4,80,000	12,80,000	6,00,000	2,40,000	8,00,000	16,40,000
(B) Marginal Cost	40,00,000	32,80,000	72,80,000	30,00,000	16,40,000	36,80,000	83,20,000
(C) Contribution (A- B)	**24,00,000**	**23,20,000**	**47,20,000**	**18,00,000**	**11,60,000**	**19,20,000**	**48,80,000**
Fixed costs							
– Factory			16,00,000				16,00,000
– Others			12,80,000				12,80,000
(D) Total fixed cost			28,80,000				28,80,000
Profit (C – D)			**18,40,000**				**20,00,000**

Comments: Introduction of Product C is likely to increase profit by ₹ 1,60,000 (i.e., from ₹18,40,000 to ₹ 20,00,000) in 20X2-X3 as compared to 20X1-X2 even if the demand for Product A & B falls. Therefore, introduction of product C is recommended.

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 20X1.

The following information are made available for this purpose: -

It expects to sell 1,50,000 bags of 'X' during the second quarter of 20X1 at the selling price of ₹ 1,200 per bag.

Each bag of 'X' requires 2.5 meter. Of raw-material 'Y' and 7.5 meter. Of raw-Material 'Z'.

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' (meter)	96,000	78,000
Raw-Material 'Z' (Meter)	1,71,000	1,41,000
Empty Bag (Nos.)	1,11,000	84,000

'Y' Cost ₹ 160 per mtr., 'Z' costs ₹ 30 per mtr. And 'Empty Bag' costs ₹ 110 each.

It requires 9 minutes of direct labour to produce and fill one bag of 'X' Labour cost is ₹ 70 per hour.

Variable manufacturing costs are ₹ 60 per bag. Fixed manufacturing costs ₹ 40,00,000 per quarter.

Variable selling and administration expenses are 5% of sales and fixed administration and selling expenses are ₹ 3,75,000 per quarter.

<u>Required: -</u>

a) Prepare a production budget for the said quarter in quantity.

b) Prepare a raw-Material purchase budget for 'Y', 'Z' and 'Empty Bags' for the said quarter in quantity as well as in rupees.

c) Compute the budgeted variable cost to produce one bag of 'X'.

(ICAI SM, Modified MTP Nov 2019, Modified MTP May 2023–II)

Ans. **a)** **<u>Production Budget of 'X' for the Second Quarter: -</u>**

Particulars	Bags (Nos.)
✓ Budgeted Sales	1,50,000
✓ **Add:** Desired Closing Stock	33,000

✓ Total Requirements	1,83,000
✓ **Less:** Opening Stock	(45,000)
✓ Required Production	1,38,000

b) <u>Raw-Materials Purchase Budget in Quantity as well as in ₹ for 1,38,000 Bags of 'X':</u>

Particulars	**'Y' Mtr.**	**'Z' Mtr.**	**Empty Bags Nos.**
✓ Production Requirements	2.5	7.5	1.0
✓ Per bag of 'X'			
✓ Requirement for Production	3,45,000	10,35,000	1,38,000
	(1,38,000 × 2.5)	(1,38,000 × 7.5)	(1,38,000 × 1)
✓ **Add:** Desired Closing Stock	78,000	1,41,000	84,000
✓ Total Requirements	4,23,000	11,76,000	2,22,000
✓ **Less:** Opening Stock	(96,000)	(1,71,000)	(1,11,000)
✓ Quantity to be purchased	3,27,000	10,05,000	1,11,000
✓ Cost per mtr./Bag	₹ 160	₹ 30	₹ 110
✓ Cost of Purchase (₹)	5,23,20,000	3,01,50,000	1,22,10,000

c) <u>Computation of Budgeted Variable Cost of Production of 1 Bag of 'X': -</u>

Particulars	**(₹)**
✓ Raw-Material	
✓ Y 2.5 mtr @ 160	400.00
✓ Z 7.5 mtr @ 30	225.00
✓ Empty Bag	110.00
✓ Direct Labour (₹ 70×9 minutes/60minutes)	10.50
✓ Variable Manufacturing Overheads)	60.00
✓ Variable Cost of Production per bag	805.50

9. You are given the following data of a manufacturing concern;

Particulars	**(₹)**
Variable Expenses (at 50% capacity):	
Materials	48,00,000
Labour	51,20,000
Others	7,60,000
Semi-variable expenses (at 50% capacity):	
Maintenance and Repairs	5,00,000
Indirect Labour	19,80,000
Sales Dept. Salaries	5,80,000
Sundry Administrative Expenses	5,20,000
Fixed Expenses:	
Wages & Salaries	16,80,000
Rent, Rates and Taxes	11,20,000
Depreciation	14,00,000
Sundry Administration Exp.	17,80,000

The fixed expenses remain constant for all levels of production. Semi-variable expenses remain constant between 45% and 65% of capacity whereas it increases by 10% between 65% and 80% capacity and by 20% between 80% and 100% capacity.

Sales at various levels are as under: -

Capacity	Sales (₹)
75%	2,40,00,000
100%	3,20,00,000

Prepare flexible budget at 75% and 100% capacity.

(May 2017, ICAI SM Modified)

Ans. **Flexible Budget: -**

Particulars	75% (₹)	100% (₹)
Sales	**2,40,00,000**	**3,20,00,000**
Variable Expenses;		
✓ Materials	72,00,000	96,00,000
✓ Labour	76,80,000	1,02,40,000
✓ Others	11,40,000	15,20,000
✓ **Total Variable Expense (A)**	**1,60,20,000**	**2,13,60,000**
Semi-Variable Expenses;		
✓ Maintenance & repairs	5,50,000	6,00,000
	[(5,00,000 + (10% × 5,00,000)	[(5,00,000 + (20% × 5,00,000)
✓ Indirect Labour	21,78,000	23,76,000
	[(19,80,000 + (10% × 19,80,000)	[(19,80,000 + (20% × 19,80,000)
✓ Sales Department Salaries	6,38,000	6,96,000
	[(5,80,000 + (10% × 5,80,000)	[(5,80,000 + (20% × 5,80,000)
✓ Sundry Administration expenses	5,72,000	6,24,000
	[(5,20,000 + (10% × 5,20,000)	[(5,20,000 + (20% × 5,20,000)
✓ **Total Semi-Variable Expenses (B)**	**39,38,000**	**42,96,000**
Fixed Expenses;		
✓ Wages and Salaries	16,80,000	16,80,000
✓ Rent, Rates, Taxes	11,20,000	11,20,000
✓ Depreciation	14,00,000	14,00,000
✓ Sundry Administration Expenses	17,80,000	17,80,000
✓ **Total Fixed Expenses (C)**	**59,80,000**	**59,80,000**
✓ Profit (Sales—A—B—C)	(19,38,000)	3,64,000

10. A single product company estimated its quarter-wise sales for the next year as under: -

Quarter	Sales (units)
I	30,000
II	37,500
III	41,250
IV	45,000

The opening stock of finished goods is 6,000 units and the company expects to maintain the closing stock of finished goods at 12,250 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 company maintains this 20% of sales of next quarter as closing stock of current 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	Purchases 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).
iv) Priced stores ledger card of the raw material using first in first out method.

(ICAI SM, Modified May 2023)

Ans.

a) <u>Production Budget (in units): -</u>

Quarters	I Units	II Units	III Units	IV Units	Total Units
Sales	30,000	37,500	41,250	45,000	1,53,750
Production in current quarter	24,000	30,000	33,000	36,000	
(80% of the sale of current quarter)					
Production for next quarter	7,500	8,250	9,000	12,250	
(20% of the sale of next quarter)					
Total production	**31,500**	**38,250**	**42,000**	**48,250**	**1,60,000**

b) <u>Raw material consumption budget in quantity: -</u>

Quarters	I	II	III	IV	Total
Units to be produced in each quarter: (A)	31,500	38,250	42,000	48,250	1,60,000
Raw material consumption p.u. (kg.): (B)	2	2	2	2	
Total raw material consumption (kg.): (A×B)	63,000	76,500	84,000	96,500	3,20,000

c) Raw material purchase budget (in quantity): -

Particulars	Quantity (Kg.)
Raw material required for production	3,20,000
Add: Closing balance of raw material	5,000
	3,25,000
Less: Opening balance	(10,000)
Material to be purchased	3,15,000

Raw material purchase budget (in value)

Quarters (1)	% Of annual requirement (2)	Quantity of material (3)	Rate per kg. (₹) (4)	(₹) (5)=(3×4)
I	30	94,500 (3,15,000 kg. ×30%)	2	1,89,000
II	50	1,57,500 (3,15,000 kg. × 50%)	3	4,72,500
III	20	63,000 (3,15,000 kg × 20%)	4	2,52,000
Total		**3,15,000**		**9,13,500**

d) Priced stores ledger card of the raw material using first in first out method

Particulars	Quarters											
	I			II			III			IV		
	Kg.	Rate (₹)	Value (₹)	Kg.	Rate (₹)	Value (₹)	Kg.	Rate (₹)	Value (₹)	Kg.	Rate (₹)	Value (₹)
Opening balance	10,000	2	20,000	41,500	2	83,000	1,22,500	3	3,67,500	38,500	3	1,15,500
(A)										63,000	4	2,52,000
Purchase: (B)	94,500	2	1,89,000	1,57,500	3	4,72,500	63,000	4	2,52,000	-	-	-
Consumption: (C)	63,000	2	1,26,000	41,500	2	83,000	84,000	3	2,52,000	38,500	3	1,15,500
				35,000	3	1,05,000				58,000	4	2,32,000
Balance (D)	41,500	2	83,000	1,22,500	3	3,67,500	38,500	3	1,15,500	5,000	4	20,000
(D)=(A)+(B)−(C)							63,000	4	2,52,000			

Working Notes: -

Calculation of total annual production: -

Particulars	(units)
Sales in 4 quarters	1,53,750
Add: Closing balance	12,250
	1,66,000
Less: Opening balance	(6,000)
Total number of units to be produced in the next year	1,60,000

11. RS Ltd manufactures and sells a single product and has estimated sales revenue of ₹302.4 lakh during the year based on 20% profit on selling price. Each unit of product requires 6 kg of material A and 3 kg. of material B and processing time of 4 hours in machine shop and 2 hours in assembly shop. Factory Overheads are absorbed at a blanket rate of 20% of direct labour. Variable selling & distribution overheads are ₹60 per unit sold and fixed selling & distribution overheads are estimated to be ₹69,12,000.

The other relevant details are as under;

Purchase	Material A Material B	₹ 160 per kg ₹ 100 per kg
Labour Rate	Machine Shop Assembly Shop	₹ 140 per hour ₹ 70 per hour

Particulars	**Finished Stock**	**Material A**	**Material B**
Opening Stock	2,500 units	7,500 kg.	4,000 kg.
Closing Stock	3,000 units	8,000 kg.	5,500 kg.

Required: -

a) Calculate number of units of product proposed to be sold and selling price per unit.
b) Prepare Production Budget in units
c) Prepare Material Purchase Budget in units.

(RTP May 2021, Modified MTP Dec. 2021)

Ans.

a) Calculation of number of units of product proposed to be sold and selling price per unit: -

✓ **Number of units Sold**	= Total Variable Cost/Variable Cost per unit
	= ₹ 1,72,80,000/₹ 2,160
	= 8,000 units
✓ **Selling Price per unit**	= Total Sales Value/Number of Units Sold
	= ₹ 3,02,40,000/8,000 units
	= ₹ 3,780

b) Production Budget (Units.);

Particulars	**Units**
✓ Budgeted Sales	8,000
✓ **Add:** Closing Stock	3,000
✓ Total Requirements	11,000
✓ **Less:** Opening Stock	(2,500)
✓ Required Production	8,500

c) Materials Purchase Budget (Kg.);

Particulars	**Material A**	**Material B**
✓ Requirements for Production	51,000 (8,500 units × 6 kg.)	25,500 (8,500 units × 3 kg.)
✓ **Add:** Desired Closing Stock	8,000	5,500
✓ Total Requirements	59,000	31,000
✓ **Less:** Opening Stock	(7,500)	(4,000)
✓ Quantity to be purchased	51,500	27,000

Workings: -

Statement Showing "Total Variable Cost for the year"

Particulars	**(₹)**
✓ Estimated Sales Revenue	3,02,40,000
✓ **Less:** Desired Profit Margin on Sale @ 20%	60,48,000
✓ Estimated Total Cost	2,41,92,000
✓ **Less:** Fixed Selling and Distribution Overheads	69,12,000
✓ **Total Variable Cost**	**1,72,80,000**

Statement Showing "Variable Cost per unit"

Particulars	Variable Cost p.u. (₹)
✓ **Direct Materials;**	
✓ A : 6 kg @ ₹ 160 per kg	960
✓ B : 3 kg @ ₹ 100 per kg.	300
✓ **Labour Cost.**	
✓ Machine Shop 4 hours @ ₹ 140 per hour	560
✓ Assembly Shop 2 hours @ ₹ 70 per hour	140
✓ Factory Overheads 20% of (₹ 560 + ₹ 140)	140
✓ Variable Selling & Distribution Expenses	60
✓ **Total Variable Cost per unit**	**2,160**

12. Jigyasa Ltd. is drawing a production plan for its two products Minimax (MM) and Heavy high (HH) for the year 20X1-X2.

The company's policy is to hold closing stock of finished goods at 25% of the anticipated volume of sales of the succeeding month. The following are the estimated data for two products: -

Particulars	Minimax (MM)	Heavy high (HH)
Budgeted Production units	1,80,000	1,20,000
Particulars	**(₹)**	**(₹)**
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 20X1-X2 are as under: -

Particulars	April	May	June	July
Minimax	8,000	10,000	12,000	16,000
Heavy high	6,000	8,000	9,000	14,000

Prepare production budget for the first quarter in month-wise.

(ICAI SM, Modified May 2015 RTP)

Ans. **Production Budget of Product Minimax and Heavy high (in units)**

	April		May		June		Total	
	MM	**HH**	**MM**	**HH**	**MM**	**HH**	**MM**	**HH**
Sales	8,000	6,000	10,000	8,000	12,000	9,000	30,000	23,000
Add: Closing Stock (25% of next month's sale)	2,500	2,000	3,000	2,250	4,000	3,500	9,500	7,750
Less: Opening Stock	2,000*	1,500*	2,500	2,000	3,000	2,250	7,500	5,750
Production units	8,500	6,500	10,500	8,250	13,000	10,250	32,000	25,000

*Opening stock of April is the closing stock of March, which is as per company's policy 25% of next month" sale. = 8000 X 25% = 2000.

Production Cost Budget

Element of cost	**Rate (₹)**		**Amount (₹)**	
	MM (32,000 units)	**HH (25,000 units)**	**MM**	**HH**
Direct Material	220	280	70,40,000	70,00,000
Direct Labour	130	120	41,60,000	30,00,000

	Manufacturing Overhead (4,00,000-1,80,000×32,000)			71,111	
	(5,00,000 + 1,20,000 × 25,000)			1,12,71,111	1,01,04,167

13. B 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 20X1-X2: -

Product	Budgeted Sales		Actual Sales	
	East Division	West Division	East Division	West Division
X	800 units at ₹ 18	1,200 units at ₹ 18	1,000 units at ₹ 18	1,400 units at ₹ 18
Y	600 units at ₹ 42	1,000 units at ₹ 42	400 units at ₹ 42	800 units at ₹ 42

Adequate market studies reveal that product X is popular but under-priced. It is expected that if the price of X is increased by ₹2, it will, find a ready market. On the other hand, Y is overpriced and if the price of Y is reduced by ₹2 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	+12.5%	+7.5%
Y	+22.5%	+12.5%

With the help of intensive advertisement campaign, following additional sales (Over and above the above-mentioned estimated sales by Divisional Managers) are possible: -

Product	East Division	West Division
X	120 units	140 units
Y	80 units	100 units

You are required to Prepare Sales Budget for 20X2-X3 after incorporating above estimates and also Show the Budgeted Sales and Actual Sales of 20X1-X2.

(ICAI SM, Nov. 2015)

Ans. **Statement Showing Sales Budget for 20X2-X3**

Division	Product X			Product Y			Total
	Qty.	Rate (₹)	Amt. (₹)	Qty.	Rate (₹)	Amt. (₹)	Amt. (₹)
East	1,020	20	20,400	815	40	32,600	53,000
West	1,430	20	28,600	1225	40	49,000	77,600
Total	1,200		49,000	1000		81,600	1,30,600

Workings

1) 800 × 112.5% +120 = 1,020 units
2) 1,200 × 107.5% + 140 = 1,430 units
3) 600 × 122.5% + 80 = 815 units
4) 1,000 × 112.5% + 100 = 1,225 units

Statement Showing Sales Budget for 20X1-X2

Division	Product X			Product Y			Total
	Qty.	Rate (₹)	Amt. (₹)	Qty.	Rate (₹)	Amt. (₹)	Amt. (₹)
East	800	18	14,400	600	42	25,200	39,600
West	1,200	18	21,600	1,000	42	42,000	63,600
Total	2,000		36,000	1,600		67,200	1,03,200

Statement Showing Actual Sales for 20X1-X2

Division	Product X			Product Y			T tal
	Qty.	Rate (₹)	Amt. (₹)	Qty.	Rate (₹)	Amt. (₹)	Amt. (₹)
East	1,000	18	18,000	400	42	16,800	34,800
West	1,400	18	25,200	800	42	33,600	58,800
Total	2,400		43,200	1,200		50,400	93,600

14. Answer the following:

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

(Nov 2007, MTP May 2023–I)

Ans.

Budgeted Production	=	80 units
Actual Production	=	60 units
Standard time per units	=	8 hours
Total hours worked	=	500
Standard hours for actual Production	=	60 × 8
	=	480 hours
Budgeted hours	=	80 × 8
	=	640 hours

Efficiency Ratio = $\frac{Standard\ hours\ for\ actual\ production}{Actual\ hours\ worked} \times 100$

$= \frac{480}{500} \times 100$

= 96%

Capacity Ratio = $\frac{Actual\ hours\ worked}{Budgeted\ hours} \times 100$

$= \frac{500}{640} \times 100$

= 78.125%

15. 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, 20X1, the sales will be 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, 20X1 are as under: -

Sub-assemblies		Components	
ACB	800	Base Board	1,600
MCB	1,200	IC00	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, 20X1 of sub-assemblies and components by 10% of quantity as compared to the opening stock. Prepare the following budgets for December 20X1.

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.
e) Manpower budget showing the number of workers and the amount of wages payable.

(ICAI SM)

Ans.

Budgets for December, 2020

a) Sales budget in quantity and value: -

Sub-assemblies	ACB	MCB	DP	Total
✓ Sales (Qty.)	6,300	8,400	4,200	
✓	(2,100×3)	(2,100×4)	(2,100×2)	
✓ Selling Price p.u. (₹)	520	500	350	
✓ Sales value (₹)	**32,76,000**	**42,00,000**	**14,70,000**	**89,46,000**

b) Production budget in quantity: -

Sub-assemblies	ACB	MCB	DP
a) Sales	6,300	8,400	4,200
b) **Add:** Closing Stock	720	1,080	2,520
c) Total quantity required	7,020	9,480	6,720
d) **Less:** Opening Stock	(800)	(1,200)	(2,800)
e) Production	6,220	8,280	3,920

c) Component usage budget in quantity: -

Sub-assemblies	ACB	MCB	DP	Total
✓ Production	6,220	8,280	3,920	-

✓ Base board (1 each)	6,220	8,280	3,920	18,420
✓ Component IC08 (8:2:2)	49,760 (6,220×8)	16,560 (8,280×2)	7,840 (3,920×2)	74,160
✓ Component IC12 (4:10:4)	24,880 (6,220×4)	82,800 (8,280×10)	15,680 (3,920×4)	1,23,360
✓ Component IC26 (2:6:8)	12,440 (6,220×2)	49,680 (8,280×6)	31,360 (3,920×8)	93,480

d) **Component Purchase budget in quantity and value: -**

Sub-assemblies	**Base board**	**IC08**	**IC12**	**IC26**	**Total**
Usage in production	18,420	74,160	1,23,360	93,480	
Add: Closing stock	1,440	1,080	5,400	3,600	
(Opening stock less 10%)					
	19,860	**75,240**	**1,28,760**	**97,080**	
Less: Opening stock	(1,600)	(1,200)	(6,000)	(4,000)	
Purchase (Qty.)	18,260	74,040	1,22,760	93,080	
Purchase Price (₹)	60	20	12	8	
Purchase value (₹)	10,95,600	14,80,800	14,73,120	7,44,640	47,94,160

e) **Manpower budget showing the number of workers and the amount of wages payable: -**

Sub-assemblies	**Budgeted Production**	**Direct labour**				**Total**
		Grade A		**Grade B**		
		Hours P.U.	**Total Hours**	**Hours P. U.**	**Total Hours**	
✓ ACB	6,220	8	49,760	16	99,520	
✓ MCB	8,280	6	49,680	12	99,360	
✓ DP	3,920	4	15,680	8	31,360	
a) Total Hours			1,15,120		2,30,240	
b) Hours per man per month			200		200	
c) Number of workers per month: (A/B)			575.6		1,151.2	
d) Wage rate per month (₹)			1,000		800	
e) Wages payable (₹) : (C×D)			5,75,600		9,20,960	14,96,560

Working Note: -

a) **Statement showing contribution: -**

Sub-assemblies	**ABC (₹)**	**MCB (₹)**	**DP (₹)**	**Total (₹)**
Selling price per unit (p.u.): (A)	520	500	350	
Marginal Cost per unit.				
Components				
– Base board	60	60	60	
– IC08	160	40	40	
– IC12	48	120	48	
– IC26	16	48	64	
Labour				
✓ Grade A	40	30	20	

✓ Grade B	64	48	32	
Variable production overhead	36	24	24	
Total marginal cost per unit, : (B)	**424**	**370**	**288**	
Contribution per unit, : (C)=(A)−(B)	96	130	62	
Sales ratio: (D)	3	4	2	
Contribution×Sales ratio: [(E)=(C)×(D)]	288	520	124	932

b) **Desired Contribution for the forthcoming month December, 2020: -**

Particulars	**(₹)**
✓ Fixed overheads	7,57,200
✓ Desired Profit	12,00,000
✓ Desired Contribution	19,57,200

c) Sales mix required i.e., number of batches for the forthcoming month December, 2020

✓ Sales mix required =Desired Contribution/Contribution×Sales ratio

✓ = ₹ 19,57,200/932 (Refer to Working Notes b and a)

= 2,100 batches

16. TQM Ltd. has furnished the following information for the month ending 30th June, 20X1: -

Particulars	**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 Cost of the products are as follows: -

Particulars	**Per Unit (₹)**
Direct Materials (1 kg. at the rate of ₹ 1 per kg.)	1.00
Direct wages (1 hour at the rate of ₹ 1.50)	1.50
Variable overheads (1 hour at the rate of ₹ 0.50)	0.50

Actual results for the month showed that 78,400 kg. of material were used and 70,400 labour hours were recorded.

Required: -

i) Prepare Flexible budget for the month and compare with actual results.

ii) Calculate Material, Labour, Sales Price, Variable Overhead and Fixed Overhead Expenditure variances and Sales Volume (Profit) Variance.

(ICAI SM)

Ans. **i)** **Statement Showing Flexible Budget and its comparison with actual: -**

Particulars	**Master Budget 80,000 units**	**Flexible Budget (At Standard Cost)**		**Actual for 72,000 Units**	**Variance**
		Per unit (Based on 80,000 units)	**72,000 units**		

a) Sales	3,20,000	4.00	2,88,000	2,80,000	8,000 (A)
b) Direct Material	80,000	1.00	72,000	73,600	1,600 (A)
c) Direct wages	1,20,000	1.50	1,08,000	1,04,800	3,200 (F)
d) Variable Overhead	40,000	0.50	36,000	37,600	1,600 (A)
e) Total variable cost	2,40,000	3.00	2,16,000	2,16,000	--
f) Contribution	80,000	1.00	72,000	64,000	--
g) Fixed overhead	40,000	0.50	40,000	39,200	800 (F)
h) Net profit	40,000	0.50	32,000	24,800	7,200 (A)

ii) **Variances: -**

- ✓ Sales Price variance = Actual Quantity (Standard Rate – Actual Rate)
  = 72,000 units (₹ 4.00 – ₹ 3.89)
  = ₹ 8,000 (A)
- ✓ Direct Material Cost Variance = Standard Cost for Actual Output – Actual Cost
  = ₹ 72,000 – ₹ 73,600 = ₹ 1,600 (A)
- ✓ Direct Material Price variance = Actual Quantity (Standard rate – Actual Rate)
  $= 78{,}400 \text{ units} \left(₹\ 1.00 - \frac{₹\ 73{,}600}{78{,}400 \text{ units}}\right)$
  = ₹ 4,800 (F)
- ✓ Direct Material Usage variance = Standard Rate (Std. Qty – Actual Quantity)
  = ₹ 1 (72,000 units – 78,400 units)
  = ₹ 6,400 (A)
- ✓ Direct Labour Cost Variance = Standard Cost for actual output – Actual cost
  = ₹ 1,08,000 – ₹ 1,04,800 = ₹ 3,200 (F)
- ✓ Direct Labour Rate Variance = Actual Hour (Std Rate – Actual Rate)
  $= 70{,}400 \text{ hours} \left(₹1.5 - \frac{₹\ 1{,}04{,}800}{70{,}400 \text{ hours}}\right)$
  = ₹ 800 (F)
- ✓ Direct Labour Efficiency = Standard Rate (Standard hour – Actual Hour)
  = ₹ 1.5 (72,000 – 70,400) = ₹ 2,400 (F)
- ✓ Variable Overhead = Recovered variable overhead – Actual variable overhead
  = (72,000 units × ₹ 0.50) – ₹ 37,600
  = ₹ 1,600 (A)
- ✓ Fixed Overhead Expenditure = budgeted Fixed Overhead – Actual Fixed Overhead
  = ₹ 40,000 – ₹ 39,200 = ₹ 800 (F)
- ✓ Sales Volume (Profit) Variance = Std. Profit (Budgeted Quantity – Actual Quantity)
  = ₹ 0.50 (80,000 – 72,000) = ₹ 4,000 (A)

17. Action Plan Manufactures 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 in costs 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 you answer with facts and figures. EXPLAIN.

(ICAI SM)

Ans.

Flexible Budget of "Action Plan Manufacturers"
(For the month of January)

Indirect Manufacturing cost	**Nature of cost (1)**	**Expenses for a normal month (₹) (2)**	**Planned Expenses (₹) (3)**	**Expenses as per Flexible budget (₹) (4)**	**Actual Expenses (₹) (5)**	**Difference (₹) (6) = (5) – (4)**
Salary of foreman	Fixed	1,000	1,000	1,000	1,000	Nil
Indirect labour (WN 1)	Variable	720	900	540	600	60
Indirect material (WN 2)	Variable	800	1,000	600	700	100
Repair and maintenance (WN 3)	Semi-Variable	600	650	550	600	50
Power (WN 4)	Semi-Variable	800	875	725	740	15
Tools consumed (WN 5)	Variable	320	400	240	300	60
Rates and taxes	Fixed	150	150	150	150	Nil
Depreciation	Fixed	800	800	800	800	Nil
Insurance	Fixed	100	100	100	100	Nil
		5,290	**5,875**	**4,705**	**4,990**	**285**

Conclusion: -

*The above statement of flexible budget shows that the concern's expenses in the month of January have increased by ₹285 as compared to flexible budget. Under such circumstances, assuming the expenses are controllable and based on the financial perspective the foreman of the company should not be entitled for any performance bonus for the month of January.

Working Notes: -

1) Indirect labour cost per unit $\frac{₹\ 720}{8,000} = ₹\ 0.09$

✓ Indirect labour for 6,000 units = 6,000 × ₹ 0.09 = ₹540.

2) Indirect material cost per unit $\frac{₹800}{8,000} = ₹0.10$

- ✓ Indirect material for 6,000 units= 6,000 × ₹0.10 = ₹600

3) According to high and low point method of segregating semi-variable cost into fixed and variable components, following formulae may be used.

- ✓ Variable cost of repair and maintenance per unit= $\frac{\text{Change in expense level}}{\text{Change in output level}}$
- ✓ $= \frac{₹\,650-₹600}{2,000} = 0.025$
- ✓ For 8,000 units
- ✓ Total Variable cost of repair and maintenance = ₹200
- ✓ Fixed repair & maintenance cost = ₹400
- ✓ Hence at 6,000 units output level, total cost of repair and maintenance should be
- ✓ = ₹ 400 + ₹ 0.025 × 6,000 units = ₹400 + ₹150 = ₹550

4) Variable cost of power per unit= $\frac{₹875-₹800}{2,000 \text{ units}} = 0.0375$

- ✓ For 8,000 units
- ✓ Total Variable cost of power = ₹300
- ✓ Fixed cost = ₹500
- ✓ Hence, at 6,000 units output level, total cost of power should be
- ✓ = ₹500 + ₹0.0375 × 6,000units = ₹500 + ₹225 = ₹725

5) Tools consumed cost for 8,000 units =₹320

Hence, tools consumed cost for 6,000 units = $\left(\frac{320}{8,000}\text{units}\right) \times 6,000 \text{ units} = ₹240.$

18.

Concorde Ltd. manufactures two products using two types of materials and one grade of labour. Shown below is an extract from the company's working papers for the next month's budget: -

Particulars	Product -A	Product-B
Budgeted sales (in units)	2,400	3,600
Budgeted material consumption per unit (in kg): -		
Material-X	5	3
Material-Y	4	6
Standard labour hours allowed per unit of product	3	5

Material-X and Material-Y cost ₹4 and ₹6 per kg and labours are paid ₹25 per hour. Overtime premium is 50% and is payable, if a worker works for more than 40 hours a week. There are 180 direct workers.

The target productivity ratio (or efficiency ratio) for the productive hours worked by the direct workers in actually manufacturing the products is 80%. In addition, the non-productive down-time is budgeted at 20% of the productive hours worked.

There are four 5-Day's 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.

(ICAI SM)

Ans.

1) Material Purchase Budget: -

Particulars	**Material-X (kg.)**	**Material-Y(kg.)**
Material required: -		
Product-A	12,400 (2,480 units × 5 kg.)	9,920 (2,480 units × 4 kg.)
Product-B	12,900 (4,300 units × 3 kg.)	25,800 (4,300 units × 6 kg.)
	25,300	**35,720**
Add: Closing Stock	12,650	10,716
Material X - $\left(\frac{25,300 \text{ kgs}}{20 \text{ days}} \times 10 \text{ days}\right)$		
Material Y - $\left(\frac{35,720 \text{ kgs}}{20 \text{ days}} \times 6 \text{ days}\right)$		
Less: Opening Stock	1,000	500
Quantity to be purchased	36,950	45,936
Rate per kg. of Material	₹ 4	₹ 6
Total Cost	**₹ 1,47,800**	**₹2,75,616**

Workings

Number of days in budget period = 4 weeks × 5 days = 20 days

Number of units to be produced

Particulars	**Product-A (units)**	**Product-B (units)**
Budgeted Sales	2,400	3,600
Add: Closing Stock		
$\left(\frac{2,400 \text{ units}}{20 \text{ days}} \times 4 \text{ days}\right)\left(\frac{3,600 \text{ units}}{20 \text{ days}} \times 5 \text{ days}\right)$	480	900
Less: Opening Stock	400	200
	2,480	**4,300**

2) Wages Budget: -

Particulars	**Product-A (Hours)**	**Product-B (Hours)**
Units to be produced	2,480 units	4,300 units
Standard hours allowed per unit	3	5
Total Standard Hours allowed	7,440	21,500
Productive hours required for production	$\frac{7,440 \text{ hours}}{80\%}$ = 9,300	$\frac{21,500 \text{ hours}}{80\%}$ = 26,875

Add: Non-Productive down time	1,860 hours. (20% of 9,300 hours)	5,375 hours. (20% of 26,875 hours)
Hours to be paid	11,160	32,250

Workings

- ✓ Total Hours to be paid = 43,410 hours(11,160 + 32,250)
- ✓ Hours to be paid at normal rate = 4 weeks × 40 hours × 180 workers = 28,800 hours
- ✓ Hours to be paid at premium rate = 43,410 hours − 28,800 hours = 14,610 hours
- ✓ Total wages to be paid = 28,800 hours × ₹ 25 + 14,610 hours × ₹ 37.5
  = ₹ 7,20,000 + ₹ 5,47,875
  = ₹ 12,67,875

19. The Cost Sheet of a company based on a budgeted volume of Sales of 3,00,000 units per quarter is as under;

Particulars	(₹) Per Unit
Direct Materials	5.00
Direct Wages	2.00
Factory Overheads (50% Fixed)	6.00
S/Adm. Overheads (1/3 variable)	3.00
Selling price	18.00

When the budget was discussed, it was felt that the company would be able to achieve only a volume of 2,50,000 units of production and sales per quarter. The company therefore decided that an aggressive sales promotion campaign should be launched to achieve the following improved operations;

Proposal I;

Sell 4,00,000 units per quarter by spending ₹ 2,00,000 on special advertising.

The factory fixed costs will increase by ₹ 4,00,000 per quarter.

Proposal II;

Sell 5,00,000 units per quarter subject to the following conditions.

An overall price reduction of ₹ 2 per unit is allowed on all sales.

Variable Selling and Administration Costs will increase by 5%.

Direct Material Costs will be reduced by 1% due to purchase price discounts.

The fixed factory costs will increase by ₹ 2,00,000 more.

You are required to prepare a Flexible Budget at 2,50,000, 4,00,000 and 5,00,000 units of output per quarter and Calculate the Profit at each of the above levels of output.

(May 2002)

Ans. **Statement of flexible budget and profit per quarter at 2,50,000; 4,00,000 and 5,00,000 units of output level per quarter;**

Units (to be sold)	2,50,000	4,00,000	5,00,000
Particulars	**(₹)**	**(₹)**	**(₹)**
✓ Sales revenue; (A)	45,00,000 (2,50,000 Units × ₹ 18)	72,00,000 (4,00,000 units × ₹ 18)	80,00,000 (5,00,000 × units × 16)
✓ Less: Variable Cost:			
✓ Direct Materials	12,50,000 (2,50,000 units × ₹5)	20,00,000 (4,00,000 units × ₹5)	24,75,000 (5,00,000 units × ₹ 4.95)

✓ Direct labour @ 2/- per unit	5,00,000	8,00,000	10,00,000
✓ Factory Overheads @ 3/-	7,50,000	12,00,000	15,00,000
✓ Selling & Administration Overheads	2,50,000 (2,50,000 units × ₹1)	4,00,000 (4,00,000 units × ₹ 1)	5,25,000 (5,00,000 × ₹ 1.05)
✓ **Total Variable Costs; (B)**	**27,50,000**	**44,00,000**	**55,00,000**
✓ **Contribution: (C): {(A)−(B)}**	17,50,000	28,00,000	25,00,000
Fixed Costs;			
✓ Factory Overhead	9,00,000	9,00,000	9,00,000
✓ Selling & Administration ✓	6,00,000	6,00,000	6,00,000
✓ Overheads	----	4,00,000	6,00,000
✓ Increase in fixed Costs	----	2,00,000	----
✓ Advertisement Costs	----	----	----
✓ Total fixed costs: (D)	**15,00,000**	**21,00,000**	**21,00,000**
✓ **Profit: {(C)−(D)}**	**2,50,000**	**7,00,000**	**4,00,000**

*Under proposal II the factory costs were increased by ₹ 2,00,000 more over proposal I.

20. SV Ltd. manufactures a single product. The selling price of the product is ₹ 95 per unit. The following are the results obtained by the company during the last two quarters;

Particulars	Quarter 1	Quarter 2
Sales units	5,100	4,800
Production units	5,500	4,500

Particulars	(₹)	(₹)
Direct Materials		
A	66,000	54,000
B	55,000	45,000
Manufacturing wages	1,56,750	1,38,000
Factory Overheads	86,000	83,000
Selling Overheads	79,000	73,000

The Company estimates its sales for the next quarter to range between 5,500 units and 6,500 units, the most likely volume being 6,000 units. The manufacturing programme will match with the sales quantity such that no increase in inventory of finished goods is contemplated in the next quarter. The following price and cost changes will, however, apply to the next quarter; The price of direct material B will increase by 10%. There will be no change in the price of direct material A.

The wage rates will go up by 8%. If the production volume increases beyond 5,500 units, Overtime premium of 50% is payable on the increased volume due to overtime working to be done by the variable labour complement.

The fixed factory and selling expenses will increase by 20% and 25% respectively.

A discount in the selling price of 2% is allowed on all sales made at 6,500 units level of output. The selling price, however, will remain unaltered, if the volume of output is below 6,500 units.

While operating at a volume of output of 6,500 units in the next quarter, the company intends to quote for an additional volume of 2,000 units to be supplied to a government department for its captive consumption. The working capital requirement of this order is estimated at 80%

of the sales value of the Government order. The company desires a return of 20% on the capital employed in respect of this order.

Required: -

i) Prepare a flexible budget for the next quarter at 5,500-, 6,000- and 6,500-unit levels and determine the profit at the respective volumes.

ii) Calculate the lowest price per unit to be quoted in respect of the Government order for 2,000 units.

(May 2003)

Ans.

1) Flexible budget for next quarter at 5,500, 6,000 and 6,500 units;

Particulars	**Output**		
	5,500	**6,000**	**6,500**
	(₹)	**(₹)**	**(₹)**
✓ Direct Material A	66,000	72,000	78,000
✓ Material B	60,500	66,000	71,500
✓ Total Material cost (A)	**1,26,500**	**1,38,000**	**1,49,500**
Manufacturing wages;			
✓ Variable	1,03,125	1,12,500	1,21,875
✓ Fixed	53,625	53,625	53,625
✓ Manufacturing wages	1,56,750	1,66,125	1,75,500
✓ Increase in wage rate by 8%	12,540	13,290	14,040
✓ Overtime premium	----	5,063	10,125
✓ Total Wages (B)	**1,69,290**	**1,84,478**	**1,99,665**
Factory Overhead			
✓ Variable	16,500	18,000	19,500
✓ Fixed	83,400	83,400	83,400
✓ Total factory Overhead (C)	**99,900**	**1,01,400**	**1,02,900**
Selling Overhead			
✓ Variable	1,10,000	1,20,000	1,30,000
✓ Fixed	96,250	96,250	96,250
✓ Total selling overhead (D)	**2,06,250**	**2,16,250**	**2,26,250**
✓ Cost of goods & old (A+B+C+D)	**6,01,940**	**6,40,128**	**6,78,315**
✓ Sales revenue	5,22,500	5,70,000	6,05,150
✓ Profit/Loss	(79,440)	(70,128)	(73,165)

2) Computation of lowest price to be quoted for 2,000 units of Govt. order;

Particulars	**(₹)**
Direct Material;	
✓ A @ ₹ 12	24,000
✓ B @ ₹ 11	22,000
✓ Manufacturing wages (Working notes)	60,750
✓ Variable factory overhead	6,000
✓ Variable selling overhead	40,000
✓ Total variable cost of production	**1,52,750**

*Capital employed = 80% of Sales Value.

✓ Let Sales Value	✓ = 100 X
✓ Capital employed	✓ = 80 % of 100 X
	= 80 X

✓ Desired return	✓ = 20 % 80 X
	= 16 X
✓ Sales value	✓ = Total variable cost + Desired return
	100 X = ₹ 1,52,750 + 16 X
	100 X−16X = ₹ 1,52,750
	84 X = ₹ 1,52,750
	$X = \frac{1,52,750}{84}$
	= ₹ 1,818,45
✓ Sales Value	✓ = 100 X
	= 100 × 1,818.45
	= ₹ 1,81,845.23
✓ Selling price/unit	– = $\frac{₹\ 1,81,845}{2,000}$
	= ₹ 90.92 or 91/unit.

*Lowest price to be quoted for govt. order is ₹ 91/unit.

<u>Working Notes: -</u>

1) Direct Material Cost of A & B Material Per unit;

- ✓ Material A = $\frac{₹\ 66,000}{5500\text{ units}}$ = ₹ 12 per unit
- ✓ Material B = $\frac{₹\ 55,000}{5,500\text{ units}}$ = ₹ 10 per unit + 10% Increase = ₹ 11

2)

I) Variable manufacturing wages per unit;

✓ $\frac{₹\ 1,56,750-\ ₹\ 1,38,000}{5,500\text{ unit}-\ 4,500\text{ unit}} = \frac{₹\ 18,750}{1,000\text{ units}}$ = ₹ 18.75

II) Fixed manufacturing wages;

- ✓ Total wages−Variable manufacturing wages
- ✓ ₹ 1,56,750−₹ 1,03,125(18.75 *X* 5500) =₹ 53,625

3) Overtime premium;

a) = 50% (500 units × ₹ 18.75 + 500 units × ₹ 1.50) − 6000 units
= 50% of ₹ 10,125 = ₹ 5,063

b) = 50% (1000 units × ₹ 18.75 + ₹ 1000 units × ₹ 1.50) − 6500 units
= ₹ 10,125

4) Variable Factory Overhead per unit;

Particulars	**(₹)**	**Production (Units)**
✓ Quarter I	86,000	5500
✓ Quarter II	<u>83,000</u>	<u>4500</u>
✓ Difference	3,000	1000

*Variable Cost/unit= $\frac{\text{Change in Cost}}{\text{Change in Output}} = \frac{3,000}{1,000}$ = 3/unit

- ✓ Fixed factory Overhead = Total factory overhead −Variable factory overhead
- ✓ = ₹ 86,000 − ₹ 16,500
- ✓ = ₹ 69,500
- ✓ Increase in fixed factory overhead by 20%
- ✓ = ₹ 69,.500 + ₹ 13,900 = ₹ 83,400

5)

I) Variable Selling Overhead per unit;

Particulars	(₹)	Sales (in units)
✓ Quarter I	79,000	5100
✓ Quarter II	73,000	4800
✓ Difference	6,000	300

✓ $= \frac{\text{Change in Cost}}{\text{Change in units}} = \frac{₹\ 6{,}000}{300\ \text{units}} = ₹20/\text{unit}$

II) Fixed Selling Overheads;

- ✓ Total Selling Overhead−Variable Selling Overhead
- ✓ = ₹ 1,79,000 − ₹ 1,02,000
- ✓ = ₹ 77,000
- ✓ Increase in fixed selling overhead by 25%.
- ✓ = ₹ 77,000 + ₹ 19,250
- ✓ ₹ 96,250

6) Manufacturing wages for 2,000 additional units;

Particulars	(₹)
✓ Wages (2,000 units × ₹ 20.25)	40,500
✓ Overtime premium (50% of wages)	20,250
Total wages	**60,750**

21. A company manufactures three products namely A, B and C. The current pattern of sales of A, B and C is in the ratio of 8:2:1 respectively. The relevant data are as under:

Products	A	B	C
Selling price per unit ₹	130	230	417
Raw materials per unit Kg.	0.50	1.2	2.5
Direct materials per unit Kg.	0.25	--	--
Skilled labour hours/unit	4	6	8
Semi-skilled labour hours per unit	2	2	3
Variable overheads ₹ per unit	20	40	80

The prices of raw materials and direct materials respectively are ₹100 and ₹40 per kg. The wage rates of skilled and semi-skilled labour respectively are ₹6 and ₹5. Each operator works 8 hours a day for 25 days in a month. The position of inventories is as under:

	Raw Materials	Direct Materials	A Unit	B Unit	C Unit
Opening	660	400	400	100	50
Closing	650	260	200	300	50

The fixed overheads amount to ₹2,00,000 per month and the company desires a profit of ₹1,20,000 per month.

You are required to prepare the following for a month:

a) Sales budget in quantity and value.
b) Production budget showing the quantity to be manufactured.
c) Purchase budget showing the quantity and value.
d) Direct labour budget showing the number of workers and wages.

(May 2004)

Ans.

a) Sales Budget (in quantity and value);

Products	A	B	C	Total
Sales in Units (8:2:1)	12,800	3,200	1,600	17,600
Sales value	16,64,000	7,36,000	6,67,200	30,67,200
(Units × selling price)				

b) Production Budget;

Products	A	B	C
✓ Sales (Units)	12,800	3,200	1,600
✓ **Add:** Closing stock	200	300	50
✓ **Less:** Opening Stock	400	100	50
✓ Production in units	**12,600**	3,400	1,600

c) Purchase Budget;

Particulars	Raw Material	Direct Material	Total
✓ Material required for production	14,380 Kg.	3,150 Kg.	
✓ **Add:** Closing stock of material	650 Kg.	260 Kg.	
✓ **Less:** Opening stock of material	600 Kg.	400 Kg.	
✓ Material to be purchased	14,430 Kg.	3,010 Kg.	
✓ Value of material to be purchased	**₹14,43,000**	**₹1,20,400**	**15,63,400**

d) Direct Labor Budget;

Products	A	B	C	Total
✓ Production (Unit)	12,600	3,400	1,600	
✓ Total skilled labour hours	50,400	20,400	12,800	83,600
✓ Total semi-skilled labor hours	25,200	6,800	4,800	36,800
✓ No. of skilled workers	$\frac{50,400}{25 \times 8} = 252$	$\frac{20,400}{25 \times 8} = 102$	$\frac{12,800}{25 \times 8} = 64$	418
✓ No. of Semi-skilled workers	$\frac{25,200}{25 \times 8} = 126$	$\frac{6,800}{25 \times 8} = 34$	$\frac{4,800}{25 \times 8} = 24$	184
✓ Wages paid to skilled labours (₹)	50,400×6 = 3,02,400	20,400 × 6=1,22,400	12,800 ×6=76,800	5,01,600
✓ Wages paid to semi-skilled labours (₹)	25,200×5 = 1,26,000	6,800 × 5 = 34,000	4,800 × 5 = 24,000	1,84,000
Total wages				**6,85,600**

<u>Working Notes: -</u>

i) Material requirement for production of Product A, B and C;

	A	B	C	Total
✓ Production (in units)	12,600	3,400	1,600	
✓ Raw material/unit	0.50 Kg.	1.2 Kg.	2.5 Kg.	
✓ Total raw material (Kgs.)	6,300	4,080	4,000	14,380
✓ Direct material/unit (Kg.)	0.25	--	--	
✓ Total Direct Material (Kgs.)	3,150	--	--	3,150

ii) Computation of sales value;

Products	Units	Selling Price/unit (₹)	Sales Value (₹)
A	12,800	130	16,64,000
B	3,200	230	7,36,000
C	1,600	417	6,67,200

iii) Computation of Labor hours required;

Products	In units	Hours required Per unit	Total Semi-skilled hours	Hours required Per unit	Total skilled hours
	A	**B**	**C= A X b**	**D**	**E= A X D**
A	12,600	4	50,400	2	25,200
B	3,400	6	20,400	2	6,800
C	1,600	8	12,800	3	4,800

iv) Number of batches to be sold of product A, B, C in ratio of 8:2:1 to earn desired profit of ₹1,20,000;

	A (₹)	B (₹)	C (₹)	Total (₹)
Selling price (p.u.)	130	230	417	
Variable cost + p.u.				
✓ Raw material	50	120	250	
✓ Direct material	10			
✓ Skilled labor ✓ Cost	24	36	48	
✓ Semi-skilled labour cost	10	10	15	
✓ Variable overhead	20	40	80	
✓ Total variable cost	114	206	393	
✓ Contribution on P.U. (SP - VC)	16	24	24	
✓ Total contribution Per batch (8:2:1)	128	48	24	200

Sales to earn desired profit = $\frac{\text{Fixed cost+Desired profit}}{\text{Contribution/batch}}$

$= \frac{₹2,00,000+₹1,20,000}{₹200}$

Number of batches to be sold = 1,600 batches.

22. A factory which expects to operate 7,000 hours, i.e., at 70% level of activity, furnishes details of expenses as under: -

Particulars	(₹)
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.

(ICAI SM)

Ans.

Head of Account	Control basis	70% (₹)	80% (₹)	90% (₹)	100% (₹)
Budgeted hours		**7,000**	**8,000**	**9,000**	**10,000**

Variable expenses	Variable	1,260	1,440	1,620	1,800
Semi-variable expenses	Semi-variable	1,200	1,200	1,320	1,440
Fixed expenses	Fixed	1,800	1,800	1,800	1,800
Total expenses		4,260	4,440	4,740	5,040
Recovery rate per hour					
Total expenses/Budgets hours		**0.61**	**0.56**	**0.53**	**0.50**

Conclusion: -

We notice that the recovery rate at 70% activity is ₹ 0.61 per hour. If in a particular month the factory works 8,000 hours, it will be incorrect to estimate the allowance as ₹ 4,880 @ ₹ 0.61. The correct allowance will be ₹ 4,440 as shown in the table. If the actual expenses are ₹ 4,500 for this level of activity, the company has not saved any money but has over-spent by ₹ 60 (₹ 4,500 – ₹ 4,440).

23. AK Limited produces and sells a single product. Sales budget for calendar year 20X1 by quarters is as under:

Quarters	I	II	III	IV
No. of units to be sold	18,000	22,000	25,000	27,000

The year is expected to open with an inventory of 6,000 units of finished products and close with inventory of 8,000 units. Production is customarily scheduled to provide for 70% of the current quarter's sales demand plus 30% of the following quarter demand. The budgeted selling price per unit is ₹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 labor hours for the year. Fixed overheads are evenly distributed through-out the year.

You are required to: -

a) Prepare Quarterly Production Budget for the year.

b) In which quarter of the year, Company expected to achieve break-even point.

(May 2012)

Ans.

i) Production Budget for the year 20X1;

Particulars		**Quarters**				
		I	**II**	**III**	**IV**	**Total**
Sales demand (Unit)		18,000	22,000	25,000	27,000	92,000
I	Opening Stock	6,000	7,200	8,100	8,700	30,000
II	70% of Current Quarter's demand	12,600	15,400	17,500	18,900	64,400
III	30% of Following Quarter's demand	6,600	7,500	8,100	7,400*	29,600
IV	Total Production (II & III)	19,200	22,900	25,600	26,300	94,000
V	Closing Stock (I + IV – Sales)	7,200	8,100	8,700	8,000	32,000

*Balancing Figure

ii) Break Even Point = Fixed Cost /PV Ratio

= 2,20,000/13.75% = 16,00,000 or 40,000 units.

P/V Ratio = (40 – 34.50 = 5.50)/40 × 100 = 13.75%

(Or, Break Even Point = Fixed Cost/ Contribution = 2,20,000/5.50 = 40,000 Units)

Total sales in the quarter II is 40,000 equal to BEP means BEP achieved in II quarter.

24. 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.

(Nov. 2020)

Ans. **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**

25. Following information relates to ABC company for the year 20X1:

Projected Sales: (amount in lakh)

Month	**August**	**September**	**October**	**November**	**December**
Sale	35	40	40	45	46

i) Gross profit margin will be 20% on sale.

ii) 10% of projected sale will be cash sale. Out of credit sale of each month, 50% will be collected in the next month and the balance will be collected during the second month following the month of sale.

iii) Creditors will be paid in the first month following credit purchase. There will be credit purchase only.

iv) Wages and salaries will be paid on the first day of the next month. The amount will be ₹3 lakhs each month.

v) Interim dividend of ₹2 lakhs will be paid in December 20X1.

vi) Machinery costing ₹10 lakhs will be purchased in September 20X1. Repayment by installment of ₹50,000 p.m. will start from October 20X1.

vii) Administrative expenses of ₹1,00,000 per month will be paid in the month of their incurrence.

viii) Assume no minimum cash balance is required. Opening cash balances as on 01-10-20X1 is estimated at ₹10 lakhs.

You are required to prepare the monthly cash budget for the 3-month period (October 20X1 to December 20X1).

(Nov. 2016)

Ans.

Cash Budget
(From October, 20X1 to December, 20X1)

Particulars	October	November	December
Opening Cash Balance	**10,00,000**	**14,25,000**	**21,25,000**
Receipts:			
✓ Cash Sales	4,00,000	4,50,000	4,60,000
✓ Collection from Debtors (W.N.1)	33,75,000	36,00,000	38,25,000
(A)	47,75,000	54,75,000	64,10,000
Payments;			
✓ Payment to creditors (W.N. 2)	29,00,000	29,00,000	33,00,000
✓ Wages & Salaries	3,00,000	3,00,000	3,00,000
✓ Interim dividend	--	--	2,00,000
✓ Installment of Asset	50,000	50,000	50,000
✓ Administration expenses	1,00,000	1,00,000	1,00,000
(B)	33,50,000	33,50,000	39,50,000
Closing Cash Balance (A – B)	14,25,000	21,25,000	24,60,000

Working Notes: -

1) Calculation of collection from Debtors: -

Particulars	August	September	October	November	December
Credit sale @ 90% of sale	31,50,000	36,00,000	36,00,000	40,50,000	41,40,000
50% collection in next month	--	15,75,000	18,00,000	18,00,000	20,25,000
Remaining in second month	--	--	15,75,000	18,00,000	18,00,000
Total collection			**33,75,000**	**36,00,000**	**38,25,000**

2) Calculation of purchase;

Payment to creditors	October	November	December
✓ For September purchase	29,00,000 {(*80% of ₹40,00,000) – #3,00,000}	--	--
✓ For October purchase		29,00,000 {(*80% of ₹40,00,000) – #3,00,000}	
✓ For November purchase	--	--	33,00,000 {(*80% of ₹45,00,000) – #3,00000}
✓ Total of payment made to creditors	**29,00,000**	**29,00,000**	**33,00,000**

*Let sales be 100%.
Gross profit =20% (Given)
Therefore, Cost of goods sold = 100-20 = 80%

Wages and salaries of 3,00,000 is part of cost of goods sold. In order to calculate purchase, same has been removed from the cost of goods sold/

26. A company prepared the following budget for a year:

		Percentage; to total Sales
Direct materials		40
Direct labour		20
Factory overheads	— Variable	10
	— Fixed	10
Selling and Adm. overheads	— Variable	5
	— Fixed	12
Profit		3
Sales		**<u>100</u>**

After evaluating the half-yearly performance, it was observed that the company would be able to achieve only 80% of the original budgeted sales. The revised budgeted sale as envisaged above was estimated at ₹1,080 lacs after taking into account a reduction in the selling price by 10%.

You are required to prepare a statement showing the break-up of the Original and revised budget for the year.

(May 2000)

Ans. **Statement showing the break-up of the original and revised budget for a year:**

(₹ in lakhs)

	Original budget	**Revised budget**
Sales revenue: (A)	1,500	1,080
(Refer to Working notes 1 & 2)		
Variable costs:		
Direct materials	600	480
		(40% × ₹1,200)
Direct labour	300	240
		(20% × ₹1,200)
Factory overheads	150	120
		(10% × ₹1,200)
Selling and Admin, overheads	<u>75</u>	60
		(5% × <u>₹1,200</u>)
Total variable costs: (B)	1,125	900
Contribution: (C) = (A) – (B)	375	180
Fixed overheads:		
Factory overheads	150	150
Selling and Admin. Overheads	<u>180</u>	<u>180</u>
Total fixed overheads: (D)	<u>330</u>	<u>330</u>
Profit (Loss): {(C) – (D)}	<u>45</u>	<u>(150)</u>

Working Notes:

1) Revised budgeted sales (after taking into account 10% reduction in selling price)

If revised budgeted S.P. is ₹90 The original budgeted S.P. is ₹100

If revised budgeted S.P. is ₹1 the original budgeted S.P. is $\frac{\text{₹}100}{\text{₹}90}$

If revised budgeted sales at revised S.P. is ₹1,080 lacs then the revised budgeted sales at original S.P. will is $\frac{\text{₹}100}{\text{₹}90}$ × ₹1,080 lacs = ₹1,200 lacs

2) Original budgeted sales

If revised budgeted sales at original S.P. is ₹80 then the original budgeted sales at original selling price is ₹100

If revised budgeted sales at original S.P. is ₹1 then the original sales at original selling price is $\frac{\text{₹}100}{\text{₹}80}$

If revised budgeted sales at original S.P. is ₹1,200 lacs then the original budgeted sales at original selling price is $\frac{\text{₹}100}{\text{₹}80}$ × ₹1,200 lacs = ₹1,500 Lacs.

27. 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 20X1-X2.

The cost details are as follows: -

Particulars	55% (₹)	65% (₹)	75% (₹)
Direct Materials	11,00,000	13,00,000	15,00,000
Direct Labour	5,50,000	6,50,000	7,50,000
Factory Overheads	3,10,000	3,30,000	3,50,000
Selling Overheads	3,20,000	3,60,000	4,00,000
Administrative Overheads	1,60,000	1,60,000	1,60,000
	24,40,000	**28,00,000**	**31,60,000**

Profit is estimated @ 20% on sales.

The following increases in costs are expected during the year:

Particulars	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 20X1-X2 at 85% level of capacity. Also ascertain profit and contribution.

(ICAI SM)

Ans.

ABC Ltd.

<u>Budgeted for 85% capacity level for the period 20X1-X2</u>

Budgeted production (units)	Per unit (₹)	(₹) 85,000
✓ Direct Material (note 1)	21.60	18,36,000
✓ Direct Labour (note 2)	10.50	8,92,500
✓ Variable Factory Overhead (note 3)	2.10	1,78,500
✓ Variable Selling Overhead (note 4)	4.32	3,67,200
Total Variable Cost (A)	38.52	32,74,200
✓ Fixed Factory Overhead (note 3)		2,20,000
✓ Fixed Selling Overhead (note 4)		1,15,000
✓ Administrative overhead		1,76,000
Total Fixed Cost (B)		5,11,000
Total Cost (A+B)		**<u>37,85,200</u>**
✓ **Add:** Profit 20% on sales or 25% on total cost		9,46,300

Sales		47,31,500
✓ Contribution (Sales−Variable Cost)		14,57,300

Working Notes: -

1) Direct Materials: -

Particulars	(₹)	Particulars	(₹)
✓ 75% Capacity	15,00,000	✓ 65% Capacity	13,00,000
✓ 65% Capacity	13,00,000	✓ 55% Capacity	11,00,000
✓ 10% Change in Capacity	**2,00,000**	✓ 10% Change in Capacity	**2,00,000**

- ✓ For 10% increase in capacity, i.e., for increase by 10,000 units, the total direct material cost regularly changes by ₹2,00,000.
- ✓ Direct Material Cost (Variable)= ₹ 2,00,000 ÷ 10,000 = ₹ 20
- ✓ After 8% increase in price, direct material cost per unit = ₹ 20 × 1.08 = ₹ 21.60
- ✓ Direct Material Cost for 85,000 budgeted units= 85,000 × ₹ 21.60 = ₹ 18,36,000

2) Direct Labour: -

Particulars	(₹)	Particulars	(₹)
✓ 75% Capacity	7,50,000	✓ 65% Capacity	6,50,000
✓ 65% Capacity	6,50,000	✓ 55% Capacity	5,50,000
✓ 10% Change in Capacity	**1,00,000**	✓ 10% Change in Capacity	**1,00,000**

- ✓ For 10% increase in capacity, direct labour cost regularly changes by ₹ 1,00,000.
- ✓ Direct labour cost per unit= ₹ 1,00,000 ÷ 10,000 = ₹ 10
- ✓ After 5% increase in price, direct labour cost per unit = ₹ 10 × 1.05 = ₹ 10.50
- ✓ Direct labour for 85,000 units= 85,000 units × ₹ 10.50 = ₹ 8,92,500.

3) Factory Overheads are semi-Variable Overheads: -

Particulars	(₹)	Particulars	(₹)
75% Capacity	3,50,000	65% Capacity	3,30,000
65% Capacity	3,30,000	55% Capacity	3,10,000
10% Change in Capacity	**20,000**	10% Change in Capacity	**20,000**

- ✓ Variable Factory Overhead = ₹ 20,000 ÷ 10,000 = ₹ 2
- ✓ Variable Factory Overhead for 75,000 units = 75,000 × ₹ 2 = ₹ 1,50,000
- ✓ Fixed Factory Overhead = ₹ 3,50,000 − ₹ 1,50,000 = ₹ 2,00,000.
- ✓ Variable Factory Overhead after 5% increase = ₹ 2 × 1.05 = ₹ 2.10
- ✓ Fixed Factory Overhead after 10% increase = ₹ 2,00,000 × 1.10 = ₹ 2,20,000

4) Selling Overhead is Semi-Variable Overhead: -

Particulars	(₹)	Particulars	(₹)
✓ 75% Capacity	4,00,000	✓ 65% Capacity	3,60,000
✓ 65% Capacity	3,60,000	✓ 55% Capacity	3,20,000
✓ 10% Change in Capacity	**40,000**	✓ 10% Change in Capacity	**40,000**

- ✓ Variable Selling Overhead = ₹ 40,000 ÷ 10,000 units = ₹4
- ✓ Variable Selling Overhead for 75,000 units= 75,000 × ₹ 4 = ₹ 3,00,000.
- ✓ Fixed Selling Overhead = ₹ 4,00,000 − ₹ 3,00,000 = ₹ 1,00,000.

- ✓ Variable Selling Overhead after 8% increase= ₹4 × 1.08 = ₹4.32
- ✓ Fixed Selling Overhead after 15% increase = ₹ 1,00,000 × 1.15

  = ₹ 1,15,000.

5) Administrative overhead is fixed:

After 10% increase = ₹ 1,60,000 × 1.10 = ₹ 1,76,000

28. Following is the sales budget for the first six months of the year 20X0 in respect of PQR Ltd:

Month:	Jan.	Feb.	March	April	May	June
Sales (units):	10,000	12,000	14,000	15,000	15,000	16,000

Finished goods inventory at the end of each month is expected to be 20% of budgeted sales quantity for the following month. Finished goods inventory was 2,700 units on January 1, 20X0. There would be no work-in Progress at the end of any month.

Each unit of finished product requires two types of materials as detailed below:

Material X: 4 kgs. @ % 10/kg

Material Y: 6 kgs. @ % 15/kg

Material on hand on January, 1,2009 was 19,000 kgs. of material X and 29,000 kgs. of material Y. Monthly closing stock of material is budgeted to be equal to half of the requirements of next month's production.

Budgeted direct labour hour per unit of finished product is 3/4 hour. Budgeted direct labour cost for the first quarter of the year 20X0 is ₹10,89,000.

Actual data for the quarter one, ended on March 31, 20X0 is as under:

Actual production quantity: 40,000 units

Direct material cost

(Purchase cost based on materials actually issued to production)

Material X: 1,65,000 kgs. @ ₹ 10.20/kg

Material Y: 2,38,000 kgs. @ ₹ 15.10/kg

Actual direct labour hours worked:	32,000 hours
Actual direct labour cost:	₹13,12,000

Required

a) Prepare the following budgets:
   - i) Monthly production quantity budget for the quarter one.
   - ii) Monthly raw material consumption quantity budget from January, 20X0 to April, 20X0.
   - iii) Materials purchase quantity budget for the quarter one.

b) Compute the following variances:
   - i) Material cost variance
   - ii) Material price variance
   - iii) Material usage variance;
   - iv) Direct labour cost variance
   - v) Direct labour rate variance
   - vi) Direct labour efficiency variance.

(May 2009)

Ans. **a)**

i) Statement showing monthly production quantity budget:

Production Budget for January, 20X0 to March, 20X0

Particulars (in Unit)	Jan	Feb	Mar	April
Budgeted Sales (in Unit)	10,000	12,000	14,000	15,000
Add: Budgeted Closing Stock				
(20% of sales of next month)	2,400	2,800	3,000	3,000
	12,400	14,800	17,000	18,000
Less: Opening Stock	2,700	2,400	2,800	3,000
Budgeted Output	9,700	12,400	14,200	15,000

Total Budgeted Output for the Quarter ended March 31, 2009
= (9,700 + 12,400 + 14,200)
= 36,300 units

ii) Monthly Raw Material consumption quantity budget from January 20X0 to April 20X0

Raw Material Consumption Budget (in quantity)

Month	Budgeted Output (Units)	Material 'X' @ 4 kg. per unit (Kg.)	Material 'Y' @ 6 kg. per unit (Kg.)
Jan	9,700	38,800	58,200
Feb	12,400	49,600	74,400
Mar	14,200	56,800	85,200
Apr	15,000	60,000	90,000
Total		2,05,200	3,07,800

iii) Material purchase quantity budget for the quarter

Raw Materials Purchase Budget (in quantity)
For the Quarter ended (March 31st, 20X0)
Material X

Particulars (in Unit)	Jan	Feb	Mar	Total
Raw material required for production (X)	38,800	49,600	56,800	1,45,200
Add: Closing stock of raw material (1/2 of Next month requirement)	24,800	28,400	30,000	83,200
	63,600	78,000	86,800	2,28,400
Less: Opening Stock at raw material X	19,000	24,800	28,400	72,200
Materials to be purchased X	44,600	53,200	58,400	1,56,200

Raw Materials Purchase Budget (in quantity
For the Quarter ended (March 31st, 20X0)
Material Y

Particulars (in Unit)	Jan	Feb	Mar	Total
Raw material required for production (Y)	58,200	74,400	85,200	2,17,800
Add: Closing stock of raw material (1/2 of Next month requirement)	37,200	42,600	45,000	1,24,800
	95,400	1,17,000	1,30,200	3,42,600
Less: Opening Stock at raw material Y	29,000	37,200	42,600	1,08,800
Materials to be purchased Y	66,400	79,800	87,600	2,33,800

b) Calculation of Material Cost Variance:

i) **Material cost variance** = 1 – 4 = 76,800 (A)
ii) **Material Price variance** = 3 – 4 = 56,800 (A)
iii) **Material uses variance** = 1 – 3 = 20,000 (A)

Workings

Material Variance

(1)	(2)	(3)	(4)
SP × SQ	**SP × SM**	**SP × AQ used**	**AP × AQ used**
X 10 × 1,60,000	10 × 1,60,200	10, × 1,65,000	10.20 × 1,65,000
Y 15 × 2,40,000	15 × 2,41,800	15 × 2,38,000	15.10 × 2,38,000
52,00,000	52,29,000	52,20,000	52,76,800

SM = Std. mix i.e., total actual quantity used in std. mix ratio

Total Actual quantity used	=	1,65,000 + 2,38,000
	=	4,03,000 kgs.
Std. mix ratio	=	4:6 i.e., x: y
Std. mix for X	=	$\frac{4}{10}$ × 4,03,000
	=	1,61,200 kg.
Std. mix for Y	=	$\frac{6}{10}$ × 4,03,000
	=	2,41,800 kgs.

Std. quantity i.e., std. qty. for actual output.

Actual output = 40,000 kg.

∴ material y required = 40,000 × 4 = 1,60,000

Material y required = 40,000 × 4 = 2,40,000

Here: SP	=	Standard Price per kg of RM
SQ	=	Standard quantity for actual output.
SM	=	Standard mix i.e., Total actual quantity used in standard mix ratio
AQ used	=	Actual quantity used.

i) **Direct Labour Cost Variance** = 1 – 5 = 1,12,000 (A)

ii) **Direct Labour rate Variance** = 4 – 5 = 32,000 (A)

iii) **Direct Labour efficiency variance** = 1 – 2 = 80,000 (A)

Working Notes:

Labor Variance

(1)	(2)	(3)	(4)	(5)
SR × ST	**SR × SM**	**SR × ATW**	**SR × ATP**	**AR × ATP**
40 × (40,000 × .75)	40 × 32,000	40 × 32,000	40 × 32,000	13,12,000
12,00,000	12,80,000	12,80,000	12,80,000	13,12,000

Budgeted Hours	=	Budget Production × Budgeted Time per unit
Budget Production	=	9,700 + 12,400 + 14,200
= 36,300 × $\frac{3}{4}$	=	27,225 hours
	=	$\frac{Budgeted\ labours\ cost}{Budgeted\ hours}$
	=	$\frac{10,89,000}{27,225}$ = ₹40
Let Actual time worked	=	Actual time paid
Here: SR	=	Standard rate of labor per hour

ST = Standard time for Actual output

SM = Standard mix i.e., total at worked in ltd. mix ratio.

ATW = Actual time worked

ATP = Actual time paid for

29. Define Budget Manual. What are the salient features of Budget Manual?

(Nov. 2022)

Ans. **Budget Manual:** The budget manual is a booklet specifying the objectives of an organisation in relation to its strategy. The Budget is made to decide budget. The organization sets its priorities too.

CIMA, London, defines budget manual as, "A document which sets out the responsibilities of the persons engaged in, the routine of, and the forms and records required for, budgetary control."

Effective budgetary planning relies on the provision of adequate information to the individuals involved in the planning process. Many of these information needs are contained in the budget manual. A budget manual is collection of documents that contains key information for those involved in the planning process.

Features of a budget manual

Typical budget manual may include the following:

i) A statement regarding the objectives of the organisation and how they can be achieved through budgetary control.

ii) A statement about the functions and responsibilities of each executive, both regarding preparation and execution of budgets;

iii) Procedures to be followed for obtaining the necessary approval of budgets. The authority of granting approval should be stated in explicit terms. Whether, one two or more signatures are required on each document should be clearly stated;

iv) A form of organization chart to show who are responsible for the preparation of each functional budget and the way in which the budgets are interrelated.

v) A timetable for the preparation of each budget.

vi) The manner of scrutiny and the personnel to carry it out:

vii) Reports, statements, forms and other record to be maintained;

viii) The accounts classification to be employed. It is necessary that the framework within which the costs, revenue and other financial accounts are classified must be identical both in the accounts and budget department.

ix) The reporting of the remedial actions;

x) The manner in which budgets, after acceptance and issuance, are to be revised or the matter amended these are included in budgets and on which action can be taken only with the approval of top management

xi) This will prevent the formation of a 'bottleneck' with the late preparation of one budget holding up the preparation of all others.

xii) Copies of all forms to be completed by those responsible for preparing budgets, with explanations concerning their completion.

xiii) A list of the organization's account codes, with full explanations of how to use them.

Information concerning key assumptions to be made by managers in their budgets, for example the rate of inflation, key exchange rates, etc.

30. 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:

1) 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.

2) 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.

(May 2022)

Ans. **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		

31. Maharatna Ltd., a public sector undertaking (PSU), produces product A. The company is in process of preparing its revenue budget for the year 2022. The company has the following information which can be useful in preparing the budget:

i) It has anticipated 12% growth in sales volume from the year 2021 of 4,20,000 tonnes.
ii) The sales price of ₹23,000 per tonne will be increased by 10% provided Wholesale Price Index (WPI) increases by 5%.
iii) To produce one tonne of product A, 2.3 tonnes of raw material are required. The raw material cost is ₹4,500 per tonne. The price of raw material will also increase by 10% if WPI increase by 5%.
iv) The projected increase in WPI for 2022 is 4%
v) A total of 6,000 employees works for the company. The company works 26 days in a month.
vi) 85% of employees of the company are permanent and getting salary as per 5- year wage agreement. The earnings per manshift (means an employee cost for a shift of 8 hours) is ₹3,000 (excluding terminal benefits). The new wage agreement will be implemented from 1st July 2022 and it is expected that a 15% increase in pay will be given.
vii) The casual employees are getting a daily wage of ₹ 850. The wages in linked to Consumer Price Index (CPI). The present CPI is 165.17 points and it is expected to be 173.59 points in year 2022.
viii) Power cost for the year 2021 is ₹ 42,00,000 for 7,00,000 units (1 unit = 1 Kwh). 60% of power is used for production purpose (directly related to production volume) and remaining are for employee quarters and administrative offices.
ix) During the year 2021, the company has paid ₹ 60,00,000 for safety and maintenance works. The amount will increase in proportion to the volume of production.
x) During the year 2021, the company has paid ₹ 1,20,000 for the purchase of diesel to be used in car hired for administrative purposes. The cost of diesel will increase by 15% in year 2022.
xi) During the year 2021, the company has paid ₹ 6,00,000 for car hire charges (excluding fuel cost). In year 2022, the company has decided to reimburse the diesel cost to the car rental company. Doing this will attract 5% GST on Reverse Charge Mechanism (RCM) basis on which the company will not get GST input credit.

xii) Depreciation on fixed assets for the year 2021 is ₹ 80,40,00,000 and it will be 15% lower in 2022.

Required:

From the above information PREPARE Revenue (Flexible) budget for the year 2022 and also show the budgeted profit/ loss for the year.

(RTP May 2022)

Ans. Revenue Budget (Flexible Budget) of Maharatna Ltd. for the Year 2022

	Particulars	**PY 2021**	**CY 2022**
A	Sales Volume (Tonnes)	4,20,000	4,70,400 [112%×4,20,000]
B	Selling Price per tonne (₹)	23,000	23,000
		(₹ in lakh)	**(₹ in lakh)**
C	**Sales value [A×B]**	**96,600**	**1,08,192**
D	**Raw material Cost:**		
i)	Qty. of Material [2.3 tonnes × A] (tonnes)	9,66,000	10,81,920
ii)	Price per tonne (₹)	4,500	4,500
iii)	**Total raw material cost (₹ in lakh) [(i)×(ii)]**	**43,470**	**48,686.40**
E	**Wages & Salary Cost:**		
i)	Wages to casual employees (15% × 6,000 = 900 employees)	2,386.80 [900 × 26 × 12 × ₹ 850]	2,508.47 [900 × 26 × 12 × ₹ 893.33]
ii)	Salary to permanent employees (85% × 6,000 = 5,100 employees)	47,736 [5100 × 26 × 12 × ₹ 3,000]	51,316.20 [(5100 × 26 × 6 × ₹ 3,000) + (5100 × 26 × 6 × ₹ 3,450)]
iii)	**Total wages & salary [(i)+(ii)]**	**50,122.80**	**53,824.67**
F	**Power cost:**		
i)	For production (units)	4,20,000 [60% × 7,00,000]	4,70,400 [112% × 4,20,000]
ii)	For employees & offices (units) [40% × 7,00.000]	2,80,000	2,80,000
iii)	Total Power consumption (units) [(i)+(ii)]	7,00,000	7,50,400
(iv)	Power rate per unit (₹) [₹42,00,000 ÷ 7,00,000]	6.00	6.00
v)	Total power cost [(iii)×(iv)]	**42**	**45.024**
G	**Safety and maintenance Cost**	**60**	**67.20 [112% × 60,00,000]**
H	**Diesel cost**	**1.2**	-
I	Car Hire charge:		
i)	Car hire charge	6	6
ii)	Fuel reimbursement cost	-	1.38 [115% × 1.2]
iii)	GST@5% on RCM basis [5%×(i+ii)]	-	0.369
iv)	**Total Car hire charge cost [(i)+(ii)+(iii)]**	**6**	**7.749**
J	**Depreciation**	**8,040**	**6,834 [85% × 8040]**
K	Total Cost [Sum of D to J]	1,01,742	1,09,465.043
L	**Profit/ (Loss) [C-L]**	**(5,142)**	**(1273.043)**

32. 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 no 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.

(May 2023)

Ans. **Budget Showing the Current Position:**

Particulars	X	Y	Z	Total
Output	2,50,000	2,80,000	3,20,000	
Selling price per unit ₹ (WN)	60	96	48	
Less:				
DMC/U ₹	(20)	(20)	(20)	
DWC/U ₹	(16)	(24)	(16)	
*VOH/U ₹	(4) (1 X 4)	(6) (1X6)	(4) (1 X 4)	
∴ Contribution Per unit₹	20	46	8	
Total Contribution (Output X Contribution Per unit)	50,00,000	1,28,80,000	25,60,000	₹2,04,40,000

Less: Fixed Cost	₹13,20,000
Total FOH = 52,80,000	
(-) V. OH = 39,60,000	
(1 X 39,60,000 hours)	
13,20,000	
∴ **Profit →**	**₹ 1,91,20,000**

*Variable overhead is 1 per labor hour and labor hours per unit is 4/6/4.

Working Note:

1) Determination of selling price:
   → Product Z can be sold at 20% profit on Marginal cost
   → Marginal cost = Direct Material cost + Direct Labour Cost + Variable overhead.

= 20 + 16 + Variable OH.

→ In order to ascertain variable OH cost Per unit we need to find out Labour hours:

	X	Y	Z	Total
Direct wage cost @ ₹ 4 per Lab. hour	16	24	16	
∴ Labour hours per unit	4	6	4	
Total Labour hours	10,00,000	16,80,000	12,80,000	39,60,000

It is given in the Question that V. OH is ₹1 (Labour hour).
∴ for product Z, variable OH/Unit = ₹1 X 4 hours = ₹4

∴ MC = 20 + 16 + 4
= ₹40/U.
S.P/U of product 'Z' = ₹40 + (20% of 40)
= ₹48
S.P/U of 'X' = 1.25 X 48
= 60

S.P/U of 'Y' = 2 x 48
= 96

Budget Showing next year Position:

Particulars	X	Y	Z	Total
Output	280000 (25000 X 112%)	266000	368000 (320000 x 115%)	
S. P/U	60	96	48	
Less:				
DMC/U	(20)	(20)	(20)	
DLC/U	(16)	(24)	(16)	
VOH/U ₹	(4)	(6)	(4)	
∴ Cont. / U.	20	46	8	
Total Contribution (output x cont. / U)	56,00,000	1,22,36,000	2944000	2,07,80,000
Less; Fixed cost				15,48,000
Total OH = 55,08,000				
Less; V. OH = (39,60,000) 15,48,000 ∴ Profit →				**1,92,32000**

Cost Accounting System
Assignment

Q. No.	Questions & Answers

1. M/s. Abid Private Limited disclosed a net profit of ₹ 48,408 as per cost books for the year ending 31st March 202X. 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;

Particulars	(₹)
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

(May 2019, Modified RTP Nov 2020, MTP July 2021, Modified MTP May 2019, Modified ICAI SM, Modified MTP May 2023)

Ans.

Memorandum Reconciliation Accounts

Particulars	(₹)	Particulars	(₹)
To Works Overheads under recovered in cost Books	48,600	By Net Profit as per Costing records	48,408
To Provision for Doubtful Debts	17,800	By Office overheads over recovered in Cost Books	11,500
To Obsolescence loss not charged in cost accounts	17,200	By dividend received on shares	17,475
To Stores Adjustment (Debit in Financial Account)	35,433	By Interest on Fixed Deposits	21,650
		By Depreciation over charged in cost Accounts	5,000
		By Net loss as per Financial Accounts	15,000
	1,19,033		**1,19,033**

2. R Limited showed a net loss of ₹ 35,400 as per their cost accounts for the year ended 31st March, 202X. 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;

Particulars	(₹)
Administrative overhead under recovered	25,500
Factory overhead over recovered	1,35,000
Depreciation under charged in Cost Accounts	26,000
Dividend received	20,000
Loss due to obsolescence charged in Financial Accounts	16,800
Income tax provided	43,600
Bank interest credited in Financial Accounts	13,600
Value of opening stock;	
In Cost Accounts	1,65,000
In Financial Accounts	1,45,000
Value of Closing Stock	
In Cost Accounts	1,25,500
In Financial Accounts	1,32,000

Goodwill written-off in Financial Accounts	25,000
Notional rent of own premises charged in Cost Accounts	60,000
Provision for doubtful debts in Financial Accounts	15,000

Prepare a reconciliation statement by taking costing net loss as base.

(Nov. 2012, Modified May. 2014 & ICAI SM, Modified MTP May 2019, Modified RTP May 2023)

Ans.

Statement of Reconciliation

Particulars	**(₹)**	**(₹)**
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/cs		**67,800**

3. As on 31st March, 202X, the following balances existed in a firm's Cost Ledger;

Particulars	**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;

Particulars	**(₹)**
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 issue 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.

(ICAI SM, Nov. 2008, Modified RTP Nov-2019, Modified RTP May 2020, Modified MTP Nov 2022)

Ans. **Journal Entries are as follows: -**

Particulars		L.F.	Dr. (₹)	Cr. (₹)
1) Finished Stock Ledger Control A/c	Dr.		2,10,835	
To Work-in-Process Control A/c				2,10,835
2) Manufacturing Overhead Control, A/c	Dr.		91,510	
To Cost Ledger Control A/c				91,510
3) Stores Ledger Control A/c	Dr.		1,23,000	
To Cost Ledger Control A/c				1,23,000
4) i) Wage Control A/c	Dr.		72,195	
To Cost Ledger Control A/c				72,195
ii) Work-in-Process Control A/c	Dr.		50,530	
To Wages Control A/c				50,530
iii) Manufacturing Overhead Control A/c	Dr.		21,665	
To Wages Control A/c				21,665
5) Cost of Sales A/c	Dr.		1,85,890	
To Finished Stock Ledger A/c				1,85,890
6) Work-in-Process Control A/c	Dr.		1,27,315	
To Stores Ledger Control A/c				1,27,315
7) Finished Stock Ledger Control A/c	Dr.		5,380	
To Cost of Sales A/c				5,380
8) Cost Ledger Control A/c	Dr.		2,900	
To Stores Ledger Control A/c				2,900
9) Work-in-Process Control A/c	Dr.		77,200	
To Manufacturing Overhead Control A/c				77,200

Cost Ledgers

Stores Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	3,01,435	By Work in Process Control A/c	1,27,315
To Cost Ledger Control A/c	1,23,000	By Cost Ledger Control A/c	2,900
		By Balance c/d	2,94,220
	4,24,435		**4,24,435**

Wages Control Account

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	72,195	By Work in Process Control A/c	50,530
		By Manufacturing OH Control A/c (Bal. Fig)	21,665
	72,195		**72,195**

Manufacturing Overhead Control Account

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	91,510	By Balance b/d	10,525
To Wages Control A/c	21,665	By Work in Process Control A/c	77,200
		By Balance c/d	25,450
	1,13,175		**1,13,175**

Work-in-Process Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,22,365	By Finished Stock Ledger Control A/c	2,10,835
To Wages Control A/c	50,530	By Balance c/d	1,66,575
To Stores Ledger Control A/c	1,27,315		

To Manufacturing OH Control A/c	77,200		
	3,77,410		**3,77,410**

Cost Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To Stores Ledger Control A/c (return)	2,900	By Balance b/d	6,65,220
To Balance c/d	9,49,025	By Manufacturing OH Control A/c	91,510
		By Stores Ledger Control A/c	1,23,000
		By Wages Control A/c	72,195
	9,51,925		**9,51,925**

Finished Stock Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	2,51,945	By Cost of Sales Control A/c	1,85,890
To Work-in-Process Control A/c	2,10,835	By Balance c/d	2,82,270
To Cost of Sales Control A/c (Return at Cost)	5,380		
	4,68,160		**4,68,160**

Cost of Sales Account

Particulars	(₹)	Particulars	(₹)
To Finished Stock Ledger Control	1,85,890	By Finished Stock Ledger Control (Return)	5,380
		By Balance c/d	1,80,510
	1,85,890		**1,85,890**

Trial Balance

Particulars	Dr. (₹)	Cr. (₹)
– Stores Ledger Control A/c	2,94,220	
– Work-in-Process Control A/c	1,66,575	
– Finished Stock Ledger Control A/c	2,82,270	
– Manufacturing Overhead Control, A/c	25,450	
– Cost of Sales A/c	1,80,510	
– Cost Ledger Control A/c		9,49,025
Total	**9,49,025**	**9,49,025**

4. Following are the figures extracted from the Cost Ledger of a Manufacturing Unit: -

Particulars	(₹)
Stores;	
Opening balance	15,000
Purchase	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 Overhead Expenses	35,000 1,25,000

Ascertain the profit or loss as per Financial Account and Cost accounts and reconcile them.

(ICAI SM, May 2005, May 2011, Nov. 2011, May 2017)

Ans.

Statement of Profit as per Costing Records

Particulars	(₹)
– Direct Material Cost (₹ 80,000–₹ 40,000)	40,000
– Direct Wages	30,000
Prime Cost;	**70,000**
– Production Overheads	1,20,000
Works Cost;	**1,90,000**
– ***Add:*** Opening WIP	30,000
	2,20,000
– ***Less:*** Closing WIP	(20,000)
Cost of Finished Goods;	**2,00,000**
– Profit (10% of Cost)	20,000
Sales	**2,20,000**

Profit & Loss A/c

Particulars	(₹)	Particulars	(₹)
To Materials (Op. bal + Purchase–Sale)	90,000	By Sales A/c	2,20,000
To Opening WIP	30,000	By Closing WIP	20,000
To Wages for the period	35,000	By Closing stock of raw material	37,000
To Overheads expenses	1,25,000	**By Net Loss**	**3,000**
	2,80,000		**2,80,000**

Reconciliation Statement

Particulars	(₹)
Profit (loss) as per Financial Accounts	**(3,000)**
Add: Overheads Over-absorbed (refer Overhead Control A/c)	23,000
Net Profit as per Cost Accounts	**20,000**

Working notes:

Stores Ledger Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	15,000	By Work-in-Process Control A/c (Issued to WIP)	80,000
To Cost Ledger Control A/c (Purchase)	80,000	By Overhead Control A/c (Issued for repairs)	10,000
To Work-in-Process Control A/c (Return from WIP)	40,000	By Cost Ledger Control A/c (Sold at Cost)	5,000
		By Overheads Control A/c* (Shortages)	3,000

		By Balance c/d	37,000
	1,35,000		**1,35,000**

*Assumed Normal.

Wages Control A/c

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	35,000	By Work-in-Process Control A/c By Overhead Control A/c (Bal. Fig)	30,000 5,000
	35,000		**35,000**

Overhead Control A/c

Particulars	(₹)	Particulars	(₹)
To Stores Ledger Control A/c	10,000	By Work-in-Process Control A/c	1,20,000
To Stores Ledger Control A/c	3,000	By Balance c/d	23,000
To Cost Ledger Control A/c	1,25,000		
To Wages Control A/c	5,000		
	1,43,000		**1,43,000**

WIP Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	30,000	By Stores Ledger Control A/c	40,000
To Stores Ledger Control A/c	80,000	By Finished Goods Control A/C (Bal. Fig)	2,00,000*
To Wages Control A/c	30,000	By Balance c/d	20,000
To Overheads Control A/c	1,20,000		
	2,60,000		**2,60,000**

*Finished Output at Cost	2,00,000
Profit at 10% on actual Cost from WIP Sales	20,000
Total	**2,20,000**

5. The Trading and Profit and Loss Account of a company for the year ended 31-03-20X1 is as under.

Trading and Profit and Loss Account

Particulars	(₹)	Particulars	(₹)
To Materials	26,80,000	By Sales (50,000 units)	62,00,000
To Wages	17,80,000	By Closing Stock (2000 units)	1,50,000
To Factory Expenses	9,50,000	By Dividend received	20,000
To Administrative Expenses	4,80,200		
To Selling Expenses	2,50,000		
To Preliminary Expenses written off	50,000		
To Net Profit	1,79,800		
	63,70,000		**63,70,000**

In the Cost Accounts;

a) Factory expenses have been allocated to production at 20% of Prime Cost.
b) Administrative expenses absorbed at 10% of factory cost.
c) Selling expenses charged at ₹ 10 per unit sold.

Prepare the Costing Profit and Loss Account of the company and reconcile the Profit/Loss with the profit as shown in the Financial Accounts.

(Nov. 2016, Modified July 2021, Modified Nov. 2022, Modified MTP May 2020)

Ans.

Costing Profit and Loss Account

Particulars	(₹)	Particulars	(₹)
To Materials	26,80,000	By Sales	62,00,000
To Wages	17,80,000	By Closing Stock	2,26,431
To Factory expenses	8,92,000		
To Administrative expenses	5,35,200		
To Selling expenses	5,00,000		
To Profit (Balancing figure)	39,231		
	64,23,431		**64,26,431**

Cost Sheet

Particulars	(₹)
Direct Material	26,80,000
Add: Direct Labour	17,80,000
Prime Cost	44,60,000
Add: Factory expenses @ 20% of Prime Cost	8,92,000
Factory Cost	53,52,000
Add: Administration overheads @ 10% of Factory	5,35,200
Cost of production	58,87,200
Less: Finished goods $\left(\frac{₹\ 58,87,200 \times 2,000}{52,000}\right)$	(2,26,431)
Cost of Goods Sold	56,60,769
Add: Selling & Distribution overheads	5,00,000
Cost of sales	61,60,769
Profit (Balancing figure)	39,231
Sales	**62,00,000**

Statement of Reconciliation of Profit/Loss

Particulars	(₹)
Profit as per cost Accounts	39,231
Add;	
✓ Over recovery of Administration expenses	55,000
✓ Over recovery of selling expenses	2,50,000
✓ Dividend Received	20,000
	3,64,231
Less:	
✓ Under recovery of factory expenses	(58,000)
✓ Over valuation of closing stock	(76,430)
✓ Preliminary expenses w/f	(50,000)
	1,84,431
Profit as per financial Account	**1,79,800**

6. XYZ Ltd. maintains a non-integrated accounting system for the purpose of management information. The following are the data related with year 20X0-X1:

Particulars	(₹ in '000)
Opening balances:	
– Stores ledger control A/c	24,000
– Work-in-process control A/c	6,000
– Finished goods control A/c	1,29,000
– Building construction, A/c	3,000
– Cost ledger control A/c	1,62,000
During the year following transactions took place:	
Materials:	
– Purchased	12,000

– Issued to production	15,000
– Issued to general maintenance	1,800
– Issued to building construction	1,200
Wages:	
– Gross wages paid	45,000
– Indirect wages paid	12,000
– For building construction	3,000
Factory overheads:	
– Actual amount incurred (excluding items shown above)	48,000
– Absorbed in building construction	6,000
– Under-absorbed	2,400
Royalty paid	1,500
Selling, distribution and administration overheads	7,500
Sales	1,35,000

At the end of the year, the stock of raw material and work-in-process was ₹1,65,00,000 and ₹ 75,00,000 respectively. The loss arising in the raw material account is treated as factory overheads. The building under construction was completed during the year. Gross profit margin is 20% on sales.

PREPARE the relevant control accounts to record the above transactions in the cost ledger of the company.

(RTP Nov 2019, MTP Dec 2021 and RTP May 2020)

Ans.

Dr. Cost Ledger Control Account Cr.

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Costing P&L A/c	1,35,000	By Balance b/d	1,62,000
To Building Construction A/c	13,200	By Stores Ledger control A/c	12,000
To Balance c/d	1,44,900	By Wages Control A/c	45,000
		By Factory overhead control A/c	48,000
		By Royalty A/c	1,500
		By Selling, Distribution and Administration overheads	7,500
		By Costing P&L A/c	17,100
	2,93,100		2,93,100

Dr. Stores Ledger Control Account Cr.

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Balance b/d	24,000	By WIP control A/c	15,000
To Cost Ledger control A/c	12,000	By Factory overheads control A/c	1,800
		By Building construction, A/c	1,200
		By Factory overhead control A/c (bal. fig.) (loss)	1,500
		By Balance c/d	16,500
	36,000		36,000

Dr. Wages Control Account Cr.

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Cost Ledger control A/c	45,000	By Factory overhead control A/c	12,000
		By Building Construction, A/c	3,000
		By WIP Control A/c (bal. fig.)	30,000
	45,000		45,000

Dr. Factory Overhead Control Account Cr.

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Stores Ledger control A/c	1,800	By Building Construction, A/c	6,000
To Wages Control A/c	12,000	By WIP Control A/c (bal. fig.)	54,900
To Cost Ledger control A/c	48,000	By Costing P&L A/c (under-absorption)	2,400
To Stores Ledger control A/c (loss)	1,500		
	63,300		63,300

Dr. Royalty Account Cr.

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Cost Ledger control A/c	1,500	By WIP Control A/c	1,500
	1,500		1,500

Dr. Work-in-process Control Account Cr.

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Balance b/d	6,000	By Finished goods control A/c (bal. fig.)	99,900
To Stores Ledger control A/c	15,000		
To Wages Control A/c	30,000		
To Factory overhead control A/c	54,900		
To Royalty A/c	1,500	By Balance c/d	7,500
	1,07,400		1,07,400

Dr. Finished Goods Control Account Cr.

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Balance b/d	1,29,000	By Cost of Goods Sold A/c (Refer working note)	1,08,000
To WIP control A/c	99,900	By Balance c/d	1,20,900
	2,28,900		2,28,900

Dr. Cost of Goods Sold Account Cr.

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Finished Goods control A/c	1,08,000	By Cost of sales A/c	1,08,000
	1,08,000		1,08,000

Dr. Selling, Distribution and Administration Overhead Control Account Cr.

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Cost Ledger control A/c	7,500	By Cost of sales A/c	7,500
	7,500		7,500

Dr. Cost of Sales Account Cr.

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Cost of Goods Sold A/c	1,08,000	By Costing P&L A/c	1,15,500
To Selling, Distribution and Administration A/c	7,500		
	1,15,500		1,15,500

Dr. **Costing P&L Account** **Cr.**

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Cost of Sales A/c	1,15,500	By Cost Ledger control A/c	1,35,000
To Factory overhead control A/c	2,400		
To Cost Ledger control A/c (bal. fig.) (Profit)	17,100		
	1,35,000		1,35,000

Dr. **Building Construction Account** **Cr.**

Particulars	(₹ in '000)	Particulars	(₹ in '000)
To Balance b/d	3,000	By Cost Ledger control A/c	13,200
To Stores Ledger control A/c	1,200		
To Wages Control A/c	3,000		
To Factory overhead control A/c	6,000		
	13,200		13,200

Trial Balance

Particulars	Dr.	Cr.
	(₹ in '000)	(₹ in '000)
Stores Ledger Control A/c	16,500	
WIP Control A/c	7,500	
Finished Goods Control A/c	1,20,900	
Cost Ledger Control A/c		1,44,900
	1,44,900	1,44,900

Workings Note:

Cost of Goods sold = $\frac{₹\ 1,35,000 \times 80}{100}$ = ₹1,08,000

7. A Company Operates on historic job cost accounting system. Which is not integrated with the financial accounts. At the beginning of a month; the opening balance in cost ledger were;

Particulars	(₹) 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 transactions took place;

Particulars		(₹) In Lakhs
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 materials 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. **(ICAI SM, RTP May 2022 Modified, RTP Nov 2021 Modified)**

Ans.

Cost Ledger Control A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Costing P&L A/c	450	By Balance b/d	540
To Building Construction A/c	44	By Stores Ledger Control A/c	40
To Balance c/d	483	By Wages Control A/c	150
		By Works OH Control A/c	160
		By Royalty A/c	5
		By Admin. OH, and S&D OH A/c	25
		By Costing P&L A/c	57
	977		**977**

Stores Ledger Control A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Balance b/d	80	By Work-in-Process A/c	50
To Cost Ledger Control A/c	40	By Works OH Control A/c	6
		By Building Construction, A/c	4
		By Works OH Control A/c (Balance figure) (loss)	5
		By Balance c/d	55
	120		**120**

Wages Control A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	150	By Works OH Control A/c	40
		By Building Construction, A/c	10
		By Work-in-Process Control A/c (Balancing figure)	100
	150		**150**

Works Overhead Control A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Stores Ledger Control A/c	6	By Building Construction, A/c	20
To Wages Control A/c	40	By Work-in-Process Control A/c (Balancing figure)	183
To Cost Ledger Control A/c	160	By Costing P&L A/c (under-absorption)	8
To Store Ledger Control A/c (loss)	5		
	211		**211**

Royalty A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	5	By Work-in-Process Control A/c	5
	5		**5**

Work-in-Process Control A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Balance b/d	20	By Finished Goods Control A/c (Balancing figure)	333
To Stores Ledger Control A/c	50	By Balance c/d	25
To Wages Control A/c	100		
To Works OH Control A/c	183		
To Royalty A/c	5		
	358		**358**

Finished Goods Control A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Balance b/d	430	By Cost of Goods Sold A/c (80% of ₹ 450)	360
To Work-in-Process Control A/c	333	By Balance c/d	403
	763		**763**

Cost of Goods Sold A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Finished Goods Control A/c	360	By Cost of Sales A/c	360
	360		**360**

Selling, Distribution and Administration Overhead A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	25	By Cost of Sales A/c	25
	25		**25**

Cost of Sales A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Cost of Goods Sold	360	By Costing P&L A/c (Balancing Figure)	385
To Admin. OH, and S&D OH A/c	25		
	385		**385**

Costing P & L A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Cost of Sales A/c	385	By Cost Ledger Control A/c (Sales)	450
To Works Overhead Control A/c	8		
To Cost Ledger Control A/c (Profit) (Balancing figure)	57		
	450		**450**

Building Construction, A/c

(₹ In Lakhs)

Particulars	(₹)	Particulars	(₹)
To Balance b/d	10	By Cost Ledger Control A/c (Balancing Figure)	44
To Stores Ledger Control A/c	4		
To Wages Control A/c	10		

To Works OH Control A/c	20		
	44		**44**

Trial Balance

Particulars	Dr. (₹)	Cr. (₹)
Stores Control A/c	55	
Work-in-Process A/c	25	
Finished Goods A/c	403	
Cost Ledger Adjustment A/c		483
	483	**483**

8. A manufacturing company has disclosed a net loss of ₹8,75,000 as per net cost accounting records for the year ended March 31,20X0. However, their financial accounting records disclosed a net loss of ₹7,91,250 for the same period. A scrutiny of the data of both the sets of books of accounts revealed the following information:

		₹
i)	Factory overheads over-absorbed	47,500
ii)	Administration overheads under-absorbed	32,750
iii)	Depreciation charged in Financial Accounts	2,25,000
iv)	Depreciation charged in Cost Accounts	2,42,250
v)	Interest on investments not included in Cost	62,750
vi)	Income Tax provided in Financial Accounts	7,250
vii)	Transfer fees (credit in Financial Accounts)	12,500
viii)	Preliminary expenses written off	27,500
ix)	Under-valuation of opening stock in Cost Accounts	6,250
x)	Under valuation of closing stock in Cost Accounts	17,500

Required:

Prepare a Memorandum Reconciliation A/c.

(Nov 2010, Modified Nov 2009, Modified MTP Nov 2019)

Ans.

Dr. **Memorandum Reconciliation Account** **Cr.**

Particulars	Amount	Particulars	Amount
To Net loss as per Cost Accounting records	8,75,000	By Factory overheads over-absorbed	47,500
To Administrative overheads under-absorbed	32,750	By Excess charge of depreciation in Cost Accounts (2,42,250- 2,25,000)	17,250
To Income tax provided in Financial Accounts	7,250	By Transfer fee	12,500
To Preliminary expenses written off	27,500	By Interest on investment not included in Cost Accounts	62,750
To Under valuation of opening stock in Cost Accounts	6,250	By Under valuation of Closing stock in Cost Accounts	17,500
		By Net Loss as per financial records	7,91,250
	9,48,750		9,48,750

9. JOURNALISE the following transactions in cost books under Non-Integrated system of accounting.

i)	Credit Purchase of Material	₹ 27,000
ii)	Manufacturing overhead charged to Production	₹ 6,000
iii)	Selling and Distribution overheads recovered from Sales	₹ 4,000
iv)	Indirect wages incurred for Manufacturing department	₹ 8,000
v)	Material returned from production to stores	₹ 9,000

(MTP Dec 2021, Nov. 2019)

Ans.

Journal entries are as follows:

			Dr. **(₹)**	**Cr.** **(₹)**
i)	Stores Ledger Control A/c……………………	Dr.	27,000	
	To Cost Ledger Control A/c			27,000
ii)	Work-in-Process Control A/c…………………….	Dr.	6,000	
	To Manufacturing Overhead Control A/c			6,000
iii)	Cost of Sales A/c……………………………..	Dr.	4,000	
	To Selling & Dist. Overhead Control A/c			4,000
iv)	1) Wage Control A/c……………………	Dr.	8,000	
	To Cost Ledger Control A/c			8,000
	2) Manufacturing Overhead Control A/c………	Dr.	8,000	
	To Wages Control A/c			8,000
	OR			
	Manufacturing Overhead Control A/c……………	Dr.	8,000	
	To Cost Ledger Control A/c			8,000
v)	Stores Ledger Control A/c ……………………..	Dr.	9,000	
	To Work-in-Process Control A/c			9,000

*Cost Ledger Control A/c is also known as General Ledger Control A/c

10. Acme Manufacturing Co. Ltd. Opens the costing records, with the balances as on 1st July, 202X as follows: -

Particulars	**(₹)**	**(₹)**
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 202X;

Particulars	**(₹)**
Materials Purchased	4,80,100
Materials issued to jobs	4,77,400
Materials to Works Maintenance	41,200
Materials to Administrative Office	3,400
Materials to Sales Department	7,200
Wages Direct	1,49,300
Wages Indirect	65,000
Transportation for Indirect Materials	8,400
Production Overheads incurred	2,42,250
Absorbed Production Overheads	3,59,100
Administrative Overheads incurred	74,000
Administrative Overheads Allocated to Production	52,900
Administrative Overheads Allocated to Sales Department	14,800
Selling & Distribution Overheads incurred	64,200
Selling & Distribution 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, 202X.

(ICAI SM, Nov. 2018)

Ans.

Cost Ledgers

Material Control A/c*

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,24,000	By Work-in-Process Control A/c	4,77,400
To Cost Ledger Control A/c (purchase)	4,80,100	By Production OH Control A/c	41,200
		By Admin. OH. Control A/c	3,400
		By S&D OH Control A/c	7,200
		By Balance c/d	74,900
	6,04,100		**6,04,100**

*Material Control A/c May also by written as Stores Ledger Control A/c.

Wages Control A/c

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c (Bal. Fig)	2,14,300	By Work-in-process Control A/c	1,49,300
		By Production OH Control A/c	65,000
	2,14,300		**2,14,300**

Production Overhead Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	8,400	By Work-in-process Control A/c	3,59,100
To Cost Ledger Control A/c			
– Transportation	8,400		
– Production OH	2,42,250		
To Wages Control A/c	65,000		
To Material Control A/c	41,200	By Balance c/d	6,150
	3,65,250		**3,65,250**

Administrative Overheads Control A/c

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	74,000	By Balance b/d	12,000
To Material Control A/c	3,400	By Finished Goods Control A/c	52,900
To Balance c/d	2,300	By Cost of Sales A/c	14,800
	79,700		**79,700**

Work-in-Process Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	62,500	By Finished goods Control A/c	9,58,400
To Material Control A/c	4,77,400		
To Wages Control A/c	1,49,300		
To Production OH Control A/c	3,59,100	By Balance c/d	89,900
	10,48,300		**10,48,300**

Finished Goods Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,24,000	By Cost of Sales A/c	9,77,300
To Administrative Overhead Control A/c	52,900		

To Work-in-process Control A/c	9,58,400	By Balance c/d	1,58,000
	11,35,300		**11,35,300**

Selling and Distribution Overhead Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	6,250	By Cost of Sales A/c	82,000
To Cost Ledger Control A/c	64,200		
To Material Control A/c	7,200		
To Balance c/d	4,350		
	82,000		**82,000**

Cost of Sales A/c

Particulars	(₹)	Particulars	(₹)
To Finished Goods Control A/c	9,77,300	By Costing P&L A/c (Bal. Fig)	10,74,100
To Admin. OH. Control A/c	14,800		
To S&D OH Control A/c	82,000		
	10,74,100		**10,74,100**

Cost Ledger Control A/c

Particulars	(₹)	Particulars	(₹)
To Costing P&L A/c (Sales)	14,43,000	By Balance b/d	3,13,150
		By Material Control A/c	4,80,100
		By Wages Control A/c (₹ 1,49,300 + ₹ 65,000)	2,14,300
		By Production OH Control A/c (₹ 8,400 + ₹ 2,42,250)	2,50,650
		By Administrative OH A/c	74,000
		By S&D OH Control A/c	64,200
To Balance c/d	3,22,300	By Costing P&L A/c	3,68,900
	17,65,300		**17,65,300**

Costing Profit & Loss A/c

Particulars	(₹)	Particulars	(₹)
To Cost of Sales A/c	10,74,100	By Cost Ledger Control A/c (Sales)	14,43,000
To Cost Ledger Control A/c (profit) (balancing figure)	3,68,900		
	14,43,000		**14,43,000**

Trial Balance a at 30th September, 202X

Particulars	Dr. (₹)	Cr. (₹)
– Material Control A/c	74,900	
– Production OH Control A/c	6,150	
– Administrative OH Control A/c		2,300
– Selling & Distribution OH Control A/c		4,350
– Work-in-process Control A/c	89,900	
– Finished Goods Control A/c	1,58,000	
– Cost Ledger Control A/c		3,22,300
Total	**3,28,950**	**3,28,950**

11. **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;
iv)	Administration (under) ₹ 10,000.		

(Nov. 2000, Modified MTP May 2020)

Ans. **In Cost Books Maintained on Non-Integrated System Journal Entries;**

Particulars		L.F.	Dr. (₹)	Cr. (₹)
1) Work-in-progress Control A/c Works O/H Control A/c To Stores ledger control A/c [Being issue of materials]	Dr. Dr		5,50,000 1,50,000	 7,00,000
2) Work-in-progress Control A/c Work O/H Control A/c To Wages Control A/c [Being allocation of wages]	Dr. Dr.		2,00,000 40,000	 2,40,000
3) Factory O/H Control A/c To O/H adjustment A/c [Being Factory O/H over-absorbed]	Dr. Dr.		20,000	 20,000
4) Overhead Adjustment A/c To Admn O/H Control A/c [Being Administration O/H under absorbed]	Dr.		10,000	 10,000
5) Overhead Adjustment A/c To Costing Profit & Loss A/c [Being balance of O/H Adjustment transferred to costing Profit & Loss A/c]	Dr.		10,000	 10,000

12. A Company operates separate cost accounting and financial accounting systems. The following is the list of Opening balances as on 1.04.202X in the Cost Ledger.

Particulars	Dr. (₹)	Cr. (₹)
Stores Ledger Control Account	53,375	----
WIP Control Account	1,04,595	----
Finished Goods Control Account	780	----
General Ledger Adjustment Account	----	1,88,750

Transactions for the quarter ended 30.06.202X are as under;

Particulars	(₹)
Materials purchased	26,700
Material issued to production	40,000
Materials issued for factory 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 Factory Cost. At the end of the quarter, WIP stocks increased by ₹ 7,500.

Prepare the relevant Control Accounts, Costing Profit and Loss Account and General Ledger Adjustment Account to record the above transactions for the quarter ended 30.06.202X.

(Nov. 2001, Nov 2019)

Ans. **1)** **General Ledger Adjustment A/c**

Particulars	(₹)	Particulars	(₹)
To Costing Profit & Loss A/c	2,56,000	By Balance b/d	1,88,750
To Balance c/d	1,80,150	By Stores ledger Control A/c	26,700
		By Wages Control A/c	77,500

		By Factory O/H Control A/c By Costing Profit Loss, A/c	95,200 48,000
	4,36,150		**4,36,150**

2) **Stores Ledger Control A/c**

Particulars	(₹)	Particulars	(₹)
To Balance b/d To General ledger Adjustment A/c	53,375 26,700	By WIP Control A/c By Factory O/H Control A/c By Bal. c/d (Balancing Figure)	40,000 900 39,175
	80,075		**80,075**

1) **Work-in-progress Control A/c**

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 (1,04,595 + 7,500)	1,12,095
To Wages Control A/c	54,500		
To Factory O/H Control A/c	1,15,900		
	3,14,995		**3,14,995**

2) **Finished Goods Control A/c**

Particulars	(₹)	Particulars	(₹)
To Balance b/d	30,780	By Cost of Sales (2,56,000 × $\frac{100}{125}$	2,04,800
To WIP Control A/c	2,02,900	By Balance c/d (Balancing figure.)	28,880
	2,33,680		**2,33,680**

3) **Factory Overhead Control A/c**

Particulars	(₹)	Particulars	(₹)
To Store Ledger Control A/c	900	By Costing P/L A/c	3,200
To Wages Control A/c	23,000	By Work-in-progress (Control A/c (Balancing figure.)	1,15,900
To General ledger (Adjustment A/c)	95,200		
	1,19,100		**1,19,100**

4) **Wages Control A/c**

Particulars	(₹)	Particulars	(₹)
To General Ledger Adjustment A/c	77,500	By WIP Control A/c (Balancing Figure)	54,500
		By Factory O/H Control A/c	23,000
	77,500		**77,500**

5) **Cost of Sales A/c**

Particulars	(₹)	Particulars	(₹)
To Finished Goods Control A/c	2,04,800	By Costing Profit & Loss A/c	2,04,800
	2,04,800		**2,04,800**

6) **Costing Profit & Loss A/c**

Particulars	(₹)	Particulars	(₹)
To Cost of Sales A/c	2,04,800	By General ledger Adjustment A/c	2,56,000
To Factory O/H Control A/c	3,200		
To General Ledger Adjustment A/c	48,000		
	2,56,000		**2,56,000**

Trial Balance
As on 30-06-202X

Particulars	Dr. (₹)	Cr. (₹)
✓ Stores ledger Control A/c	39,175	
✓ Work-in-progress control A/c	1,12,095	
✓ Finished goods control A/c	28,880	
✓ General Ledger Adjustment A/c		1,80,150
	1,80,150	**1,80,150**

13. **The Financial books of a company reveal the following data for the year ended 31st March, 20X1;**

Particulars	(₹)
Opening Stock;	
Finished goods 625 units	53,125
Work-in-process	46,000
01.04.20X0 to 31.03.20X1	
Raw materials consumed	8,40,000
Direct Labour	6,10,000
Factory Overheads	4,22,000
Administration Overheads (Production related)	1,98,000
Dividend paid	1,22,000
Bad Debts	18,000
Selling and Distribution Overheads	72,000
Interest received	38,000
Rent received	46,000
Sales 12,615 units	22,80,000
Closing Stock;	
Finished goods 415 units	45,650
Work-in-process	41,200

The Cost records provide as under;

- ✓ Factory overheads are absorbed at 70% of direct wages.
- ✓ Administration overheads are recovered at 15% of factory cost.
- ✓ Selling and distribution overheads are charged at ₹ 3 per unit sold.
- ✓ Opening Stock of finished goods is valued at ₹ 120 per unit.
- ✓ The company values work-in-process at factory cost for both Financial and Cost Profit Reporting.

Required: -

a) Prepare a statement for the year ended 31st March, 20X1. Show
  i) The Profit as per financial records.
  ii) The profit as per costing records.

b) Prepare a statement reconciling the profit as per costing records with the profit as per Financial Records.

(RTP May 2021, RTP Nov 2022 Modified)

Ans. **a)**

i) Statement of Profit as per financial records

(For the year ended 31st March, 20X1)

Particulars	(₹)	Particulars	(₹)
To Opening Stock of Finished Goods	53,125	By Sales	22,80,000
To Work-in-process	46,000	By Closing stock of finished Goods	45,650
To Raw materials consumed	8,40,000	By Work-in-Process	41,200
To Direct labour	6,10,000	By Rent received	46,000
To Factory overheads	4,22,000	By Interest received	38,000
To Administration overheads	1,98,000		
To Selling & distribution overheads	72,000		
To Dividend paid	1,22,000		
To Bad debts	18,000		
To Profit	69,725		
	24,50,850		**24,50,850**

ii) Statement of Profit as per Costing records

(For the year ended 31st March, 20X1)

Particulars	(₹)
✓ Sales revenue (A) (12,615 units)	22,80,000
✓ **Cost of Sales;**	
✓ Opening Stock (625 units × ₹ 120)	75,000
✓ ***Add:*** Cost of production of 12,405 units (Refer to working note 2)	21,63,350
✓ ***Less:*** Closing stock (₹ 174.39 × 415 units)	(72,372)
✓ Cost of goods sold (12,615 units)	21,65,978
✓ Selling & distribution overheads (12,615 units × ₹ 3)	37,845
✓ Cost of sales: (B)	22,03,823
✓ Profit: {(A)–(B)}	76,177

b)

Statement of Reconciliation

(Reconciling the profit as per costing records with the profit as per financial records)

Particulars	(₹)	(₹)
Profit as per Cost Accounts		76,177
Add: Administration overheads over absorbed (₹ 2,81,550–₹ 1,98,000)	83,550	
Opening stock overvalued (₹ 75,000–₹ 53,125)	21,875	
Interest received	38,000	
Rent received	46,000	
Factory overheads over recovered (₹ 4,27,000– ₹ 4,22,000)	5,000	1,94,425
		2,70,602
Less: Selling & distribution overheads under recovery (₹ 72,000– ₹ 37,845)	34,155	
Closing stock overvalued (₹ 72,372–₹ 45,650)	26,722	
Dividend	1,22,000	
Bad debts	18,000	(2,00,877)
Profit as per financial accounts		69,725

Working Notes: -

1) **Number of units produced;**

Particulars	Units
Sales	12,615
Add: Closing Stock	415
Total	13,030
Less: Opening stock	(625)
Number of units produced	12,405

2) **Cost Sheet;**

Particulars	(₹)
Raw materials consumed	8,40,000
Direct labour	6,10,000
Prime cost	14,50,000
Factory overheads (70% of direct wages)	4,27,000
Factory cost	18,77,000
Add: Opening work-in-process	46,000
Less: Closing work-in-process	41,200
Factory cost of goods produced	18,81,800
Administration overheads (15% of factory cost)	2,81,550
Cost of production of 12,405 units (Refer to working note 1)	21,63,350
Cost of production per unit; $= \frac{\text{Total Cost of Production}}{\text{No.of units produced}} = \frac{₹\ 21,63,350}{12,405\ \text{units}} = ₹\ 174.39$	

14. R Ltd. showed a Net Profit of ₹3,60,740 as per their cost accounts for the year ended 31st March, 20X1.

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 account	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.

(Dec 2021)

Ans.

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

15. The following incomplete accounts are furnished to you for the month ended 31st October, 20X1.

Stores Ledger Control Account		
1.10.20X1	To Balance	₹ 54,000
Work in Process Control Account		
1.10.20X1	To Balance	₹ 6,000
Finished Goods Control Account		
1.10.20X1	To Balance	₹ 75,000
Factory Overheads Control Account		
Total debits for October, 20X1 ₹ 45,000		
Factory Overheads Applied Account		
Cost of Goods Sold Account		
Creditors for Purchases Account		
1.10.20X1	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 202X 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 31.10.202X is ₹ 15,000 and the payments made to Creditors in October, 202X amount to ₹ 1,05,000.
- **iii)** The Finished Goods Inventory as on 31st October, 202X is ₹ 66,000.
- **iv)** The Cost of goods sold during the month was ₹ 1,95,000.
- **v)** On 31st October, 202X 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, 202X. All Factory workers earn same rate of pay.
- **vii)** All actual factory overheads incurred in October, 202X have been posted.

You are required to Find: -

- **a)** Materials purchased during October, 202X.
- **b)** Cost of goods Completed in October, 202X.
- **c)** Overheads applied to production in October, 202X.
- **d)** Balance of Work-in-Process Control A/c on 31st October, 202X.
- **e)** Direct Materials Consumed during October, 202X.
- **f)** Balance of Stores Ledger Control Account on 31st October, 202X.
- **g)** Over absorbed or under absorbed overheads for October, 202X.

(ICAI SM)

Ans. **Working Notes: -**

1) Overhead recovery rate per direct labour hour;

- ✓ Budgeted factory Overheads: ₹ 6,75,000
- ✓ Budgeted direct labour hours: 4,50,000
- ✓ Overhead recovery rate: $= \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Direct labour hours}}$
- ✓ $= \frac{₹\ 6{,}75{,}000}{4{,}50{,}000\ \text{hours}}$
- ✓ $= ₹\ \mathbf{1.50}$ **per direct labour**

2) Direct Wage rate per hour;

- ✓ Direct labour Cost of WIP: ₹ 3,000 (on 31st October 202X)
- ✓ Direct labour hours of WIP: 1,200 hours
- ✓ Direct wage rate per hour $= \frac{\text{Direct labour cost on WIP}}{\text{Direct labour hours on WIP}}$
- ✓ $= \frac{₹\ 3{,}000}{1{,}200\ \text{hours}} = ₹\ \mathbf{2.50}$

3) Total direct wages charged to production;

- ✓ Total direct labour hours spent on production × Direct wage rate per hour
- ✓ = 28,200 hours × ₹ 2.50 = ₹ **70,500**

a) Material Purchased during October, 202X;

Particulars	(₹)
Payments made to creditors	1,05,000
Add: Closing balance in the account of creditors for purchase	15,000
Less: Opening balance	(30,000)
Material Purchased	**90,000**

b) Cost of Finished Goods in October, 202X;

Particulars	(₹)
Cost of goods sold during the month	1,95,000
Add: Closing finished goods inventory	66,000
Less: Opening finished goods inventory	(75,000)
Cost of goods completed during the month	**1,86,000**

c) Overhead applied to production in October, 202X;

– = 28,200 hours × ₹ 1.50 = ₹ **42,300**

d) Balance of Work-in-Process on 31st October, 202X;

Particulars	(₹)
Direct Material Cost	6,000
Direct labour Cost	3,000
Overheads (₹ 1.50 × 1,200 hours)	1,800
	10,800

e) Direct Material Consumed during October, 202X;

= ₹ 78,000 (Refer to following Accounts);

Work in Process Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	6,000	By Finished goods Control A/c [Refer (b) above]	1,86,000
To Wages Control A/c [Refer Working Note (iii)]	70,500	By Balance c/d [Refer (d) above]	10,800
To Factory OH Control A/c [Refer (c) above]	42,300		
To Material Consumed (Balancing figure.)	78,000		
	1,96,800		**1,96,800**

f) Balance of Stores Control Account on 31st October, 202X

= ₹ 66,000 (Refer to following Account)

Stores Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	54,000	By Work-in-Process Control A/c [Refer (e) above]	78,000
To Payables (Creditors) A/c [Refer (a) above]	90,000	By Balance c/d (Balancing figure.)	66,000
	1,44,000		**1,44,000**

g) Over-absorbed or under-absorbed Overheads for October, 202X;

(Balance in Factory Overhead Account below showing that ₹ 2,700 is under-absorbed.)

Factory Overhead Account

Particulars	(₹)	Particulars	(₹)
To Bank A/c	45,000	By Work-in-process Control A/c (Factory OH applied)	42,300
		By Costing P/L A/c (Under-absorbed, Balancing Figure)	2,700
	45,000		**45,000**

16. 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 for the period of January, 202X;

Incomplete Ledger Entries;

Materials Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	32,000		

Work-in-Process Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	9,200	By Finished Goods Control A/c	1,51,000

Payables (Creditors) A/c

Particulars	(₹)	Particulars	(₹)
		By Balance b/d	16,400
To Balance c/d	19,200		

Manufacturing Overheads Control A/c

Particulars	(₹)	Particulars	(₹)
To Bank A/c (Amount Spent)	29,600		

Finished Goods Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	24,000		
		By Balance c/d	30,000

Additional Information: -

i) The bank-book showed that ₹ 89,200 have been paid to creditors for raw-material.

ii) Ending Inventory of Work-in-Process included materials of ₹ 5,000 on which 300 direct labour hours have been booked against wages and overheads.

iii) The Job card showed that workers have worked for 7,000 hours, The wage rate is ₹ 10 per labour hour.

iv) Overhead recovery rate was ₹ 4 per direct labour hour.

You are required to Complete the above accounts in the cost ledger of the company. **(ICAI SM)**

Ans.

Materials Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d Cost Ledger Control A/c	32,000	By Work-in-Process Control A/c	53,000
To Payables (Creditors) A/c (Purchases)	92,000	By Balance c/d	71,000
	1,24,000		**1,24,000**

Manufacturing Overheads A/c

Particulars	(₹)	Particulars	(₹)
To Bank A/c (Amount Spent)	29,600	By Work-in-Process Control A/c (₹4 × 7,000 hours)	28,000
		By Costing P/L A/c (Under-Absorbed OH, Balancing figure)	1,600
	29,600		**29,600**

Work-in-Process Control A/c

Particulars	(₹)	Particulars		(₹)
To Balance b/d	9,200	By Finished Goods Control A/c		1,51,000
To Wages Control A/c (₹ 10 × 7,000 hours)	70,000	By Balance c/d		
To Overheads Control A/c (₹4 × 7,000 hours)	28,000	Material	5,000	
To Materials Control A/c (Balancing figure)	53,000	Wages (₹ 10 × 300 hours)	3,000	
		Overheads (₹ 4 × 300 hours)	1,200	9,200
	1,60,200			**1,60,200**

Finished Goods Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	24,000	By Cost of Sales A/c (Balancing figure)	1,45,000
To Work-in-Process Control A/c (as above)	1,51,000	By Balance c/d	30,000
	1,75,000		**1,75,000**

Payables (Creditors) A/c

Particulars	(₹)	Particulars	(₹)
To Bank A/c	89,200	By Balance b/d	16,400
To Balance c/d	19,200	By Material Control A/c (Purchases) (Balancing figure)	92,000
	1,08,400		**1,08,400**

17. 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	61,500
iv)	Opening Stock	17,500	22,500
v)	Closing Stock	12,500	15,000

Required:

Indicate under–recovery and their effects on cost accounting profit.

[**Note:** You are not required to prepare reconciliation statements.]

(May 2023)

Ans.

Particulars	Financial Accounting ₹	Cost Accounting ₹	Under/over Recovery ₹	Effect on Cost Profit
Factory Overhead	94,750	90,000	4750 (UNDER)	Decrease
Adm. OH.	60,000	57000	3000 (UNDER)	Decrease
Selling OH.	55000	61500	6500 (OVER)	Increase
Opening Stock	17500	22500	5000 (OVER)	Increase
Closing Stock	12500	15000	2500 (OVER)	Increase

18. 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, 202X.

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 dividends received ₹ 15,000.

You are required to: -

a) Find Out Profit as per financial books for the year ended 31st March, 202X.
b) Prepare the Cost Sheet and ascertain the profit as per Cost Accounts for the year ended 31st March, 202X assuming that the indirect expenses are absorbed on the basis of normal production capacity; and
c) Prepare a Statement reconciling profits shown by financial and Cost books. **(ICAI SM)**

Ans. **a)**

Profit & Loss Account
(For the year ended 31st March, 202X)

Particulars	(₹)	Particulars	(₹)
To Direct Material	5,00,000	By Sales (50,000 units)	10,00,000
To Direct Wages	2,50,000	By Interest and dividends	15,000
To Factory expenses	1,50,000		
To Administrative expenses	45,000		
To Selling & Distribution Expenses	30,000		
To Net Profit	**40,000**		
	10,15,000		**10,15,000**

b)

Cost Sheet
(For the year ended 31st March, 202X)

Particulars		(₹)
✓Direct Material		5,00,000
✓Direct Wages		2,50,000
Prime Cost;		**7,50,000**
✓Factory expenses;		
– Variable (40% of ₹ 1,50,000)	60,000	
– Fixed (₹ 90,000 × 50,000/60,000)	75,000	1,35,000
Works Cost;		**8,85,000**
✓Administrative expenses; (₹ 45,000 × 50,000/60,000)		37,500
Cost of Production;		**9,22,500**
✓Selling & Distribution expenses;		
✓Variable (60% of ₹ 30,000)	18,000	
✓Fixed* (₹ 12,000 × 50,000/60,000)	10,000	28,000
Cost of Sales;		**9,50,500**
✓Profit (Balancing figure)		49,500
Sales revenue;		**10,00,000**

*It is assumed that the company sells what it generally produces i.e., normal production.

c)

Statement of Reconciliation
(Reconciling Profit Shown by Financial and Cost Accounts.)

Particulars	(₹)	(₹)
Profit as Per Cost Account;		**49,500**
✓ ***Add:*** Income from Interest and dividends		15,000
		64,500
✓ ***Less:*** Factory expenses under-charged in Cost Accounts (₹ 1,50,000–₹ 1,35,000)	15,000	
✓ Administrative expenses under-charged in Cost Accounts (₹ 45,000–₹ 37,500)	7,500	
✓ Selling & Distribution expenses under- charged in Cost Accounts (₹ 30,000–₹ 28,000)	2,000	(24,500)
Profit as per Financial Accounts		**40,000**

19. The following figures are available from the financial records of ABC Manufacturing Co. Ltd. for the year ended 31-03-20X1.

Particulars	(₹)
Sales (20,000 units)	25,00,000
Materials	10,00,000
Wages	5,00,000
Factory Overheads	4,50,000
Administrative Overhead (Production related)	2,60,000
Selling and Distribution Overheads	1,80,000
Finished goods (1,230 Units)	1,50,000

Particulars		(₹)
Work-in-Process;		
Materials	30,000	
Labour	20,000	
Factory Overheads	20,000	70,000
Goodwill Written Off		2,00,000
Interest on loan taken		20,000

In the Costing records, Factory Overhead is charged at 100% of wages, administrative Overheads 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.

(ICAI SM)

Ans.

Profit & Loss Account of ABC Manufacturing Co. Ltd.
(For the year ended 31-3-20X1)

Particulars	(₹)	Particulars	(₹)
To Opening Stock	----	By Sales (20,000 units)	25,00,000
To Materials	10,00,000	By Closing Stock:	
To Wages	5,00,000	✓Finished Goods (1,230 units)	1,50,000
To Factory Overheads	4,50,000	✓Work-in-Process	70,000
To Admn. Overheads	2,60,000		
To S&D Overheads	1,80,000		
To Goodwill written off	2,00,000		
To Interest on loan	20,000		
To Net Profit	**1,10,000**		
	27,20,000		**27,20,000**

Cost Sheet

Particulars	(₹)
– Materials	10,00,000
– Wages	5,00,000
– Direct Expenses	Nil
Prime Cost	**15,00,000**
– **Add:** Factory Overhead @ 100% of Wages	5,00,000
– Gross Factory Cost	20,00,000
– **Less:** Closing WIP	(70,000)
– **Factory Cost** of (20,000 + 1,230) units	**19,30,000**
– **Add:** Admn. Overhead @ 10% of Factory Cost	1,93,000
	21,23,000
– **Less:** Closing Stock of finished goods (1,230 units)	(1,23,000)*
– **Cost of Goods Sold** (20,000 units)	**20,00,000**
– **Add:** Selling & Dist. Overhead @ ₹ 10 per unit	2,00,000
– **Cost of Sales** (20,000 units)	**22,00,000**
– Sales of 20,000 units	25,00,000
Profit	**3,00,000**

***(₹ 21,23,000 × 1,230 Units/ 21,230 Units)**

Reconciliation Statement

Particulars	(₹)	(₹)
Profit as per Cost Accounts		**3,00,000**
Add: Factory Overheads Over-absorbed (₹ 5,00,000–₹ 4,50,000)	50,000	
Selling & Distribution Overhead Over-absorbed (₹ 2,00,000–₹ 1,80,000)	20,000	
Difference in the valuation of Closing Stock of finished goods (₹ 1,50,000–₹ 1,23,000)	27,000	97,000
		3,97,000
Less: Admn. Overhead Under-absorbed (₹ 2,60,000–₹ 1,93,000)	67,000	
Goodwill Written off	2,00,000	
Interest on loan	20,000	2,87,000
Profit as Per Financial Accounts		**1,10,000**

20. The Following figures have been extracted from the Financial Accounts of a Manufacturing firm for the first year of its operation.

Particulars	(₹)
Direct Material Consumption	50,00,000
Direct Wages	30,00,000
Factory Overheads	16,00,000
General Administrative Overheads	7,00,000
Selling and Distribution Overheads	9,60,000
Bad debts	80,000
Preliminary expenses written off	40,000
Legal charges	10,000
Dividends received	1,00,000
Interest received on deposits	20,000
Sales (1,20,000 units)	1,20,00,000
Closing Stock;	
Finished Goods (4,000 Units)	3,20,000
Work-in-Process	2,40,000

The Cost Accounts for the same period reveal that the direct material consumption was ₹ 56,00,000. Factory Overheads 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.

(ICAI SM)

Ans.

Profit and Loss Account

(As Per Financial Records)

Particulars	(₹)	Particulars	(₹)
To Direct Materials	50,00,000	By Sales (1,20,000 Units)	1,20,00,000
To Direct Wages	30,00,000	**By Closing Stock;**	
To Factory Overheads	16,00,000	✓ Work-in-Process	2,40,000
To Gross Profit c/d	29,60,000	✓ Finished Goods (4,000 units)	3,20,000
	1,25,60,000		**1,25,60,000**
To General Administrative Overheads	7,00,000	By Gross Profit b/d	29,60,000
To Selling and Dis. OH	9,60,000	By Dividend received	1,00,000
To Bad debts	80,000	By Interest received	20,000
To Preliminary Expenses written off	40,000		
To Legal Charges	10,000		
To Net Profit	**12,90,000**		
	30,80,000		**30,80,000**

Statement of Cost and Profit

(As per Cost Records)

Particulars	Total (₹)
– Direct Material	56,00,000
– Direct Wages	30,00,000
Prime Cost	**86,00,000**
– Factory Overhead (20% of ₹ 86,00,000)	17,20,000
	1,03,20,000
Less: Closing Stock (WIP)	(2,40,000)
Works Cost or Cost of Production (1,24,000 units)	**1,00,80,000**
Less: Finished Goods (4,000 units @ ₹81.29)	(3,25,160)
Cost of goods sold (1,20,000 units)	**97,54,840**
Administrative Overhead (1,24,000 units @ ₹ 6 p.u.)	7,44,000
Selling and Distribution Overhead (1,20,000 @ ₹ 8 p.u.)	9,60,000
Cost of Sales	**1,14,58,840**
Net Profit (Balancing figure)	5,41,160
Sales Revenue	**1,20,00,000**

Statement of Reconciliation of profit as obtained under Cost and Financial Accounts

Particulars	(₹)	Total (₹)
Profit as Per Cost Records		5,41,160
Add: Excess of Material Consumption	6,00,000	
Factory Overhead	1,20,000	
Administrative Overhead	44,000	
Dividend Received	1,00,000	
Interest Received	20,000	8,84,000
		14,25,160

Less: Bad debts	80,000	
Preliminary expenses written off	40,000	
Legal Charges	10,000	
Over-Valuation of Stock in Cost book (₹3,25,160−₹ 3,20,000)	5,160	(1,35,160)
Profit as Per Financial Records		**12,90,000**

21. **The following information is available from a company's records for March, 202X;**

Particulars	(₹)
Opening Balance of Creditors Account	25,000
Closing Balance of Creditors Account	40,000
Payment made to Creditors	5,80,000
Opening Balance of Stores Ledger Control Account	40,000
Closing Balance of Stores Ledger Control Account	65,000
Wages paid (for 8000 hours) 20% relate to indirect workers	4,00,000
Various indirect expenses incurred	60,000
Opening balance of WIP control account	50,000

Inventory of WIP at the end of the month includes material worth ₹ 35,000 on which 400 labour hours have been booked.
Factory overhead is charged to production at budgeted rate based on direct labour hours.
Budgeted overhead cost is ₹ 20,80,000 for budgeted direct labour hours of 1,04,000.
You are required to prepare Creditors A/c, Stores Ledger Control A/c, WIP Control A/c, Wages Control A/c and Factory Overhead Control A/c. **(May 2016)**

Ans. **Ledgers Accounts;**

Creditors A/c

Particulars	(₹)	Particulars	(₹)
To Bank A/c	5,80,000	By Opening balance	25,000
To Closing balance	40,000	By Stores ledger control A/c (Balancing Figure)	5,95,000
	6,20,000		**6,20,000**

Stores Ledger Control A/c

Particulars	(₹)	Particulars	(₹)
To Opening balance	40,000	By WIP Control A/c (Balancing Figure)	5,70,000
To Creditors A/c	5,95,000	By Closing balance	65,000
	6,35,000		**6,35,000**

Wages Control A/c

Particulars	(₹)	Particulars	(₹)
To Bank	4,00,000	By WIP Control A/c (Balancing Figure)	3,20,000
		By Production OH A/c	80,000
	4,00,000		**4,00,000**

Work-in-Progress Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	50,000	By Finished Goods Control A/c (Balancing figure)	10,05,000
To Stores Ledger Control A/c	5,70,000	By Balance c/d	
To Wages Control A/c (80% of ₹ 4,00,000)	3,20,000	Material 35,000 Labour 20,000 (₹ 50* × 400 hours)	
To Factory Overhead Control A/c	1,28,000	Factory OH 8,000 (₹ 20** × 400 hours)	63,000
	10,68,000		**10,68,000**

*Direct Labour Hour Rate = ₹ 3,20,000/6,400 hours = ₹ 50

** Factory Overhead Rate = ₹ 20,80,000/1,04,000= ₹ 20

Factory Overheads Control A/c

Particulars	(₹)	Particulars	(₹)
To Wages Control A/c	80,000	By Work in Process A/c	1,28,000
To Bank A/c	60,000	By Balance c/d	12,000
	1,40,000		**1,40,000**

22. 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 you;

Particulars	(₹)	(₹)
Balance 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.

(ICAI SM)

Ans.

a) **Stores Ledger Control Account**

Particulars	(₹)	Particulars	(₹)
To Balance b/d	25,000	By Work in Process Control A/c	30,000
To Creditors/Bank A/c	75,000	By Production OH Control A/c	4,000
		By Balance c/d	66,000
	1,00,000		**1,00,000**

b) **Wages Control Account**

Particulars	(₹)	Particulars	(₹)
To Bank A/c (Paid to direct workers)	25,000	By Work in Process Control A/c (Charged to batches)	20,000
To Bank A/c (Paid to Indirect workers)	5,000	By Production OH Control A/c (Bal. Fig)	5,000
		By Production OH Control A/c (Non-productive wages)	5,000
	30,000		**30,000**

c) **Production Overhead Control Account**

Particulars	(₹)	Particulars	(₹)
To Balance b/d (Prepaid amount)	3,000	By Work-in-Process Control A/c (150% of direct wages)	30,000
To Stores Ledger Control A/c	4,000		
To Wages Control A/c (₹ 5,000 + ₹ 5,000)	10,000		
To Bank A/c	12,000		
To Costing P&L A/c* (Over-absorption, balancing figure)	1,000		
	30,000		**30,000**

*Alternatively, the Over Absorbed Overhead may be carried forward.

d) **Work-in-Process Control Account**

Particulars	(₹)	Particulars	(₹)
To Balance b/d	20,000	By Finished Goods Control A/c	65,000
To Store Ledger Control A/c	30,000	By Balance c/d (Physical Value)	40,000
To Wages Control A/c	20,000		
To Production OH Control A/c (150% of direct wages)	30,000		
To Costing P&L A/c (Stock Gains, Bal Fig.)	5,000		
	1,05,000		**1,05,000**

e) **Finished Goods Control Account**

Particulars	(₹)	Particulars	(₹)
To Balance b/d	35,000	By Cost of Goods Sold* A/c	80,000
To Work-in-Process Control A/c	65,000	By Balance c/d	20,000
	1,00,000		**1,00,000**

*Alternatively, Costing Profit & Loss Account

f) **Costing Profit & Loss Account**

Particulars	(₹)	Particulars	(₹)
To Finished Goods Control A/c or Cost of Goods Sold A/c	80,000	By Sales A/c	1,00,000
To Selling & Distribution OH A/c	6,000	By Production OH Control A/c	1,000
To Balance c/d	20,000	By Work-in-Process Control A/c (Stock gain)	5,000
	1,06,000		**1,06,000**

Notes: -

1) Materials transferred between batches will not affect the Control Accounts.

2) Non-Production time of direct workers is a production overhead and therefore will not be charged to work-in-Process Control A/c.

3) Production Overheads absorbed in work-in-Process Control A/c equals to ₹ 30,000 (150% of ₹ 20,000).

4) In the work-in-Process Control A/c the excess physical value of stock is taken resulting in stock gain. Is transferred to Profit & Loss A/c.

23. **BPR Limited keeps books on integrated accounting system. The following balances appear in the books as on April 1, 20X0;**

Particulars	Dr. (₹)	Dr. (₹)
Stores Control A/c	40,950	----
Work-in-progress A/c	38,675	----
Finished Goods A/c	52,325	----
Bank A/c	----	22,750
Creditors A/c	----	18,200
Fixed Assets A/c	1,47,875	----
Debtors 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
	3,17,100	**3,17,100**

The transactions for the year ended March 31, 20X1 were as given below;

Particulars	(₹)	(₹)
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
Materials 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
Payments to Creditors		2,29,775
Payment received from Debtors		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.

(Nov. 2003)

Ans.

1) **Stores Control A/c**

Particulars	(₹)	Particulars	(₹)
To Balance b/d	40,950	By WIP A/c	2,50,250
To Creditors A/c	2,27,500	By Production O/H A/c	4,550
		By Balance c/d	13,650
	2,68,450		**2,68,450**

2) **Wages Control A/c**

Particulars	(₹)	Particulars	(₹)
To Bank	1,97,925	By WIP A/c	1,97,925
To Bank	11,375	By Production O/H A/c	11,375
	2,09,300		**2,09,300**

3) **Work-in-Progress A/c**

Particulars	(₹)	Particulars	(₹)
To Balance b/d	38,675	By Finished Goods	4,89,125
To Wages Control A/c	1,97,925	By Balance c/d	1,06,925
To Stores Control A/c	2,50,250		
To Production O/H A/c	1,09,200		
	5,96,050		**5,96,050**

4) **Production Overheads A/c**

Particulars	(₹)	Particulars	(₹)
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 (Under-absorbed O/Hs written off, Balancing Figure))	14,039
To Bank (91,000−6,250)	84,750		
To Production O/H outstanding	7,775		
To Provision for depreciation	14,789		
	1,23,239		**1,23,239**

5) **Finished Goods A/c**

Particulars	(₹)	Particulars	(₹)
To Balance b/d	52,325	By Cost of Sales A/c	5,00,500
To WIP A/c	4,89,125	By Balance c/d	80,450
To Administration O/H A/c	39,500		
	5,80,950		**5,80,950**

6) **Administration Overhead A/c**

Particulars	(₹)	Particulars	(₹)
To Prepaid Admin. Overheads A/c	9,975	By Finished Goods A/c (Balancing Figure)	39,500
To Bank	27,300		
To Administration O/H (Outstanding)	2,225		
	39,500		**39,500**

7) **Cost of Sales A/c**

Particulars	(₹)	Particulars	(₹)
To Finished goods A/c	5,00,500	By Sales A/c (Balancing Figure)	5,32,350
To Selling O/Hs	31,850		
	5,32,350		**5,32,350**

8) **Sales A/c**

Particulars	(₹)	Particulars	(₹)
To Cost of Sales A/c	5,32,350	By Debtors A/c	6,82,500
To Profit & Loss A/c (Balancing Figure)	1,50,150		
	6,82,500		**6,82,500**

9) **Factory O/Hs/ Production O/Hs Outstanding A/c**

Particulars	(₹)	Particulars	(₹)
To Bank	6,250	By Balance b/d	6,250
To Balance c/d	7,775	By Production	7,775
	14,025		**14,025**

10) **Prepaid Administration O/H A/c**

Particulars	(₹)	Particulars	(₹)
To Balance b/d	9,975	By Administration O/Hs A/c	9,975
	9,975		**9,975**

11) **Provision for Depreciation A/c**

Particulars	(₹)	Particulars	(₹)
To Balance C/d	26,164	By Balance b/d	11,375
		By Production O/Hs A/c	14,789
	26,164		**26,164**

12) **Provision for Doubtful Debts A/c**

Particulars	(₹)	Particulars	(₹)
To Balance c/d	4,590	By Balance b/d	3,725
		By Profit & Loss A/c (Balancing Figure)	865
	4,590		**4,590**

13) **Profit & Loss A/c**

Particulars	(₹)	Particulars	(₹)
To Provision for doubtful debts	865	By Balance b/d	72,800
To Production O/Hs	14,039	By Sales A/c	1,50,150
To Balance c/d	2,08,046		
	2,22,950		**2,22,950**

14) **Debtors A/c**

Particulars	(₹)	Particulars	(₹)
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**

15) **Creditors A/c**

Particulars	(₹)	Particulars	(₹)
To Bank	2,29,775	By Balance b/d	18,200
To Balance c/d	15,925	By Stores Control A/c	2,27,500
	2,45,700		**2,45,700**

16) **Fixed Assets A/c**

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,47,875	By Bank c/d	1,47,875
	1,47,875		**1,47,875**

17) **Bank A/c**

Particulars	(₹)	Particulars	(₹)
To Debtors	6,59,750	By Balance b/d	22,750
		By Direct Wages	1,97,925
		By Indirect Wages	11,375
		By Production O/Hs (84,750 + 6,250)	91,000
		By Administration O/Hs	27,300
		By Selling O/Hs	31,850
		By Creditors	2,29,775
		By Balance c/d	47,775
	6,59,750		**6,59,750**

Trial Balance
As on 31st March, 20X1

Particulars	Dr. (₹)	Cr. (₹)
Stores Control A/c	13,650	
Works-in-Progress A/c	1,06,925	
Finished Goods A/c	80,450	
Bank A/c	47,775	
Creditors A/c		15,925
Fixed Assets A/c	1,47,875	
Debtors A/c	50,050	
Share Capital A/c		1,82,000
Provision for depreciation A/c		26,164
Profit & Loss A/c		2,08,046
Production O/Hs outstanding A/c		7,775
Administration O/Hs outstanding A/c		2,225
Provision for doubtful debts A/c		4,590
	4,46,725	**4,46,725**

24. GK Ltd. showed net loss of ₹ 2,43,300 as per their financial accounts for the year ended 31st March, 202X. 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;

Particulars	(₹)
Works overheads over recovered	30,400
Selling overheads under recovered	20,300

Administrative overheads under	27,700
Depreciation over charged in cost accounts	35,100
Bad debts w/off in financial accounts	15,000
Preliminary Expense w/off in financial accounts	5,000
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. **(May 2018)**

Ans.

Reconciliation Statement

(Reconciliating losses shown by financial and Cost Accounts)

Particulars	(₹)	(₹)
✓Net loss as per cost Accounts		(2,48,300)
✓***Add:*** Interest credited during the year in financial Accounts	7,500	
✓Depreciation over charged in cost accounts	35,100	
✓Works' overheads over recovered	30,400	73,000
✓***Less:*** Selling overheads under recovered	(20,300)	
✓Administrative overheads under recovered	(27,700)	
✓Bad debts W/off in financial Account	(15,000)	
✓Preliminary Expense W/off in financial account	(5,000)	(68,000)
✓**Net loss as per financial accounts**		**(2,43,300)**

25. Journalise the following transactions assuming that cost and financial transactions are integrated:

Particulars	(₹)
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

(ICAI SM)

Ans. **Journal Entries are as follows: -**

Particulars	L.F.	Dr. (₹)	Cr. (₹)
Stores Ledger Control A/c Dr. To Payables (Creditors)/ Bank A/c (Materials purchased)		2,00,000	 2,00,000
Work-in-Process Control A/c Dr. To Stores Ledger Control A/c (Materials issued to production)		1,50,000	 1,50,000
Wages Control A/c Dr. To Bank A/c (Wages paid)		1,20,000	 1,20,000
Factory Overhead Control A/c Dr. To Wages Control A/c (30% of wages paid being indirect charged to overhead)		36,000	 36,000
Work-in-Process Control A/c Dr. To Wages Control A/c		84,000	 84,000

	(Direct wages charged to production)			
	Factory Overhead Control A/c Dr. To Bank A/c (Manufacturing Overhead incurred)		84,000	 84,000
	Work-in-Process Control A/c Dr. To Factory Overhead Control A/c (Manufacturing Overhead charged to production)		92,000	 92,000
	Selling & Distribution Overhead Control A/c Dr. To Bank A/c Selling & Distribution Costs Incurred)		20,000	 20,000
	Finished Goods Control A/c Dr. To Work-in-Process Control A/c (Cost of Finished Goods)		2,00,000	 2,00,000
	Cost of Sales A/c Dr. To Finished Goods Control A/c To Selling and Distribution Control A/c (Costs of Sales)		2,20,000	 2,00,000 20,000
	Receivables (Debtors) / Bank A/c Dr. To Sales A/c (Finished Goods Sold)		2,90,000	 2,90,000
	Bank A/c Dr. To Receivables (Debtors) A/c (Receipts from receivables)		69,000	 69,000
	Payable (Creditors) A/c Dr. To Bank A/c (Payment made to payables)		1,10,000	 1,10,000

Cost Sheet
Assignment

Q. No.	Questions & Solutions
1.	Arnav Inspat Udyog Ltd. has the following expenditures for the year ended 31st March, 20X2;

Particulars	**(₹)**	**(₹)**
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 managers;		
– 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	
– Fore re-distribution of finished goods	1,12,000	2,08,000

xxiv) Interest and Finance charges paid (for usage of non-equity fund)		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, 20X1.		
– 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, 20X2;		
– 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, 20X2, Showing;

a) Prime Cost
b) Factory Cost
c) Cost of Production
d) Cost of goods sold and
e) Cost of Sales.

(ICAI SM, Modified RTP May 2021, RTP Nov.2021 & RTP Nov. 2020, Modified MTP Dec. 2021, MTP July 2021, May 2021, Modified MTP May 2023)

Sol.

Statement of Cost of Arnav Ispat Udyog Ltd. for the year ended 31st March, 20X2;

Particulars	(₹)	(₹)
1) Material Consumed;		
– Raw Materials Purchased	10,00,00,000	
– Freight inwards	11,20,600	
– ***Add:*** Opening Stock of raw Materials	18,00,000	
– ***Less:*** Closing Stock of raw Materials	(9,60,000)	10,19,60,600
2) Direct employee (labour) Cost;		
– Wages paid to factory workers	29,20,000	
– Contribution made towards employees' PF & ESIS	3,60,000	
– Production bonus paid to factory workers	2,90,000	35,70,000
3) Direct expenses;		
– Royalty paid for production	1,72,600	
– Amount paid for power & fuel	4,62,000	
– Amortised cost of moulds and patterns	4,48,000	
– Job charges paid to Job workers	8,12,000	18,94,600
Prime Cost		**10,74,25,200**
4) Works/ Factory Overheads;		
– Store and Spares Consumed	1,12,000	
– Depreciation on factory building	84,000	
– Depreciation on Plant & Machinery	1,26,000	
– Repairs & Maintenance paid for Plant & Machinery	48,000	
– Insurance premium paid for Plant & Machinery	31,200	
– Insurance premium paid for factory building	18,100	
– Insurance premium paid for stock of raw materials & WIP	36,000	
– Salary paid to supervisors	1,26,000	
– Expenses paid for pollution control and engineering & maintenance	26,600	6,07,900
– Gross factory cost		10,80,33,100
– ***Add:*** Opening Value of W-I-P		9,20,000

– *Less:* Closing value of W-I-P		(8,70,000)
Factory Cost		**10,80,83,100**
5) Quality control cost;		
– Expenses paid for quality control check activities	19,600	
– Salary paid to quality control staffs	96,200	1,15,800
6) Research & development cost paid for improvement in production process		18,200
7) Administration cost related with production;		
– Expenses paid for administration of factory work	1,18,600	
– Salary paid to Production Control manager	9,60,000	10,78,600
8) ***Less:*** Realisable value on sale of scrap and waste		(86,000)
9) ***Add:*** Primary packing cost		96,000
– **Cost of Production**		**10,93,05,700**
– ***Add:*** Opening Stock of finished goods		11,00,000
– ***Less:*** Closing Stock of finished goods		(18,00,000)
– **Cost of Goods Sold**		**10,86,05,700**
10) Administrative Overheads;		
– Depreciation on office building	56,000	
– Repairs & Maintenance paid for vehicles used by directors	19,600	
– Salary paid to Manager – Finance & Accounts	9,18,000	
– Salary paid to General Manager	12,56,000	
– Fee paid to auditors	1,80,000	
– Fee paid to legal advisors	1,20,000	
– Fee paid to independent directors	2,20,000	27,69,600
11) Selling Overheads: -		
– Repairs & Maintenance paid for sales office building	18,000	
– Salary paid to Manager- Sales & Marketing	10,12,000	
– Performance bonus paid to sales staffs	1,80,000	12,10,000
12) Distribution Overheads;		
– Depreciation on delivery vehicles	86,000	
13) Packing Cost paid for re-distribution of finished goods	1,12,000	1,98,000
Cost of Sales		**11,27,83,300**

Note: -

1) GST paid on purchase of raw materials would not be part of cost of materials as it is eligible for input tax credit.

2) Interest and finance charges paid would not be the part of costing.

2. The following date relates to manufacturing of a standard product during the month of March, 20X1:

Particulars	Amount (in ₹)
Stock of Raw material as on 01-03-20X1	80,000
Work in Progress as on 01-03-20X1	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 31-03-20X1	30,000
Stock of Work in Progress as on 31-03-20X1	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 8,000 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

(July 2021, Modified MTP Nov. 2022, Modified MTP May 2019, May 2022 Modified, RTP Nov 2022 Modified)

Sol. **Cost Sheet during the Month of March 20X1:**

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: Realizable 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,

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: Realizable 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:		
Expenses for participation in Industrial exhibition	8,000	8,000
Distribution overheads:		
Depreciation on delivery van	6,000	
Warehousing charges	1,500	7,500
Cost of Sales		**5,77,160**

Working Note:

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

3. Following details are provided by M/s. ZIA Private Limited for the quarter ending 30 September, 20X1;

Particulars	**(₹)**
Direct Expenses	1,80,000
Direct Wages being 175% of factory overheads	2,57,250
Cost of goods sold	18,75,000
Selling & distribution overheads	60,000
Sales	22,10,000

Administration overheads are 10% of factory overheads

Stock details as per Stock Register;

Particulars	**30.06.20X1 (₹)**	**30.09.20X1 (₹)**
Raw Materials	2,45,600	2,08,000
Work-in-progress	1,70,800	1,90,000
Finished goods	3,10,000	2,75,000

You are required to prepare a cost sheet showing;

- **a)** Raw Materials Consumed.
- **b)** Prime Cost
- **c)** Factory Cost
- **d)** Cost of goods sold
- **e)** Cost of Sales and Profit

(Nov.2018/ Modified ICAI SM, Modified MTP May 2020)

Sol.

Cost Sheet

(For the quarter ending 30th September, 20X1)

Particulars	**(₹)**
a) 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
b) 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 progress	1,70,800
Less: Closing work in progress	(1,90,000)
c) 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)
d) Cost of Goods Sold;	**18,75,000**
Add: Selling and Distribution overheads	60,000
Cost of Sales	19,35,000
e) 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 materials consumed + Closing Stock – Opening Stock of raw material
- Raw material consumed = Prime cost – Direct wages – Direct expenses
- 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

4. The following data are available from the books and records of Q Ltd. for the month of April 20X1;

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;

Particulars	1st April, 20X1 (₹)	30th April, 20X1 (₹)
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 20X1 showing;

a) Prime Cost
b) Works Cost
c) Cost of Production
d) Cost of Goods sold
e) Cost of Sales and Profit earned.

(ICAI SM, January 2021, Modified MTP Nov. 2022)

Sol.

Cost Sheet for the Month of April 20X1

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
a) 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)
b) Work Cost	**3,70,000**
c) Cost of Production	**3,70,000**
Add: Opening stock of finished goods	50,000
Less: Closing Stock of finished goods	(60,000)
d) Cost of goods sold	**3,60,000**
Add: General and administration expenses*	18,000
Add: Selling expense	22,000
e) 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 Notes: -

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 $\left(\frac{₹\ 120{,}000}{120} \times 100\right)$	(1,00,000)
Prime cost	2,80,000
Less: Direct labour	(1,20,000)
Raw material consumed	1,60,000

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**

5. From the following particulars, you are required to prepare monthly cost sheet of Aditya Industries: -

Particulars	(₹)
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 Material 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

(ICAI SM/2018 MAY/RTP)

Sol.

Cost Sheet of Aditya Industries for month of……..

Units Produced – 1,94,000

Units sold – 1,60,000

Particulars	Amount (₹)	Cost per unit (₹)
Raw Materials purchased	1,44,00,000	
Add: Opening value of raw materials	12,00,000	
Less: Closing value of raw materials	(14,00,000)	
Materials Consumed	1,42,00,000	73.19
Wages paid to production workers	36,64,000	18.89
Expenses paid for utilities	1,45,600	0.75
Prime Cost	**1,80,09,600**	**92.83**
Factory overheads (₹ 8 × 21,600 hours)	1,72,800	
Add: Opening value of W-I-P	18,00,000	
Less: Closing value W-I-P	(16,04,000)	
Cost of Production	**1,83,78,400**	**94.73**
Add: Value of Opening Finished Stock	9,60,000	
Less: Value of Closing Finished Stock (₹ 94.73 × 44,000)	(41,68,120)	
Cost of Goods Sold	**1,51,70,280**	**94.81**
Office and administration expenses paid	26,52,000	16.58
Travelling allowance paid to office staffs	1,21,000	0.75
Selling expenses	6,46,000	4.04
Cost of Sales	1,85,89,280	116.18
Add: Profit	32,80,461	20.50
	2,18,69,741	**136.68**

6. 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 ₹500 per unit provided it incurs the following further expenditure.

It gives gift items costing ₹30 per unit of sale;

- **a)** It has lucky draws every month giving the first prize of ₹50,000; 2nd prize of ₹25,000, 3rd prize of ₹10,000 and three consolation prizes of ₹5,000 each to customers buying the product.
- **b)** It spends ₹1,00,000 on refreshments served every month to its customers;
- **c)** It sponsors a television programme every week at a cost of ₹20,00,000 per month.
- **d)** 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.

(ICAI SM, Modified MTP Nov 2020, Modified MTP May 2022)

Sol.

a) Cost Sheet (For the Month);

Level of Capacity	30% 30,000 Units		100% 1,00,000 Units	
	Per Unit (₹)	Total (₹)	Per unit (₹)	Total (₹)
Works Cost	**380.00**	**1,14,00,000**	**310.00**	**3,10,00,000**
Add: Fixed administration expenses	5.00	1,50,000	1.50	1,50,000
Add: Fixed Marketing expenses	8.33	2,50,000	2.50	2,50,000
Add: Variable distribution Cost	30.00	9,00,000	30.00	30,00,000
Add: Special Costs;				
Gift items costs	----	----	30.00	30,00,000
Customers' prizes*	----	----	1.00	1,00,000
Refreshments	----	----	1.00	1,00,000
Television programme sponsorship cost	----	----	20.00	20,00,000
Cost of Sales	**423.33**	**1,27,00,000**	**396.00**	**3,96,00,000**
Profit (Balancing figure)	126.67	38,00,000	104.00	1,04,00,000
Sales revenue	**550.00**	**1,65,00,000**	**500.00**	**5,00,00,000**

***Customers' Prize Cost: -**

Particulars	**(₹)**
1st Prize	50,000
2nd Prize	25,000
3rd Prize	10,000
Consolation Prizes (3 × ₹ 5,000)	15,000
Total	**1,00,000**

7. **From the following data of Arnav Metallic Ltd. Calculate Cost of Production;**

Particulars	**(₹)**
Repair & maintenance paid for plant & machinery	9,80,500
Insurance premium paid for inventories	26,000
Insurance premium paid for plant & machinery	96,000
Raw materials purchased	64,00,000
Opening stock of raw materials	2,88,000
Closing stock of raw materials	4,46,000
Wages paid	23,20,000
Value of opening work-in-process	4,06,000
Value of closing work-in-process	6,02,100
Quality control cost for the products in manufacturing process	86,000
Research and development cost for improvement in production process	92,600
Administrative cost for;	
Factory and production	9,00,000
Other	11,60,000
Amount realised by selling scrap generated during the manufacturing process.	9,200
Packing cost necessary to preserve the goods for further processing	10,200
Salary paid to Director (technical)	8,90,000

(RTP May 2020, Modified MTP Nov. 2019, Modified RTP May 2023)

Sol. **Calculation of Cost of Production of Arnav Metallic for the period;**

Particulars	**(₹)**
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 inventories	26,000
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
	1,07,43,100
Add: Opening value of W-I-P	4,06,000
Less: Closing value of W-I-P	(6,02,100)
	1,05,47,000
Less: Amount realised by selling scrap	(9,200)
Add: Primary packing cost	10,200
Cost of Production	1,05,48,000

Notes: -

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

8. X Ltd. manufactures two types of pens 'Super Pen' and 'Normal Pen'. The Cost data for the year ended 30th September, 20X1 is as follows;

Particulars	(₹)
Direct Materials	8,00,000
Direct Wages	4,48,000
Production Overhead	1,92,000
Total	**14,40,000**

It is further ascertained that;

i) Direct materials cost in Super Pen was twice as much of direct material in Normal Pen.
ii) Direct Wages for Normal Pen were 60% of those for Super Pen.
iii) Production Overhead per unit was at same rate for both the types.
iv) Administration overhead was 200% of direct labour for each.
v) Selling Cost was ₹1 per Super pen.
vi) Production and sales during the year were as follow;

Product on		Sales	
Particulars	**No. of units**	**Particulars**	**No. of units**
Super Pen Normal Pen	40,000 1,20,000	Super Pen	36,000

vii) Selling price was ₹30 per unit for Super Pen.

Prepare a Cost Sheet for 'Super Pen' showing;

a) Cost per unit and Total Cost.
b) Profit per unit and Total Profit.

(Nov. 2020, Modified MTP Dec 2021, Modified Nov. 2022)

Sol. **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) × 21.20	----	**(84,800)**
Cost of goods sold i.e., 36,000 units	21.20	7,63,200
Selling Cost	1.00	**36,000**
a) Cost of Sales/Total Cost	**22.20**	**7,99,200**
b) Profit	**7.80**	**2,80,800**
Sales Value (₹ 30 × 36,000 units)	30.00	**10,80,000**

Working Notes: -

1) Direct material cost per unit of Normal pen = M
Direct material cost per unit of Super pen = 2 M
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

2) Direct wages per unit for Super pen = W
Direct wages per unit for Normal Pen = 0.6W
So, (W × 40,000) + (0.6W × 1,20,000) = ₹4,48,000
W = ₹4 per unit

3) Production overhead per unit = $\frac{₹\ 1,92,000}{(40,000+1,20,000)}$ = ₹ 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.

9. XYZ a manufacturing firm, has revealed following information for September, 20X1;

Particulars	**1st September (₹)**	**30th September (₹)**
Raw Materials	2,42,000	2,92,000
Work-in-progress	2,00,000	5,00,000

The firm incurred following expenses for a targeted production of 1,00,000 units during the month:

Particulars	**(₹)**
Consumable Stores and Spares of factory	3,50,000
Research and development cost for process improvements	2,50,000
Quality control cost	2,00,000
Packing cost (Secondary) per unit of goods sold	2
Lease rent of production asset	2,00,000
Administrative Expenses (General)	2,24,000
Selling and distribution Expenses	4,13,000

Finished goods (opening)	Nil
Finished goods (Closing)	5,000 units

Defective output which is 4% of targeted production. Realizes ₹61 per unit. Closing stock is valued at cost of production (excluding administrative expenses)
Cost of goods sold, excluding administrative expenses amounts to ₹78,26,000.

Direct employee cost is ½ of the cost of material consumed.
Selling price of the output is ₹110 per unit.

You are required to;

a) Calculate the Value of material purchased.
b) Prepare cost sheet showing the profit earned by the firm.

(Nov. 2019)

Sol. **a) Computation of Value of Material Purchased;**

Particulars	(₹)
Cost of Goods Sold (100000 −5000−4000) = (91000 units × ₹ 86 per unit)	78,26,000
Add: Closing Stock of finished goods (₹ 86 × 5000 units)	4,30,000
Less: Opening Stock of finished goods Cost of production	----
	82,56,000
Less: Research & development Cost for process improvements	(2,50,000)
Less: Qualify Control Cost	(2,00,000)
Add: Credit for defective output sale	2,44,000
Works/Factory Cost	80,50,000
Add: Closing Work-in-progress	5,00,000
Less: Opening Work-in-progress	(2,00,000)
Gross Works Cost	83,50,000
Less: Consumable stores and spares of factory	(3,50,000)
Less: Lease Rent of Production Asset	(2,00,000)
Prime Cost	78,00,000
Less: Direct Labour Cost (1/2 of Material Consumed)	(26,00,000)
Direct Material Consumed	52,00,000
Add: Closing Stock of Material	2,92,000
Less: Opening Stock of Material	(2,42,000)
Value of Material Purchased	52,50,000

2) Cost Sheet;

Particulars	(₹)
Raw materials consumed as (i) above)	52,00,000
Direct Labour Cost	26,00,000
Prime Cost;	78,00,000
✓ *Add:* Lease Rent Production Assets	2,00,000
✓ *Add:* Consumable stores and spares of factory	3,50,000
✓ **Gross Works Cost;**	83,50,000
✓ *Add:* Opening Works-in-Progress	2,00,000
✓ *Less:* Closing Work-in-progress	(5,00,000)
Works/Factory Cost;	80,50,000
✓ *Add:* Quality Control Cost	2,00,000
✓ *Add:* Research & development cost for process improvements	2,50,000
✓ *Less:* Credit for sale of defective output (1,00,000 × 4%) × ₹ 61	(2,44,000)
Cost of Production;	82,56,000
✓ *Add:* Opening Stock of finished goods	----
✓ *Less:* Closing Stock of finished goods	(4,30,000)

Cost of Goods Sold;	78,26,000
✓ ***Add:*** Packing Cost (Secondary) (91,000 units × ₹ 2)	1,82,000
✓ ***Add:*** Administration Expenses (General)	2,24,000
✓ ***Add:*** Selling and distribution Expenses	4,13,000
Cost of Sales;	86,45,000
✓ Profit (Balancing figure ₹ 10,10,000– 86,45,000)	13,65,000
✓ Sales (91,000 × ₹ 110)	1,00,10,000

10. The following data relates to the manufacture of a standard product during the month of April, 20X1;

Particulars	(₹)
Raw Materials	₹ 1,80,000
Direct Wages	₹ 90,000
Machine hours worked (hours)	10,000
Machine hour rate (per hour)	₹ 8
Administration overheads (general)	₹ 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: -

a) Cost per unit

b) Profit for the month

(ICAI SM, Nov 2022 Modified)

Sol. **a) Cost Sheet;** **Output: 4,000 units**

Particulars	Total Cost (₹)	Cost Per (Unit) (₹)
– Raw Materials	1,80,000	45.00
– Direct Wages	90,000	22.50
Prime Cost	2,70,000	67.50
– ***Add:*** Factory Overheads (10,000 hours × ₹ 8 per hour)	80,000	20.00
Cost of Production	**3,50,000**	**87.50**
– ***Less:*** Closing Stock of finished goods [(4,000–3,600 units)* 87.5] *(35,0000/4000) = 87.*5	(35,000)	----
Cost of Goods Sold	**3,15,000**	**87.50**
– ***Add:*** Administration Overheads (general)	35,000	9.72
– ***Add:*** Selling Overheads (3,600 units × ₹ 5 unit)	18,000	5.00
Cost of Sales (Total Cost)	**3,68,000**	**102.22**

b) Statement of Profit;

Particulars	Total Cost (₹)
– Sales revenue (3,600 units @ ₹ 125)	4,50,000
– ***Less:*** Cost of Sales	3,68,000
Profit	**82,000**

11. XYZ Auto Ltd. is in the business of selling cars. It also sells insurance and finance as part of its overall business strategy. The following information is available for the company.

Particulars	Physical Units	Sales Value
Sales of Cars	10,000 Cars	₹ 30,000 lacs
Sales of Insurance	6,000 Policies	₹ 1,500 lacs
Sales of Finance	8,000 Loans	₹ 19,200 lacs

The Revenue earnings from each line of business before expenses are as follows;

Particulars	Sales Value
Sales of Cars	3% of Sales Value
Sales of Insurance	20% of Sales Value
Sales of Finance	2% of Sales Value

The expenses of the company are as follows;

Particulars	(₹)
Salesman Salaries	200 lacs
Rent	100 lacs
Electricity	100 lacs
Advertising	200 lacs
Documentation cost per insurance policy	100
Documentation cost for each loan	200
Direct sales expenses per car	5,000

*Indirect costs have to be allocated in the ratio of physical units sold.

Required: -

a) Make a cost sheet for each product allocating the direct and indirect costs and also showing the product wise profit and total profit.

b) Calculate the percentage of profit to revenue earned from each line of business.

(May 2006)

Sol. **a)**

Cost Sheet

Particulars	Car Amount	Insurance Amount	Finance Amount	Total
A) Sales unit	10,000	6,000	8,000	----
B) Sales Value (in ₹)	30,000	1,500	19,200	----
C) Revenue earning (₹ in lacs)	900	300	384	1,584
D) Expenses				
Direct Expenses; (₹ in lacs)				
1) Sales exp.	500	----	----	500
2) Document cost for insurance policy	----	6	----	6
3) Document cost for loan	----	----	16	16
Indirect Expenses; (₹ in lacs)				
1) Salesman Salaries (10: 6: 8)	83.33	50	66.67	200
2) Rent (10: 6: 8)	41.67	25	33.33	100
3) Electricity (10:6:8)	41.67	25	33.33	100
4) Advertisement (10:6:8)	83.33	50	66.67	200
Total	750	156	216	1,122
Profit (C−D)	150	144	168	462

b) Percentage of Profit to revenue from each of business;

a) Sale of Car = $\frac{150}{900} \times 100 = 16.67\%$

b) Sale of Insurance = $\frac{144}{300} \times 100 = 48\%$

c) Sale of finance = $\frac{168}{384} \times 100 = 43.75\%$

Working Note:

Computation of direct cost:

For Cars = (₹5,000 ×10,000)/1,00,000 = ₹500 lacs

For insurance = (₹100 × 6,000)/1,00,000 = ₹6 lacs
For Finance = (₹200 × 8,000)/1,00,000 = ₹16 lacs

12. **From the following information, prepare a Cost Sheet showing the cost and profit.**

Particulars	Opening	Closing
Raw Materials;	**₹ 29,500**	**₹ 36,000**
Work-in-progress;		
Materials	13,600	12,000
Wages	11,000	16,500
Works overheads	6,600	9,900
Finished Goods:	200 units @ ₹ 84	1,600 units

Purchases of raw material ₹1,90,000, Carriage on purchases ₹1,500,
Sale of Scrap of Raw materials ₹5,000
Wages ₹2,97,000
Works overheads are absorbed @ 60% of direct labour cost.
Administration overheads are absorbed @ ₹12 per unit produced.
Selling and distribution overheads are absorbed @ 20% of selling price.
Sales – 7600 units @ at a profit of 10% on sales price.

(RTP)

Sol.

Cost Sheet

Particulars		Total (₹)	Per Unit (₹)
1) Raw Materials Consumed;			
Opening Stock	29,500		
Add: Purchases	1,90,000		
Add: Carriage on purchases	1,500		
Less: Scrap of raw materials	5,000		
Less: Closing Stock	36,000	1,80,000	
2) *Add:* Wages		2,97,000	
3) Prime Cost [1 + 2]		4,77,000	
4) *Add:* Works overheads [60% of ₹ 2,97,000]		1,78,200	
Add: Opening WIP		31,200	
Less: Closing WIP		(38,400)	
5) Works Cost		6,48,000	72.00
6) *Add:* Administration overheads [9,000 × ₹ 12]		1,08,000	12.00
7) Cost of goods produced [5 + 6]		7,56,000	84.00
8) *Add:* Opening Stock of finished goods [200 units × 84]		16,800	
Less: Closing stock of finished goods [1600 units × 84]		1,34,400	
9) Cost of goods sold [7 + 8]		6,38,400	84.00
10) *Add:* Selling & distribution overheads @ 20% on sales		1,82,400	24.00
11) Cost of Sales [9 + 10]		8,20,800	108.00
12) *Add:* Profit @ 10% on sales		91,200	12.00
13) Sales [11 + 12]		9,12,000	120.00

Working Notes: -

1) Units Produced = Closing Stock + Sales – Opening Stock

= 1,600 + 7,600−200

= 9,000

2) Let Sales be X, then,

X = 6,38,400 + 20% of X + 10% of X

=0.7X = 6,38,400

= X = 6,38,400/0.7

= ₹ 9,12,000

13. Popeye Company is a metal and wood cutting manufacturer, Selling products to the home construction market. Consider the following data for the month of October, 20X1;

Particulars	(₹)
Sandpaper	5,000
Material- handling costs	1,75,000
Lubricants and Coolants	12,500
Miscellaneous indirect manufacturing labour	1,00,000
Direct manufacturing labour	7,50,000
Direct materials, October 1, 20X1	1,00,000
Direct materials, October 31, 20X1	1,25,000
Finished goods, October 1, 20X1	2,50,000
Finished goods, October 31,20X1	3,75,000
Work-in-process, October 1, 20X1	25,000
Work-in- process, October 31, 20X1	35,000
Plant-leasing costs	1,35,000
Depreciation-plant equipment	90,000
Property taxes on plant equipment	10,000
Fire Insurance on plant equipment	7,500
Direct materials purchased	11,50,000
Sales revenues	34,00,000
Marketing promotions	1,50,000
Marketing salaries	2,50,000
Distribution costs	1,75,000
Customer-service costs	2,50,000

Required: -

a) Prepare an income statement with a separate supporting schedule of cost of goods manufactured.

b) For all manufacturing items, indicate by V or F whether each is basically a variable cost or a fixed cost (where the cost object is a product unit.) **(Nov. 2004)**

Sol.

Supporting schedule for Computation of cost of goods manufactured for the month ending Oct., 20X1.

Particulars	(₹)	(₹)
Direct Materials;		
Direct Materials as on October.1, 20X1	1,00,000	
Add: Direct Materials purchased	11,50,000	
	12,50,000	
Less: Direct Materials as on October.31, 20X1	1,25,000	
Direct Material Consumed		11,25,000 (v)
Direct Manufacturing labour		7,50,000 (v)
Prime Cost		**18,75,000**

Factory Overheads;		
Sandpaper	5,000 (v)	
Material-handling cost	1,75,000 (v)	
Lubricants and Coolants	12,500 (v)	
Miscellaneous indirect manufacturing labour	1,00,000 (v)	
Plant Leasing Cost	1,35,000 (F)	
Depreciation Plant & Equipment	90,000 (F)	
Property Taxes on Plants Equipment	10,000 (F)	
Fire Insurance	7,500 (F)	5,35,000
Work Cost		**24,10,000**
Add: Opening work-in-progress		25,000
		24,35,000
Less: Closing work-in-progress		35,000
Cost of Goods Manufactured		**24,00,000**

a) In the books of Popeye Company:

Income Statement (For the month ending on 31 October, 20X1)

Particulars	**(₹)**	**(₹)**
Sales Revenue;		34,00,000
Less: Cost of goods sold;		
Opening finished goods	2,50,000	
Add: Cost of goods manufactured	24,00,000	
Cost of goods available	26,50,000	
Less: Closing finished goods	3,75,000	22,75,000
Gross Margin		11,25,000
Less: Selling and Distribution overheads;		
Marketing promotions	1,50,000	
Marketing Salaries	2,50,000	
Distribution costs	1,75,000	
Customer Service Cost	2,50,000	8,25,000
Net Profit		**3,00,000**

14. A Re-roller produced 400 metric tons of M.S. bars spending ₹36,00,000 towards materials and ₹6,20,000 towards rolling charges. Ten percent of the output was found to be defective, which had to be sold at 10% less than the price for good production. If the sales realization should give the firm an overall profit of 12.5 % on cost, find the selling price per metric ton of both the categories of bars. The scrap arising during the rolling process fetched a realization of ₹60,000. **(Nov. 2005)**

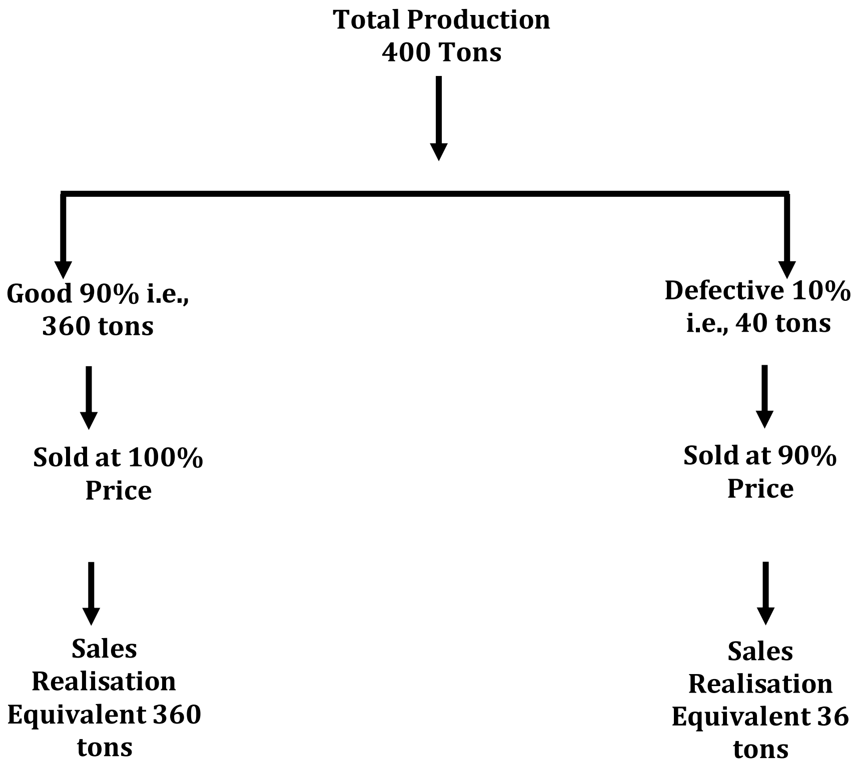
Sol. Sales Price of good output per tonne = $\frac{46,80,000}{360+36}$ = 11,818.18

∴ Sales price of defective output per tonne = 11,818.18 × 90% = 10,636.362

Working note

Particulars	**(₹)**
Material Consumed	36,00,000
Less: Realisation of Scrap	60,000
	35,40,000
Add: Rolling Charges	6,20,000
Total Cost	41,60,000
Add: Overall Profit	5,20,000
Total Sales realisation required	46,80,000

Working Notes:



Thus, output (effective) = 360 + 36 = 396 tons
i.e., 396 tons.

15. 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;

Particulars	(₹)
Direct Material	₹ 40 per unit
Direct Labour	₹ 30 per unit (subject to a minimum of ₹ 48,000 p.m.)
Factory Overheads;	
Fixed	₹ 3,60,000 per annum
Variable	₹ 10 per unit
Semi-Variable	₹ 1,08,000 per annum up to 50% capacity and additional ₹ 46,800 for every 20% increase in capacity or any part thereof.
Administrative Overheads	₹ 5,18,400 per annum (fixed)

- ✓ Selling Overheads are incurred at ₹8 per unit.
- ✓ Each unit of raw material yields scrap which is sold at the rate of ₹5 per unit.
- ✓ In year 20X1, the factory worked at 50% capacity for the first three months but it was expected that it would work at 80% capacity for the remaining nine months.
- ✓ During the first three months, the selling price per unit was ₹145.

You are required to;

a) Prepare a cost sheet showing Prime Cost, Works Cost, Cost of Production and Cost of Sales.

b) Calculate the selling price per unit for remaining nine months to achieve the total annual profit of ₹8,76,600.

(May 2019)

Sol. **a)**

Cost Sheet of M/s Areeba Pvt. Ltd. for the year 20X1.
Normal Capacity: 36,000 units p.a.

Particulars	3 Months 4,500 units		9 Months 21,600 units	
	(₹)	**Cost per unit (₹)**	**(₹)**	**Cost per unit (₹)**
Direct Material *Less:* Scrap	1,80,000 (22,500)		8,64,000 (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

<u>Working Notes: -</u>

Calculation of Costs;

Particulars	4,500 units (₹)	21,600 units (₹)
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) or (₹ 48,000 × 3 months = ₹ 1,44,000)	6,48,000 Max. of (21,600 units × ₹30=6,48,000) or (48,000*9 Months= 4,32,000)
Variable Cost	45,000 (₹ 10 × 4,500 units)	2,16,000 (₹ 10 × 21,600 units)
Semi-variable cost	27,000 $\left(\frac{₹\ 1,08,000}{12\ \text{Months}} \times 3\ \text{Months}\right)$	1,51,200$\left(\frac{₹\ 1,08,000}{12\ \text{Months}} \times 9\ \text{Months}\right)$+ 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.

b) **Calculation of Selling price for nine months period;**

Particulars	(₹)
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**

16. 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 20X1.

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 cotton 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 ₹1,209,000 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) 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 20X1 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

(Dec. 2021)

Sol. **No. of bags manufactured = 1,000 units**

Cost sheet for the month of September 20X1

	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

17. The following data relates to the manufacturing project received for the budgeted output of 19,600 units. You are required to CALCULATE the selling price per unit covering a profit of 25% on the selling price.

Direct materials: 40 sq. m. per unit @ ₹ 10.60 per sq. m.

Direct wages: Bonding department 48 hours per unit @ ₹ 25 per hour

Finishing department 30 hours per unit @ ₹ 19 per hour

Budgeted costs and hours per annum-

Variable overhead:

	(₹)	**Total Hours**
Bonding department	15,00,000	10,00,000
Finishing department	6,00,000	6,00,000

Fixed overhead-

	(₹)
Production	15,68,000
Selling & Distribution	7,84,000
Administration	3,92,000

(MTP May 2022)

Ans.

Decision making Cost Sheet (per unit)

Particulars	**(Amount in ₹)**	**(Amount in ₹)**
Direct materials 40 m^2 at ₹ 10.60 per m2		424
Direct wages:		
Bonding department- 48 hours at ₹ 25 per hour	1,200	
Finishing department- 30 hours at ₹ 19 per hour	570	1,770
Prime Cost		**2,194**
Variable overhead:*		
Bonding department- 48 hours at ₹ 1.50 per hour	72	
Finishing department- 30 hours at ₹ 1.00 per hour	30	102
Variable production cost		**2,296**
Fixed production overhead#		80
Total production cost		2,376
Selling and distribution cost$	40	
Administration cost$	20	60
Total Cost		**2,436**

Selling price per unit = $₹2{,}436 \times \frac{100}{75} = ₹3{,}248$

Working Notes:

*Variable overhead rates –

Bonding: $\frac{15{,}00{,}000}{10{,}00{,}000\ hours} = ₹1.50$

Finishing: $\frac{6{,}00{,}000}{6{,}00{,}000\ hours} = ₹1.00$

#Fixed production overhead rate per unit of output = $\frac{15{,}68{,}000}{19{,}600\ units} = ₹80$

$ Selling and production cost per unit of output = $\frac{7{,}84{,}000}{19{,}600\ units} = ₹40$

Administration cost per unit of output = $\frac{3{,}92{,}000}{19{,}600\ units} = ₹20$

18. A Ltd. produces a single product X. During the month of December 20X1, the company has produced 14,560 tonnes of X. The details for the month of December 20X1 are as follows:

i) Materials consumed ₹15,00,000
ii) Power consumed 13,000 Kwh @ ₹7 per Kwh
iii) Diesels consumed 1,000 litres @ ₹93 per litre
iv) Wages & salary paid – ₹ 64,00,000
v) Gratuity & leave encashment paid – ₹ 44,20,000
vi) Hiring charges paid for HEMM- ₹ 13,00,000
vii) Hiring charges paid for cars used for official purpose – ₹ 80,000
viii) Reimbursement of diesel cost for the cars – ₹ 20,000
ix) The hiring of cars attracts GST under RCM @5% without credit.
x) Maintenance cost paid for weighing bridge (used for weighing of final goods at the time of despatch) – ₹ 7,000
xi) AMC cost of CCTV installed at weighing bridge (used for weighing of final goods at the time of despatch) and factory premises is ₹6,000 and ₹18,000 per month respectively.
xii) TA/ DA and hotel bill paid for sales manager- ₹ 16,000
xiii) The company has 180 employees works for 26 days in a month.

Required:

a) PREPARE a Cost sheet for the month of December 20X1.
b) COMPUTE Earnings per manshift (EMS) and Output per manshift (OMS) for the month of December 20X1.

(RTP May 2022)

Ans. **a) Cost Sheet of A Ltd. for the month of December 20X1**

Particulars	**Amount (₹)**	**Amount (₹)**
Materials consumed		15,00,000
Wages & Salary	64,00,000	
Gratuity & leave encashment	44,20,000	1,08,20,000
Power cost (13,000 kwh × ₹ 7)	91,000	
Diesel cost (1,000 ltr × ₹ 93)	93,000	1,84,000
HEMM hiring charges		13,00,000
Prime Cost		**1,38,04,000**
AMC cost of CCTV installed at factory premises		18,000
Cost of Production/ Cost of Goods Sold		**1,38,22,000**
Hiring charges of cars	80,000	
Reimbursement of diesel cost	20,000	
	1,00,000	
Add: GST @5% on RCM basis	5,000	1,05,000
Maintenance cost for weighing bridge	7,000	
AMC cost of CCTV installed at weigh bridge	6,000	13,000
TA/ DA & hotel bill of sales manager		16,000
Cost of Sales		**1,39,56,000**

b) Manshift = 180 employees × 26 days = 4,680 manshifts

Computation of earnings per manshift (EMS):

$$\text{EMS} = \frac{\text{Total employee benefits paid}}{\text{Manshift}}$$

$$= \frac{₹\ 1{,}08{,}20{,}000}{4{,}680} = ₹2{,}312$$

Computation of Output per manshift (OMS):

$$\text{OMS} = \frac{\text{Total Output/ Production}}{\text{Manshift}}$$

$$= \frac{14{,}560\ \text{Tonne}}{4{,}680} = 3.11\ \text{tonne}$$

19. The following figures are extracted from the Trial Balance of Go-getter Co. on 30th September, 20X1;

Particulars	Dr. (₹)	Cr. (₹)
Inventories;		
– Finished Stock	80,000	
– Raw Materials	1,40,000	
– Work-in-Process	2,00,000	
Office Appliances	17,400	
Plant & Machinery	4,60,500	
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 factory up-Keeping expenses	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 Salaries and Expenses	8,600	
Interest on Borrowed Funds	2,000	

Further details are available as follows: -

Particulars	(₹)
1) Closing Inventories: -	
Finished Goods	1,15,000
Raw Materials	1,80,000
Work-in-Process	1,92,000
2) Outstanding 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, 20X1 along with supporting schedules of;

- **a)** Cost of Sales.
- **b)** Selling and Distribution Expenses
- **c)** Administration Expenses.

(ICAI SM)

Ans.

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

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

i) Schedule of Cost of Sales

	(₹)	(₹)
Raw Material (Inventory opening balance)		1,40,000
Add: Material Purchased	3,20,000	
Add: Freight on Material	16,000	
Less: Purchase Returns	(4,800)	3,31,200
		4,71,200
Less: Closing Raw Material Inventory		(1,80,000)
Materials consumed in Production		2,91,200
Direct employee cost (₹1,60,000 + ₹8,000)		1,68,000
Prime Cost		**4,59,200**
Factory Overheads:		
Indirect employee cost (₹18,000 + ₹1,200)	19,200	
Factory Supervision	10,000	
Repairs and factory up-keeping expenses	14,000	
Heat, Light and Power (₹65,000 × 8/10)	52,000	
Rates and Taxes (₹6,300 × 2/3rd)	4,200	
Miscellaneous Factory Expenses	18,700	
Depreciation of Plant (10% of ₹4,60,500)	46,050	
Depreciation of Buildings (4% of ₹2,00,000 ×8/10)	6,400	1,70,550
Gross Works Cost		**6,29,750**
Add: Opening Work-in-Process inventory		2,00,000
Less: Closing Work-in-Process inventory		(1,92,000)
Cost of production		**6,37,750**
Add: Opening Finished Goods inventory		80,000
Less: Closing Finished Goods inventory		(1,15,000)
Cost of Goods Sold		**6,02,750**
Add: Administration Expenses [*See*Schedule (*iii*)]		18,870
Add: Selling and Distribution Expenses[*See* Schedule (*ii*)]		92,400
Cost of Sales		**7,14,020**

ii) Schedule of Selling and Distribution Expenses

	(₹)
Sales Commission	33,600
Sales Travelling	11,000
Sales Promotion	22,500
Distribution Deptt.—Salaries and Expenses	18,000
Heat, Light and Power	6,500
Depreciation of Buildings	800
	92,400

iii) Schedule of Administration Expenses

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

20. The following information is available from SN Manufacturing Limited's books 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)		₹6,920
Administrative Overhead		₹46,765
Salary and wages for supervisor and foremen		₹28,000

Other Information:

- ✓ Opening stock of finished goods is to be valued at ₹8.05 per unit.
- ✓ During the month of April, 1,52,000 units were produced and 1,52,600 units were sold. The closing stock of finished goods is to be valued at the relevant month's cost of production. The company follows the FIFO method.
- ✓ Selling and distribution expenses are to be charged at 20 paisa per unit.
- ✓ Assume that one production cycle 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.

(May 2023)

Ans.

i) Cost sheet for the month of April, 2023

Particulars	**Amount ₹**	**Amount ₹**
Opening stock of raw material	42,500	
+ Purchases of Raw material	6,95,000	
+ Carriage inward	36,200	
-Closing stock of raw material	(38,600)	
Raw Material consumed		**7,35,100**
Direct wages paid	3,22,800	
Royalty paid for production	35,800	
Purchase of special designs, moulds etc. (1,53,600 / 12)	12800	
Power, fuel and haulage	70600	
Prime cost		**11,77,100**
Salary and wages for supervisor and foreman	28,000	
+ OWIP	42500	
-CWIP	42,800	
Factory Cost		**12,04,800**
R & D for improving the production process	31,680	
Primary packing cost	6,920	
Cost of Production		**12,43,400**
+Opening stock of finished goods (2,500 X 8.05)	20125	
-Closing stock of finished goods (2,500 + 1,52,000-1,52,600) X *8.18	15,543	
Cost of goods sold		**12,47,982**
Administrative overheads (assumed as general in nature)	46,765	
Selling overheads (152600 X 0.20)	30520	
Cost of sales		**13,25,267**

***12,43,000 / 1,52,000**

ii) Calculation of selling price per unit –

Let Sales be X
Profit = 0.20X
Cost of sales = 13,25,267
Cost of sales + Profit = Sales
13,25,267 + 0.20X = X
X = 16,56,584
S.P Per unit = 16,56,584 / 1,52,600
= 10.86 Per unit

Employee Cost
Assignment

Q. No.	Questions & Solutions
1.	The rate of change of labour force in a company during the year ending 31st March, 20X1. Was Calculated as 13%, 8%, and 5% respectively, Under 'Flux Methods, 'Replacement Method' and 'separation Method'. The number of workers separated during the year is 40. **You are required to Calculate: -** **a)** Average number of workers on roll. **b)** Number of workers replaced during the year. **c)** Number of new accessions i.e., new recruitment. **d)** Number of workers at the beginning of the year. **(Nov. 2012, Nov. 2013, May 2017, ICAI SM, Modified July 2021, Modified MTP Nov 2022)**
Ans.	**a) Labour Turnover Rate (Separation Method);** ✓ $= \frac{\text{No.of workers separated}}{\text{Average No.of workers on roll}}$ ✓ $\frac{5}{100} = \frac{40}{\text{Average No .of workers on roll}}$ ✓ Average No. of workers on roll = 800 **b) Labour Turnover Rate (Replacement Method);** ✓ $= \frac{\text{No.of workers replaced}}{\text{Average No.of workers on roll}}$ ✓ $\frac{8}{100} = \frac{\text{No.of workers replaced}}{800}$ ✓ Or, No. of workers replaced = 64 **c) Labour Turnover Rate (Flux Methods);** ✓ $= \frac{\text{No.of Separations+No.of accession (New Recruitments)}}{\text{Average No.of workers on roll}}$ ✓ $\frac{13}{100} = \frac{\text{40 + No of Acessions (New Recruitments)}}{800}$ ✓ 100 (40 + No. of Accessions) = 10,400 ✓ No. of new Accessions = 64. **d) No. of Workers at the beginning of the year;** ✓ Let workers at the beginning of the year were 'X' ✓ Average No. of workers on roll ✓ $= \frac{\text{Workers at the beginning+Workers at the end}}{2}$ ✓ $800 = \frac{X + (X + \text{New Accessions} - \text{Separations})}{2}$ ✓ $800 = \frac{X + (X + 64 - 40)}{2}$ ✓ $800 = \frac{X + (X + 24)}{2}$ ✓ $2X = 1{,}600 - 24$ ✓ X = 788 workers.
2.	The Information regarding number of employees on roll in a shopping mall for the month of December, 20X1 are given below; Number of employees as on 01-12-20X1 900 Number of employees as on 31-12-20X1 1100

During December, 20X1, 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 exist of employees.

Assuming 365 days in a year, Calculate Employee Turnover Rate and Equivalent Annual Employee Turnover Rate by applying the following;

a) Replacement Method
b) Separation Method
c) Flux Method

(May 2001 RTP, May 2020 RTP, Modified in May 2018 & July 2021, Modified RTP May 2023)

Ans. **Calculation for Employee Turnover Rate: -**

Replacement Method: -

✓ $= \frac{\text{Number of employees Replace during the period}}{\text{Average Number of Employees during the period on roll}} \times 100$

✓ $= \frac{75}{1{,}000} \times 100$

✓ $= 7.5\%$

Equivalent employee (labour) turnover rate

✓ $= \frac{\text{Employee Turnover rate for the period}}{\text{Number of days in the period}} \times 365$

✓ $= \frac{7.5\%}{31} \times 365$

✓ $= 88.31\%$

Separation Method: -

✓ $= \frac{\text{Number of Employees Separated during the period}}{\text{Average Number of employees during the period on roll}} \times 100$

✓ $= \frac{40 + 60}{1{,}000} \times 100$

✓ $= 10\%$

Equivalent employee (labour) turnover rate

✓ $= \frac{\text{Employee Turnover rate for the period}}{\text{Number of days in the period}} \times 365$

✓ $= \frac{10\%}{31} \times 365$

✓ $= 117.74\%$

Flux Method: -

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

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

✓ Equivalent Annual Turnover Rate =

✓ $= \frac{\text{Employee Turnover rate for the period}}{\text{Number of days in the period}} \times 365$

✓ $= \frac{40 \times 365}{31} = 470.97\%$

Or,

✓ $= \frac{\text{Empl. Turnover rate for the period under replacement method+Employee Turnover rate for the period under separation method}}{\text{Number of days in the period}} \times 365$

✓ $= \frac{17.5\%}{31} \times 365$

✓ $= 206.05\%.$

3. A skilled worker in XYZ Ltd. is paid a guaranteed wage rate of ₹30 per hour. The standard time per unit for a particular's 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 particulars product.

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

(ICAI SM, Nov. 2009, Nov.2017, May 2013 RTP)

Ans. Total earnings (under 50% Halsey Scheme) = Hours worked × Rate per hour + $\frac{1}{2}$ × time saved × Rate per hour

$= 3 \text{ hours} \times ₹\,30 + \frac{1}{2} \times 1 \text{ hour} \times ₹\,30 = ₹\,105$

Effective hourly rate $= \frac{\text{Total earnings}}{\text{Hours taken}} = \frac{₹\,105}{3 \text{ hours}} = ₹\,35$

Working Note: -

Let T hours be the total time worked in hours by the skilled workers (machine man P). ₹ 30 is the rate per hour; standard time is 4 hours per unit and effective hourly earnings rate is ₹37.50 then

Earning (under Rowan plan) = Hours worked × Rate per hr + $\frac{\text{Time saved}}{\text{Time allowed}}$ × Time taken × Rate per hour

$₹\,37.5\,\text{T} = \text{T} \times ₹\,30 + \frac{(4-\text{T})}{4} \times \text{T} \times ₹\,30\,.$

(Both sides are divided by T)

$₹\,37.5 = ₹30 + (4 - \text{T}) \times ₹7.5$

$₹\,37.5 = ₹\,30 + ₹\,30 - 7.5\,\text{T}$

$₹\,7.5\,\text{T} = ₹\,60 - ₹37.5$

$₹\,7.5\,\text{T} = ₹\,22.5$

$\text{T} = 3 \text{ hours}$

4. A Company is undecided as to what kind of wage scheme should be introduced. The following particulars have been complied in respect of three workers. Which are under Consideration of the management.

Particulars	I	II	III
✓ Actual hours worked	380	100	540
✓ Hourly rate of wages (in ₹)	40	50	60
✓ Production in units;			
Product A	210	----	600
Product B	360	----	1,350
Product C	460	250	----
✓ Standard time allowed per unit of each product is;			
	A	**B**	**C**
✓ Minutes	15	20	30

For the purpose of piece rate, each minute is valued at ₹1/-

You are required to Calculate the wages of each worker under;

a) Guaranteed hourly rate basis.

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

c) Premium bonus basis where the worker received bonus based on Rowan Scheme.

(Nov. 2010 RTP, Nov-2002 RTP, Modified MTP Dec. 2021)

Ans. **a) Computation of wages of each worker under guaranteed hourly rate basis;**

Worker	Actual hours worked (Hours)	Hourly Wage Rate (₹)	Wages (₹)
I	380	40	15,200
II	100	50	5,000
III	540	60	32,400

b) Computation of Wages of each worker under piece work earning basis;

Product	Piece rate per unit (₹)	Worker-I		Worker-II		Worker-III	
		Units	Wages (₹)	Units	Wages (₹)	Units	Wages (₹)
A	15	210	3,150	----	----	600	9,000
B	20	360	7,200	----	----	1,350	27,000
C	30	460	13,800	250	7,500	----	----
Total			**24,150**		**7,500**		**36,000**

Since each worker's earnings are more than 50% of basic pay. Therefore, Worker-I, II, and III, will be paid the wages as computed i.e., ₹24,150, ₹7,500 and ₹36,000 respectively.

<u>Working Notes: -</u>

1) Piece rate per unit;

Product	Standard time per unit in minute	Piece rate each minute (₹)	Piece rate per unit (₹)
A	15	1	15
B	20	1	20
C	30	1	30

2) Time Allowed to each work;

Worker	Product-A	Product -B	Product -C	Total Time (Hours)
I	210 units × 15 = 3,150	360 units × 20 = 7,200	460 units × 30 = 13,800	24,150/60= 402.50
II	----	----	250 units × 30 = 7,500	7,500/60= 125
III	600 units × 15= 9,000	1,350 units × 20 = 27,000	----	36,000/60= 600

c) Computation of Wages of each worker under Premium bonus basis (Where each worker receives bonus based on Rowan Scheme)

Worker	Time Allowed (Hr.)	Time Taken (Hr.)	Time Saved (Hr.)	Wage Rate per hour (₹)	Earnings (₹)	Bonus (₹)	Total Earnings (₹)
I	402.5	380	22.5	45	15,200	850	16,050
II	125	100	25	50	5,000	1,000	6,000
III	800	540	60	60	32,400	3,240	35,640

$*\frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Wage Rate}$

✓ Worker-I $= \frac{380}{402.5} \times 22.5 \times 40 = 850$

✓ Worker-II $= \frac{100}{125} \times 25 \times 50 = 1{,}000$

✓ Worker-III $= \frac{540}{600} \times 60 \times 60 = 3{,}240$

5. ZED Limited is working by employing 50 skilled workers. It is considered the introduction of incentive scheme-either Halsey Scheme (with 50% bonus) or Rowan scheme of wage payment for increasing the labour productivity to cope up the increasing demand for the product by 40%. It is believed that proposed incentive scheme could bring about an average 20% increase over the present earnings of the workers; If could act as sufficient incentive for them to produce more.

Because of assurance, the increase in productivity has been observed as revealed by the figures for the month of April, 20X1,

i)	Hourly rate of wages (guaranteed)	₹ 30
ii)	Average time for producing one unit by one worker at the previous performance (This may be taken as time allowed)	1.975 hours
iii)	Number of working days in the month	24
iv)	Number of workings hours per day of each worker	8
v)	Actual production during the month	6,120 Units

Required: -

a) Calculate the effective rate of earnings under the Halsey Scheme and the Rowan Scheme.

b) Calculate the savings to the ZED Limited in terms of direct labour cost per piece.

c) Advise ZED Limited about the selection of the scheme to fulfil his assurance.

(May 2004, Jan 2021, ICAI SM modified)

Ans. **a) Computation of effective rate of earning under the Halsey & Rowan Scheme;**

✓ Total earning (Under Halsey)	= Time Wages + Bonus
	= 24 days × 8 hours × 50 skilled workers × ₹ 30 + 37,305
	= ₹ 2,88,000 + ₹ 37,305 (W.N.-2)
	= ₹ 3,25,305

Total earning (under Rowan scheme)

= Time Wages + Bonus

= ₹ 2,88,000 + ₹ 59,258.38 (W-N-2)

= ₹ 3,47,258.38

✓ Effective rate earnings/hour (Under Halsey Plan)
(₹ 3,25,305/9,600 hours.) ₹ 33.89

✓ Effective rate of earning/hour (Under Rowan Plan)
(₹ 3,47,258.38/9,600 hours.) ₹ 36.17

b) Saving to the ZED Ltd. In terms of direct labours Cost/Unit;

Particulars	**(₹)**
✓ Direct labour cost (per unit) Under times wages system (1.975 times per unit × ₹ 30)	59.25
✓ Direct labour cost (per unit) Under Halsey Plan (₹ 3,25,305/6,120 units)	53.15

✓ Direct labour cost (per unit) under Rowan plan (₹ 3,47,258.38/6,120 units)	56.74
✓ **Savings of direct labour cost under:**	
✓ Halsey Plan (₹ 59.25– 53.15)	₹ 6.10
✓ Rowan Plan (₹ 59.25 – 56.74)	₹ 2.51

c) Advised to ZED Ltd:
(Regarding selection of the scheme to fulfil assurance)
Halsey scheme brings more saving to the management of ZED Ltd., Over the present earning of ₹2,88,000, but the other scheme i.e. Rowan fulfil the promise of 20% increase over the present earnings of ₹2,88,000 by paying 20.58% in the form of Bonus. Hence, Rowan Plan should be adopted.

Working Notes: -

1) Computation of time saved (In hours) per month;

✓ = Standard Production time of 6,120 units – actual time taken by the workers
✓ = (6,120 units × 1.975 hours – 24 days × 8 hours/day × 50 skilled workers)
✓ = 12,087 hours – 9,600 hours
✓ = 2,487 hours

2) Computation of bonus for time saved (in hours) under Halsey & Rowan Plan;

✓ Time Saved hours – = 2487 hours
(Refer W-N-1) –
✓ Wage rate per hour – = ₹ 30
✓ Bonus under Halsey Scheme – = ½ × 2,487 hours × ₹ 30/- = ₹ 37,305/-
✓ Bonus under Rowan Scheme – = Time Saved × $\frac{\text{Time Taken}}{\text{Time Allowed}}$ × Rate per hour
– = $\frac{9600 \text{ hours}}{12{,}087 \text{ hours}}$ × 2487 hours × ₹ 30
– = ₹ 59,258.38

6. 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 hours.	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.

(ICAI SM, RTP Nov. 2021, Modified MTP Nov. 2020)

Ans.

a) Where overtime is worked regularly as a policy due to workers' shortage: -

- ✓ The overtime premium is treated as a part of employee cost and job is charged at an inflated wage rate. Hence, employee cost chargeable to job Z
- ✓ = Total hours × Inflated wage rate = 1,125 hours × ₹ 117 = ₹ **1, 31, 625**

b) Where overtime is worked irregularly to meet the requirements of production:-

- ✓ Basic wage rate is charged to the job and overtime premium is charged to factory overheads as under: -
- ✓ Employee cost chargeable to Job Z; 1,125 hours @ ₹100 per hour = ₹1,12,500
- ✓ Factory overhead: {100 hours × ₹ (175−100)} + {25 hours × ₹ (225−100)}={₹ 7,500 + ₹3,125} = ₹ **10,625**

c) Where overtime is worked at the request of the customer, overtime premium is also charged to the job as under: -

Particulars		**(₹)**
– Job Z Employee Cost	1,125 hours @ ₹ 100	= 1,12,500
– Overtime premium	100 hours @ ₹ (175−100)	= 7,500
	25 hours @ ₹ (225−100)	= 3,125
	Total	**1,23,125**

Workings: -

- ✓ Basic wage rate : ₹ 100 per hour
- ✓ Overtime wage rate before and after working hours : ₹ 100 × 175% = ₹ 175 per hour
- ✓ Overtime wage rate for Sundays and holidays: ₹ 100 × 225% = ₹225 per hour

Computation of average inflated wage rate (including overtime premium): -

Particulars	
– Annual wages for the previous year for normal time (1,00,000 hours × ₹ 100)	1,00,00,000
– Wages for overtime before and after working hours (20,000 hours × ₹ 175)	35,00,000
– Wages for overtime on Sundays and holidays (5,000 hours × ₹ 225)	11,25,000
– **Total wages for 1,25,000 hours.**	**1,46,25,000**

Average inflated wage rate $= \frac{\text{₹ 1,46,25,000}}{\text{1,25,000 hours}} = \text{₹ } 117$

7.

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

Particulars	**(A)**	**(B)**
Basic wages (₹)	10,000	16,000
Dearness Allowance	50%	50%
Contribution to provident Fund (on basic wages)	8%	8%
Contribution to Employee's State Insurance (on basic wages)	2%	2%
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.

(ICAI SM, Nov. 2020)

Ans. **<u>Statement Showing Earnings of Workers A and B: -</u>**

Particulars	A (₹)	B (₹)
– Basic wages	10,000	16,000
– Dearness Allowance (50% of Basic Wages)	5,000	8,000
– Overtime wages (Refer to Working Note 1)	1,500	---
– Gross wages earned	16,500	24,000
– ***Less:*** Contribution to Provident fund	(800)	(1,280)
– ***Less:*** Contribution to ESI	(200)	(320)
– **Net wages earned**	**15,500**	**22,400**

<u>Statement of Employee Cost: -</u>

Particulars	A (₹)	B (₹)
– Gross Wages (excluding overtime)	15,000	24,000
– ***Add:*** Employer's Contribution to PF	800	1,280
– ***Add:*** Employer's Contribution to ESI	200	320
– Gross Wages earned	16,000	25,600
– Normal working hours	200	200
– **Ordinary wages rate per hour**	**80**	**128**

<u>Statement Showing Allocation of Wages to Jobs: -</u>

Particulars	**Total Wages (₹)**	**Jobs**		
		X (₹)	**Y (₹)**	**Z (₹)**
Worker A;				
– Ordinary wages (4:3:3)	16,000	6,400	4,800	4,800
– Overtime	1,500	---	1,500	---
Worker B;				
– Ordinary wages (5:2:3)	25,600	12,800	5,120	7,680
	43,100	**19,200**	**11,420**	**12,480**

<u>Working Notes: -</u>

1) Normal wages are considered as basic wages

Over time $= \frac{2\times(\text{Basic wage}+\text{DA})\times 10\text{ hours}}{200}$

$= 2 \times \left(\frac{₹\,15{,}000}{200}\right) \times 10\text{ hours} = ₹\,150 \times 10\text{ hours} = ₹\,1{,}500$

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.

(ICAI SM, May 2009 RTP)

Ans.

a) The normal rate of wages:
₹ 20 per hour – *Refer W.N*

b) The cost of material
X + 45 × ₹ 20 = ₹ 3,400 or, X = ₹ 3,400 – ₹ 900=₹ 2,500

c) Comparative Statement of the Factory Cost of the product made by the two workmen.

Particulars	'A' (₹)	'B' (₹)
– Material Cost	2,500	2,500
– Direct Wages	600 (30 × ₹20)	800 (40 × ₹ 20)
– Bonus	240 (12 × ₹ 20)	100 (5 × ₹20)
– Factory Overhead	150	200
Factory Cost	**3,490**	**3,600**

Working notes

Step: -1

Let X be the cost of material and Y be the normal rate of wages per hour.

Step: -2

Factory Cost of Workman 'A'

Particulars	(₹)
a) Material Cost	X
b) Wages (Rowan Plan)	30 Y
c) Bonus= $\frac{30}{50} \times (50 - 30) \times Y$	12 Y
d) Overheads (30 × ₹5)	150
e) Factory Cost	3,490
Or, X+42Y=₹ 3,490 (Given)–₹ 150=₹ 3,340…………………… equation (i)	

Step: -3

Factory Cost of Workman 'B'

Particulars	(₹)
a) Material Cost	X
b) Wages (Halsey Plan)	40 Y
c) Bonus = 50% of (Standard Hour – Actual Hour) × R	5Y
= 50% of (50 – 40) × R	
d) Overheads (40 × ₹5)	200
e) Factory Cost	3,600
Or, X + 45 Y = ₹ 3,600(Given)–₹ 200=₹ 3,400 ………………equation (ii)	

Step: -4

- ✓ Subtracting equation (i) from equation (ii)
- ✓ 3Y = ₹60
- ✓ Y = ₹60/3 = ₹20 per hour.

9. The management of B.R Ltd. is worried about their increasing employee turnover in the factory and before analysing 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. The actual direct employee hours included 30,000 hours attributable to training new recruits, out of which half of hours were unproductive. As a result of the delays by the Personnel Department in filling vacancies due to employee turnover, 1,00,000 potentially productive hours (excluding unproductive training hours) were lost.

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.

(ICAI SM, Nov-2001)

Ans. **Computation of profit foregone on account of employee turnover;**

Particulars	**(₹)**
✓ Contribution foregone (as calculated below)	4,44,130
✓ Settlement cost due to leaving	43,820
✓ Recruitment cost	26,740
✓ Selection cost	12,750
✓ Training Cost	30,490
Profit foregone	**5,57,930**

Workings: -

1) **Computation of productive hours: -**

✓ Actual hours worked (given)	4,45,000
✓ *Less:* Unproductive training hours	15,000
✓ Actual productive hours	4,30,000

2) **Productive hours lost: -**

- ✓ Loss of potential productive hours + Unproductive training hours
- ✓ = 1,00,000 + 15,000 = 1,15,000 hours

3) **Loss of Contribution due to unproductive hours: -**

- ✓ $= \frac{\text{Sales Value}}{\text{Actual productive hours}} \times$ Total unproductive hours
- ✓ $= \frac{₹\,83,03,300}{4,30,000} \times 1,15,000$ hours = ₹ 22,20,650
- ✓ Contribution lost for 1,15,000 hours $= \frac{₹\,22,20,650}{100} \times 20 =$ ₹4,44,130

10. A skilled worker is paid a guaranteed wage rate of ₹150 per hour. The standard time allowed for a job is 10 hours. He took 8 hours to complete the job. He has been paid 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.

(December 2021, Nov 2022 Modified)

Ans. **i) Calculation of Effective hourly rate of earnings under Rowan Incentive Plan:**

Standard time allowed = 10 hours

Time taken = 8 hours; Time saved = 2 hours

	Particulars	Amount (₹)
A	Basic guaranteed wages (₹150×8 hours)	1,200
B	Add: Bonus for time saved $\left(\frac{2}{10} \times 8 \times ₹150\right)$	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 = 180T

180T-75T = 750

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

11. 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;

a) Halsey Premium Plan (Rate 50%)

b) Rowan Plan

c) Time Wage System

d) Piece Rate System

(May 2019, Modified Nov. 2022)

Ans. **a) Halsey Premium Plan;**

- ✓ Halsey Premium Plan (Wages)
- ✓ = (Time taken × Time Rate) + (50% of Time Saved × Time Rate)
- ✓ = (30 hours × ₹ 75) + (40 hours – 30 hours) × 50% × ₹ 75
- ✓ = ₹ 2,625

b) Rowan Plan;

- ✓ Rowan Plan (Earnings) = (Time Taken × Rate per hour)
- ✓ $+\frac{\text{Time Saved}}{\text{Time Allowed}} \times \text{Time Taken} \times \text{Rate per hour}$

- ✓ $= (30 \text{ hours} \times ₹\,75) + \left(\frac{10 \text{ hours}}{40 \text{ hours}} \times 30 \text{ hours} \times ₹\,75\right)$
- ✓ = ₹ 2,250 + 562.50
- ✓ = ₹ 2,812.50

c) Time Wage System;

- ✓ Time Wage System (Earnings) = Hours works × Rate per hour
- ✓ = 30 hours × ₹75
- ✓ = ₹ 2,250

d) Piece Rate System;

- ✓ Standard Time × Rate per hour
- ✓ = 40 × ₹ 75 = 3,000.

Note: *The above solution(d) is as per the ICAI's suggested answers.*

12. **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: -

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

a) Existing time-rate
b) Straight piece-work
c) Rowan System
d) Halsey premium system

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

(Nov. 2005, May 2023 Modified)

Ans. **Statement showing hours worked, weekly earnings, number of articles produced and labour cost per article under various wage systems:**

Particulars (Scheme)	Hours Worked	Weekly Earning (₹)	No. of Articles Produced	Labour Cost per Article (₹)
a) Existing time rate	49	8,425 (W-N-1)	120	70.21
b) Straight piece-work	40	8,640 (W-N-2)	135	64.00
c) Rowan System	40	9,007.41 (W.N.3)	135	66.72
d) Halsey System	40	8,000 (W.N.4)	135	63.70

Working Notes: -

1)

Particulars	**(₹)**
Existing time rate: Weekly Wages	40 hours @ ₹ 160/ hours = 6,400
	9 hours @ ₹ 225/hours = 2,025
	8,425

2)

Particulars		**(₹)**
Price rate system:	Basic Time: 5 hours for 15 articles cost of 15 articles at hourly rate of ₹ 160/ hours.	= 800
	Add 20%	= 160
		960
	∴ Rate/article	= 960 ÷ 15 = 64
	& Earnings for the week = 135 × 64	8,640

3) Rowan Premium System:

- ✓ Basic time = 5 hours. For 15 articles
- ✓ ***Add:*** 50% to time (i.e.,) 2.5 hours for 15 articles
- ✓ Total time = 7.5 hours for 15 articles
- ✓ Or, 30 Minutes/articles
- ✓ Time Allowed for 135 articles = 67.5 hours
- ✓ & Actual time taken for 135 articles = 40 hours
- ✓ Earnings = $(\mathrm{HW} \times \mathrm{RH}) + \left[\frac{\mathrm{TA}-\mathrm{HW}}{\mathrm{TA}} \times \mathrm{HW} \times \mathrm{RH}\right]$
- ✓ $= (40 \text{ hours} \times ₹\,160) + \left[\frac{67.5-40}{67.5} \times 40 \times 160\right]$
- ✓ = ₹ 9,007.41

4) Halsey Premium System: Earnings;

- ✓ $= \mathrm{HW} \times \mathrm{RH} + \frac{50}{100}(\mathrm{TA} - \mathrm{HW}) \times \mathrm{RH}$
- ✓ $= 40 \times ₹\,160 + \frac{1}{2}(67.5 - 40) \times ₹160$
- ✓ = ₹ 8,600.

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

i) Basic Salary per day	₹ 1,000
ii) Dearness allowance (DA)	20% of basic Salary
iii) House rent allowance	16% of basic salary
iv) Transport allowance	₹ 50 per day of actual work
v) Overtime	Twice the hourly rate (Considers basic and DA), only if works more than 9 hours a day otherwise no overtime allowance. If works for more than 9 hours a day then overtime is considered after 8th hours.
vi) Work of holiday and Sunday.	Double of per day basic rate provided works at least 4 hours. The holiday and Sunday basic is eligible for all allowances and Statutory deductions.
vii) Earned leave & Casual leave	These are paid leave.

viii) Employer's Contribution to Provident fund	12% of basic and DA
ix) 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 20X1, 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. HT 200.

You are required to Calculate: -

a) Earnings per day.

b) Effective wages rate per hour of Mr. Z

c) Wages to be changed to Job no HT200.

(Nov. 2020 RTP, MPT 2023–II)

Ans. **a) Calculation of earnings per day;**

Particulars	(₹)
✓ 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
✓ Employers Contribution to Provident fund (12% × ₹ 31,200)	3,744
✓ Employers 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**

Note- *Additional basic salary for Sunday and holiday is to be considered only for calculation of effective wage rate.*

b) Calculation of Effective wage rate per hour of Mr. Z;

Particulars	(₹)
✓ 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
✓ Employers Contribution to Provident fund (12% × ₹ 33,600)	4,032
✓ Employers Contribution to Person 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

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

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

14. 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

a) Day wages,
b) Piece rate,
c) Halsey scheme, and
d) The Rowan schemes.

Also Calculate under the above schemes the average cost of labour for thecompany to produce 100 pieces.

(ICAI SM)

Ans. **Calculation of earnings under different wage schemes: -**

a) Day Wages: -

Workers	Day Wages (₹)	Actual Output (Units)	Labour Cost per 100 pieces (₹)
A	600	180	333.33
B	600	120	500.00
C	600	100	600.00
Total	**1,800**	**400**	

✓ Average labour Cost to produce 100 pieces:

✓ $= \frac{\text{Total wages paid}}{\text{Total Output}} \times 100 = \frac{₹\ 1,800}{400\text{ units}} \times 100 = ₹\ 450$

b) Piece rate: -

Worker	Actual Output (Units)	Piece rate (₹)	Wages earned (₹)	Labour cost per 100 pieces (₹)
A	180	7.50	1,350	750.00
B	120	7.50	900	750.00
C	100	7.50	750	750.00
Total	**400**		**3,000**	

✓ Average cost of labour for the company to produce 100 pieces;

✓ $= \frac{₹\ 3{,}000}{400\ \text{units}} \times 100 = ₹\ 750$

c) Halsey Scheme: -

Worker	Actual Output (Units.)	Std. Time (hours)	Actual Time (hours)	Time Saved (hours)	Bonus Hours (50% of time saved)	Rate Per Hour (₹)	Total Wages (₹)	Labour Cost Per 100 Pieces (₹)
	A	**B**	**C**	**D=B−C**	**E**	**F**	**G=F×(C+E)**	**H=G/A*100**
A	180	18	8	10	5	75	975	541.67
B	120	12	8	4	2	75	750	625.00
C	100	10	8	2	1	75	675	675.00
Total	**400**						**2,400**	

✓ Average Cost of labour for the company to produce 100 pieces

✓ $= \frac{₹\ 2{,}400}{400\ \text{units}} \times 100 = ₹600$

d) Rowan Scheme: -

Worker	Actual Output (Units.)	Std. Time (hours)	Actual Time (hours)	Time Saved (hours)	Bonus Hours*	Rate Per Hour (₹)	Total Wages Including bonus (₹)	Labour Cost Per 100 Pieces (₹)
	A	**B**	**C**	**D=B−C**	**E**	**F**	**G=F×(C+E)**	**H=G/A*100**
A	180	18	8	10	4.44	75	933	518.33
B	120	12	8	4	2.67	75	800	666.67
C	100	10	8	2	1.60	75	720	720.00
Total	**400**						**2,453**	

✓ Bonus hours $= \frac{\text{Time Saved}}{\text{Std.Time}} \times$ Actual time

✓ Average Cost of labour for the company to produce 100 pieces

✓ $= \frac{₹2{,}453}{400\ \text{units}} \times 100 = ₹\ \mathbf{613.25}$

15.

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.

(ICAI SM)

Ans.

a) Bonus under Halsey Plan $= \frac{50}{100} \times$ (Standard Hour − Actual Hour) × R

i) Bonus under Rowan Plan $= \frac{\text{Actual Hour}}{\text{Standard Hour}} \times$ (Standard Hour − Actual Hour) × R

ii) Bonus under Halsey Plan will be equal to the bonus under Rowan Plan when the following condition holds good: -

$\frac{50}{100} \times (\text{Standard Hour} - \text{Actual Hour}) \times R = \frac{\text{Actual Hour}}{\text{Standard Hour}} \times (\text{Standard Hour} - \text{Actual Hour}) \times R$

$\frac{50}{100} = \frac{\text{Actual Hour}}{\text{Standard Hour}}$

Hence, when the actual time taken (AH) is 50% of the time allowed (SH), the bonus under Halsey and Rowan Plans is equal.

b) Statement of Bonus, total earnings of Employee and hourly earnings under Halsey and Rowan Systems.

SH	**AH**	**Time Saved**	**Basic Wages (AH × ₹8) (8 × ₹8)**	**Bonus Under Halsey System** $\left[\frac{50}{100} \times c \times 8\right]$	**Bonus Under Rowan System** $\left[\frac{B}{A} \times c \times 8\right]$	**Total Earnings Under Halsey System D+E**	**Total Earnings Under Rowan System D+F**	**Hourly Earnings Under Halsey System G/B**	**Hourly Earnings Under Rowan System H/B**
A Hrs	**B Hrs**	**C = (A-B) Hrs**	**D (₹)**	**E (₹)**	**F (₹)**	**G (₹)**	**H (₹)**	**I (₹)**	**J (₹)**
8	8	-	64	-	-	64	64	8.00	8.00
8	7	1	56	4	7	60	63	8.57	9.00
8	6	2	48	8	12	56	60	9.33	10.00
8	5	3	40	12	15	52	55	10.40	11.00
8	4	4	32	16	16	48	48	12.00	12.00
8	3	5	24	20	15	44	39	14.67	13.00
8	2	6	16	24	12	40	28	20.00	14.00
8	1	7	8	28	7	36	15	36.00	15.00

16. 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.

(ICAI SM)

Ans.

Particulars	**(₹)**
✓ Wages paid to worker during the year {((₹) 10,000 +2,000) × 12}	1,44,000
✓ ***Add:*** Employer Contribution to:	
✓ Provident Fund @ 10%	14,400
✓ E.S.I. Premium @ 4.75% (6.5 – 1.75)	6,840
✓ Bonus at 2 months' wages (Basic + DA)	24,000
Total	**1,89,240**

Effective hours per year: 285 days × 8 hours = 2,280 hours

Wage-rate per hour (for costing purpose): (₹)1,89,240/2,280 hours = (₹)**83**

17. 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.

(ICAI SM)

Ans.

1) Effective working days in a year	300
Less: Leave days on full pay	20
Effective working days	280 days
Total effective working hours (280 days × 8 hours)	2,240
2) Total wages paid in a year	(₹)
Basic pay	1,20,000
D.A.	36,000
Fringe benefits	12,000
	1,68,000
3) Hourly rate: ₹ 1,68,000/2,240 hours	**₹ 75.00**

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

Basic pay	₹ 10,000 p.m.
Dearness allowance	₹ 2,000 p.m.
Bonus	20% of salary and D.A.
Other allowances	₹ 2,500 p.m.
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'.

(ICAI SM)

Ans.

Statement showing Computation of effective hourly cost of employee 'x'

Particulars	Per month (₹)	Per annum (₹)
a) Earning of Employee 'X':		
✓ Basic pay	10,000	1,20,000
✓ Dearness Allowance	2,000	24,000
✓ Bonus	2,400	28,800
✓ Employer's contribution to provident fund	1,200	14,400
✓ Other allowances	2,500	30,000
	18,100	**2,17,200**
b) Effective working hours (refer workings)		2,000 hours
c) Effective hourly cost {(A) ÷ (B)}		**₹ 108.60**

Workings: -

- ✓ Calculation of effective working hours:
- ✓ Annual working hour less Normal idle time = 2,400 hours – 400 hours = 2,000 hours.

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

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

You are required to Calculate: -

a) Annual cost of each employee.

b) Employee cost per hour.

c) Cost of abnormal idle time, per employee

(Nov. 2018)

Ans. **a) Statement Showing Annual Cost of each employee;**

Particulars	Per Month (₹)	Per Annum (₹)
✓ Salary	30,000	3,60,000
✓ Bonus	7,500	90,000
✓ Employer's Contribution to PF, ESI etc.	4,500	54,000
✓ Cost of employee's welfare activities $\left(\frac{₹\,6,61,500}{175 \text{ Employees}}\right)$	315	3,780
✓ **Annual Cost of each employee**		**5,07,780**

b) Employee Cost per hour;

Particulars	(₹)
✓ Annual Cost of Each Employee ÷ Effective working hours	₹ 50,7780
✓ (310 days– leave Period) × 8 hours – Normal Idle time [(310– 30) × 8– 70]	2170 hours
✓ Effective Employee Cost per hour	₹ 234

Cost of abnormal Idle time, per employee = 50 hours × ₹ 234 = ₹ 11,700.

20. **You are given the following information of a worker;**

Name of Worker	:	'X'
Ticket No.	:	002
Work Started	:	1-4-X1 at 8 a.m.
Work Finished	:	5-4-X1 at 12 noon
Work Allotted	:	Production of 2,160 units
Work done and approved	:	2,000 units
Time and units allowed	:	40 units per hour
Wage rate	:	₹ 25 per hour
Bonus	:	40% of time saved
Worker X worked	:	9 hours a day

You are required to Calculate the remuneration of the worker on the following basis;

a) Halsey plan and

b) Rowan plan

(May 2011)

Ans. **Information Given –**

- ✓ No. of units produced and approved = 2,000
- ✓ Standard time = 40 units per hour
- ✓ Hourly Wage Rate = ₹ 25
- ✓ Time allowed Rate = 40 units per hour
- ✓ Time allowed for 2,000 units $\frac{2,000}{40}$ = 50 hours

a) Calculation of Remuneration under Halsey Plan: -

✓ Standard time allowed for 2,000 units;	50 hours
✓ Actual time taken for 2,000 units (W.N.1)	40 hours
✓ Time Saved (W.N.2)	10 hours
✓ Basic Wages for time taken 40 hours @ ₹ 25	1,000
✓ Bonus: 40% of time saved $\frac{40}{100} \times 10 \times 25$	100
✓ **Total**	**₹ 1,100**

Notes: *As per ICAI's suggested answers for calculation of Bonus under Halsey 40% bonus will be considered in this question only.*

b) Calculation of Remuneration Under Rowan Plan:

- ✓ Wages for time taken 40 hours @ ₹ 25 = ₹ 1,000
- ✓ Bonus = $\frac{\text{Time Saved}}{\text{Time Allowed}} \times (\text{Time Taken} \times \text{Hourly Rate})$
- ✓ $= \frac{40\times10\times25}{50} =$ ₹ 200
- ✓ **Total = ₹ 1,200**

Working Notes: -

1) Time Worked;

1.4.11 = 9 hours
2.4.11 = 9 hours
3.4.11 = 9 hours
4.4.11 = 9 hours
5.4.11 = 4 hours
Total **40 hours**

2)

Time Allowed = 50 hours
Time Taken = 40 hours
Time Saved = 10 hours

21. 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;

a) Rowan Plan
b) Halsey Plan

(May 2018)

Ans. **Calculation of Factory Cost of Work;**

Particulars	**(a)Rowan Plan (₹)**	**(b)Halsey Plan (₹)**
✓ Material Cost of Work	50	50
✓ Labour Cost of Work. (W.N.1)	93.75	87.50
✓ Prime Cost	143.75	137.50
✓ ***Add:*** Factory Overheads (100 % of Labour)	93.75	87.50
✓ **Factory Cost of Work**	**237.50**	**225.00**

Working Note

Calculation of Labour Cost of Work:

Rowan Plan = Time Taken × Rate per hour + $\frac{\text{Time Saved}}{\text{Time Allowed}}$ × Time Taken × Rate per hour

✓ = 15 hours × ₹ 5 + $\frac{5 \text{ hours}}{20 \text{ hours}}$ × 15 hours × ₹5

✓ = ₹ 93.75

Halsey Plan = Time Taken × Time Rate + 50% of Time Saved × Time Rate

= 15 hours × ₹5 + (50% of 5 hours) × ₹5 = ₹ 87.50

22. Zico Ltd. has its factory at two locations viz. Nasik and Satara. Rowan plan is used at Nasik factory and Halsey plan at Satara factory. Standard time and basic rate of wages are same for a job which is similar and is carried out on similar machinery. Normal working hours is 8 hours per day in a 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 hour.

Required: -

a) To Find out the normal wage; and

b) To Compare the respective Conversion costs.

(Nov. 2019)

Ans. **a) Normal Wages:** Nasik Factory = (₹ 120 × 32) = ₹ 3,840

Satara Factory = (₹ 120 × 30) = ₹ 3,600

b) Comparative Statement of respective Conversion Costs;

Particulars	Nasik Factory	Satara Factory
✓ Material Cost	0	0
✓ Direct Wages	3,840	3,600
✓ Bonus	768	600
	(6.4 × ₹ 120)	(5 × ₹ 120)
✓ Factory Overhead	800	750
✓ Factory Cost	**5,408**	**4,950**

Working:

Step 1; Let X be the cost of material and Y be the normal rate of wages per hour.

Step 2; Factory Cost of Nasik Factory;

Particulars	(₹)
A) Material Cost	X
B) Wages	32 Y
C) Bonus = $\frac{32}{40} \times (40 - 32)$ Y	6.4 Y
D) Overheads (₹ 25 × 32)	800
E) Factory Cost (Conversion Cost)	**5,408**

✓ X + 32 Y + 6.4 Y + ₹800 = ₹5,408

✓ X + 38.4 Y = ₹4,608 ___________________Equation (i)

Step 3; Factory Cost of Satara Factory;

Particulars	(₹)
1) Material Cost	X
2) Wages	30 Y
3) Bonus = 50% of (Standard Hour– Actual Hour) × R	

= 50% of (40– 30) × R	5 Y
4) Overheads (₹ 25 × 30)	750
5) Factory Cost (Conversion Cost)	**4,950**

- ✓ X + 30Y + 5Y + ₹ 750 = ₹ 4,950
- ✓ X + 35 Y = ₹ 4,200________________________Equation (ii)

Step 4; Subtract equation (i) from equation (ii).

- ✓ X + 38.4 Y = ₹ 4,608
- ✓ X + 35 Y = ₹ 4,200

– – –

- ✓ 3.4 Y = ₹ 408
- ✓ Y = ₹ 120
- ✓ New, X + 38.4 Y = ₹ 4,608
- ✓ X + 38.4 (120) = ₹ 4,608
- ✓ X= 0

23. A Job can be executed either through workman A or B. A takes 32 hours to complete the job while B finishes it in 30 hours. The Standard time to finished the job is 40 hours.

The hourly wage rate is same for both the workers. In addition, workman A is entitled to receive bonus according to Halsey plan (50%) sharing while B is paid bonus as per Rowan plan. The works overheads are absorbed on the job at ₹7.50 per labour hour worked. The factory cost of the job comes to ₹2,600 irrespective of the workman engaged.

Interpret the hourly wage rate and cost of raw materials input. Also show cost against each element of cost included in factory cost.

(RTP)

Ans. **Calculation of;**

1) Time Saved and Wages;

Workmen	A	B
✓ Standard time (hours.)	40	40
✓ Actual time taken (hours.)	32	30
✓ Time Saved (hours.)	8	10
✓ Wages paid @₹ X per hour. (₹)	32X	30X

2) Bonus Plan;

Particulars	Halsey	Rowan
Time Saved (hours.)	8	10
Bonus (₹)	$\left(\frac{8\text{ hours} \times ₹\text{ X}}{2}\right) = 4X$	$\left(\frac{10\text{ hours}}{40\text{ hours}} \times 30\text{ hours} \times ₹\text{ X}\right) = 7.5X$

3) Total Wages;

- ✓ Workman A; 32X + 4X = ₹ 36 X
- ✓ Workman B : 30X + 7.5X = ₹ 37.5X

Statement of Factory Cost of the Job

Workmen	A (₹)	B (₹)
✓ Material Cost (assumed)	Y	Y
✓ Wages (Shown above)	36X	37.5X
✓ Works Overhead	240	225
✓ Factory Cost (given)	2,600	2600

The above relations can be written as follows: -

- ✓ $36X + Y + 240 = 2{,}600$ (i)
- ✓ $37.5X + Y + 225 = 2{,}600$ (ii)
- ✓ Subtracting (i) from (ii) we get
- ✓ $1.5\ X - 15 = 0$
- ✓ $1.5\ X = 15$
- ✓ X = ₹ 10 per hour
- ✓ On Substituting the value of X in (i) we get y = ₹ 2,000

Hence, the wage rate per hour is ₹ 10 and the cost of raw materials is ₹ 2,000 on the job.

24. 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 taken 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

(May 2012)

Ans. **Calculation of earnings for workers under different incentive plans;**

Halsey's Premium Plan;

Particulars	Worker-A	Worker-B
✓ Actual time taken	40 hours	40 hours
✓ Standard time for Actual Production	$\frac{176\ \text{Pcs} \times 15\ \text{Minutes}}{60\ \text{Minutes}} =$ 44 hours	$\frac{140\ \text{Pcs} \times 15\ \text{Minutes}}{60\ \text{Minutes}} =$ 35 hours
✓ Minimum Wages	40 hours × ₹ 40 = ₹1,600	40 hours × ₹40 = ₹1,600
✓ Bonus	50% (44−40) × ₹ 40 = ₹ 80	No bonus
✓ **Earning**	**₹ 1,680**	**₹ 1,600**

Rowan's Premium Plan;

Particulars	Worker-A	Worker-B
✓ Minimum Wages (as above)	₹ 1,600	₹ 1,600
✓ Bonus	$\frac{4}{44} \times 40 \times ₹40 = ₹\,145.45$	No bonus
✓ **Earnings**	**₹ 1745.45**	**₹ 1,600**

25. 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 hours.
Job Y	12 hours.
Job Z	13 hours.

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?

(ICAI SM)

Ans. **Allocation of wages in Cost Accounting: -**

Particulars		(₹)
✓ Allocated to job X	: 15 hours × ₹ 30	450
✓ Allocated to job Y	: 12 hours × ₹ 30	360
✓ Allocated to Job Z	: 13 hours × ₹ 30	390
✓ Charged to Costing Profit & Loss A/c	: 4 hours × ₹ 30	120
Total		**1,320**

Working Notes: -

1) Total effective hours in a week;

$\left(8 \text{ hours} - \frac{(30 \text{ minutes} + 10 \text{ minutes})}{60}\right) \times 6 \text{ days} = 44 \text{ hours}$

2) Total wages for a week;

$(₹\,100 + 120\% \text{ of } ₹\,100) \times 6 \text{ days} = ₹\,1{,}320$

3) Wage rate per hour $= 1320 \div 44 \text{ hours} = ₹\,30$

4) Time wasted waiting for job (Abnormal idle time);

$= 44\text{hours} - (15 \text{ hours} + 12 \text{ hours} + 13 \text{ hours}) = 4 \text{ hours}$

26. Human Resources Department of 'A' Ltd. Computed labour turnover by replacement method at 3% for the quarter ended June 20X1. 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 1010 respectively.

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

(Nov. 2015 RTP)

Ans. **Calculation of labour turnover by Separation Method;**

✓ Separation Method $= \frac{\text{No.of worker Separated}}{\text{Average No.of workers}} \times 100$

✓ $= \frac{50}{1000} \times 100$

✓ $= 5\%$

Calculation of labour Turnover by Flux Method;

- ✓ Flux Method $= \frac{\text{No.of worker Separated+No.of worker accession}}{\text{Average No.of workers}} \times 100$
- ✓ $= \frac{50+(30+40)}{1000} \times 100$
- ✓ $= 12\%$

<u>Working Notes: -</u>

1) Calculation for Number of labours replaced;

- ✓ Replacement Method $= \frac{\text{No.of worker replaced}}{\text{Average No.of workers}} \times 100$
- ✓ $3\% = \frac{\text{No.of worker replaced}}{\frac{990+1010}{2}} \times 100$
- ✓ $3\% = \frac{\text{No.of worker replaced}}{1000} \times 100$
- ✓ No. of worker replaced = 30

2) Calculation for worker Separated;

✓ Worker at beginning of quarter	=	990
✓ (+) Workers newly recruited	=	40
✓ (+) Workers replaced	=	30
✓ (–) Workers left for replacement	=	(30)
✓ (–) Workers at end of quarter	=	(1010)
		20
✓ (+) Separated due to replacement	=	30
No. of Separated workers	=	50

27. 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 Wage Incentive system. The budgeted weekly output is 19,200 units. The selling price is ₹11 per unit and the direct Material Cost is ₹8 per unit. The Variable Overheads amount to ₹0.50 per direct labour hour and the fixed overheads 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

(May 2002)

Ans.

Statement of Profit

Particulars	Present Scheme	Halsey Scheme	Rowan Scheme
✓ Sales Value @ ₹ 11/Unit on 19,200 units	2,11,200	2,11,200	2,11,200
✓ ***Less:*** Direct Materials Consumed @ ₹ 8 per unit on 19200 units	(1,53,600)	(1,53,600)	(1,53,600)
✓ Direct Labour Cost (Refer above workings)	(36,000)	(28,000)	(30,000)
✓ Variable O/H @ 0.5 per direct Labour hours (Refer W.N. 2)	(1,600)	(1,200)	(1,200)

	20,000	28,400	26,400
✓ ***Less:*** Fixed Overheads	(9,000)	(9,000)	(9,000)
✓ Weekly Profit	11,000	19,400	17,400

Working Notes: -

1) Calculation of total wages under the present scheme;

- ✓ Wage rate per hour per workers $= \frac{₹\ 400}{40 \text{ hours}} = ₹10$ per hour
- ✓ ∴ Overtime Rate his/workers = Normal rate/hours + 50%
- ✓ = ₹ 10 + 50%
- ✓ =₹ 15/Per hour
- ✓ Average current output/hour = 6 units
- ✓ ∴ Hours to be worked for budgeted weekly output of 19,200 units
- ✓ $= \frac{19{,}200 \text{ units}}{6 \text{ units}} = 3{,}200$ hours per man hour
- ✓ Total Normal hours available in a week
- ✓ = No. of workers × Hours per week
- ✓ = 60 workers × 40 hours
- ✓ = 2,400 hours

2) Overtime hour required to be worked;

- ✓ = Total hours to be worked – Total normal hours. Available
- ✓ = 3,200 hours – 2,400 hours = 800 hours
- ✓ Total Wages

✓ Normal wages for total hours worked (3,200 hours × 10)	32,000
✓ ***Add:*** Overtime premium (W.N.1) (₹5 × 800 hours)	4,000
	<u>36,000</u>

3) Total wages under the proposed scheme: -

- ✓ Time allowed: For 6 units = 1 hours
- ✓ For 19,200 units $= \frac{19{,}200}{6 \text{ units}} = 3{,}200$ hours
- ✓ Time taken: 8 units need 1 hour
- ✓ 19,200 units need $= \frac{19{,}200}{8} = 2{,}400$ hours
- ✓ Time Saved = Time allowed – Time taken

= 3,200– 2,400
= 800 hours

Under Halsey (Normal Wages + Bonus;)

- ✓ Total wages = (Time taken × Time rate) + (50% × time saved × time rate)
- ✓ = (2,400 × 10) + (50% × 800 × 10)
- ✓ = 24,000 + 4,000 = ₹ 28,000/-

Under Rowan: -

- ✓ Total wages = Normal wages + Bonus
- ✓ $(\text{Time taken} \times \text{Time Rate}) + \left(\text{Time Saved} \times \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time rate}\right)$
- ✓ $= (2{,}400 \times 10) + \left(800 \times \frac{2{,}400}{3{,}200} \times 10\right)$
- ✓ = 24,000 + 6,000 = ₹ 30,000 -

4) Overtime Premium rate = Overtime rate – Normal rate
= ₹ 15 – ₹ 10
= ₹ 5/-

5) Variable Overheads are given as absorption rates which are absorbed on the basis of Direct Labour Hours worked.

Hence,

Under Present Scheme—Direct Labour hours worked were 3,200 Hours (Including Overtime.)

Overheads = 3,200 hours × 0.5 = ₹ 1,600/-

Under Halsey & Rowan Scheme: -

Direct Labour hours worked were 2,400 hours (& rest 800 hours. Were saved & not worked). So, for 2,400 hours worked = 2,400 × 0.5 = ₹ 1,200.

28. 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:

Particulars	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 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).

Overtime is paid twice of ordinary wage rate if a worker works for more than nine hours in a day or forty-eight hours in a week. Excluding holidays, the total number of hours works out to 176 in the relevant month. The company's contribution to Provident Fund and Employees State Insurance Premium are absorbed into overheads.

Calculate the wages payable to each worker.

(ICAI SM)

Ans. **Wages Payable: -**

Particulars	(A)	(B)	(C)
✓ Basic wages per hour (₹)	25.00	12.50	37.50
✓ Dearness allowance per hour (₹)	5.50	5.50	5.50
✓ Hourly rate (₹)	30.50	18.00	43.00
✓ Total normal hours	54.00	48.00	66.00
Total wages payable (₹)	**1,647.00**	**864.00**	**2,838.00**

1) Calculation of hours to be paid for worker A: -

Days	Normal hours	Extra hours	Overtime Hours	Equivalent normal hours for overtime worked	Total normal hours
Monday	8	1	$1^{1}/_{2}$	3	12
Tuesday	8	---	---	---	8
Wednesday	8	1	$1^{1}/_{2}$	3	12
Thursday	8	1	$^{1}/_{2}$	1	10
Friday	8	1	$1^{1}/_{2}$	3	12
Saturday	---	---	---	---	---
Total	**40**	**4**	**5**	**10**	**54**

2) Calculation of hours to be paid for worker B: -

Days	Normal hours	Extra hours	Overtime hours	Equivalent normal hours for overtime worked	Total normal hours
Monday	8	---	---	---	8
Tuesday	8	---	---	---	8
Wednesday	8	---	---	---	8
Thursday	8	---	---	---	8
Friday	8	---	---	---	8
Saturday	4	4*	---	---	8
Total	**44**	**4**	**---**	**---**	**48**

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

3) Calculation of hours to be paid for worker C.: -

Days	Normal hours	Extra hours	Overtime Hours	Equivalent normal hours for overtime worked	Total normal hours
Monday	8	1	$1^{1}/_{2}$	3	12
Tuesday	8	---	---	---	8
Wednesday	8	1	$1^{1}/_{2}$	3	12
Thursday	8	1	½	1	10
Friday	8	1	$1^{1}/_{2}$	3	12
Saturday	4	---	4*	8	12
Total	**44**	**4**	**9**	**18**	**66**

(* Worker-C has worked more than 48 hours in the week)

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

Time Rate (Per hour)	₹ 60
Time allowed	8 hours
Time taken	6 hours
Time saved	2 hours

(ICAI SM)

Ans. **Calculation of total earnings:**

= Time taken × Time rate + 50% (Time Allowed – Time Taken) × Time rate

= 6 hrs. × ₹60 + 1/2 × (2 hrs. × ₹60) or ₹360 + ₹60 = ₹420

Of his total earnings, ₹360 is an account of the time worked and ₹60 is on account of his share of the premium bonus.

30. 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 20X1, 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:

Particulars	M	J
Work Assigned	15 pieces	21 pieces
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 20X2. At the end of the month December 20X1. The accountant of the company has wrongly Calculated wages to these two workers taking ₹72 per hour.

Required: -

a) Calculate the loss incurred due to incorrect rate selection.

b) Calculate the loss incurred due to incorrect rate selection, had Rowan Scheme of bonus payment followed.

c) Calculate the loss/savings if Rowan Scheme of bonus payment had followed.

d) Discuss the suitability of Rowan Scheme of bonus payment for JBL Sisters?

(May 2021 RTP)

Ans. **a) Calculation of loss incurred due to incorrect rate selection;**

(While calculating loss only excess rate per hour has been taken)

Particulars	M (₹)	J (₹)	Total (₹)
Basic Wages	1,200 (100 hours × ₹ 12)	1,680 (140 hours × ₹ 12)	2,880
Bonus (as per Halsey Scheme)	120	168	288
(50%) of Time Saved × Excess Rate)	(50% of 20 hours × ₹ 12)	(50% of 28 hours × ₹ 12)	
Excess Wages Paid	1,320	1,848	3,168

b) Calculation of loss incurred due to incorrect rate selection had Rowan Scheme of bonus payment followed:

Particulars	M (₹)	J (₹)	Total (₹)
Basic Wages	1,200 (100 hours × ₹ 12)	1,680 (140 hours × ₹ 12)	2,880
Bonus (as per Rowan Scheme)	200	280	480
$\left(\frac{\text{Time Taken}}{\text{Time Allowed}} \times \text{Time Saved} \times \text{Excess Rate}\right)$	$\left(\frac{100}{120} \times 20 \times ₹\,12\right)$	$\left(\frac{140}{168} \times 28 \times ₹\,12\right)$	
Excess Wages Paid	1,400	1,960	3,360

c) Calculation of amount that could have been saved if Rowan Scheme were followed;

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

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

i) 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.

ii) 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.

<u>**Working Notes: -**</u>

Calculation of Total hours saved;

Particulars	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

31. Calculate the earnings of a worker under Rowan 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

(ICAI SM)

Ans. <u>**Calculation of total earnings: -**</u>

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

$$= 6 \text{ hours} \times ₹\,60 + \frac{2 \text{ hours}}{8 \text{ hours}} \times 6 \text{ hours} \times ₹60 = ₹\,360 + ₹\,90 = ₹\,\mathbf{450}$$

32. The standard time allowed for a certain piece of work is 240 hours. Normal wage rate is ₹75 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) 256 hours,

b) 120 hours, and

c) 24 hours respectively.

(MTP-March 2022)

Ans. **Calculation of total earnings and earnings per hour:**

	Particulars	**(a) Time taken is 256 hours**	**(b) Time taken is 120 hours**	**(c) Time taken is 24 hours**
A)	Time Allowed	240 hours	240 hours	240 hours
B)	Time taken	256 hours	120 hours	24 hours
C)	Time Saved (A-B)	Nil	120 hours	216 hours
D)	Bonus hours (Refer workings)	Nil	40.80 hours	64.80 hours
E)	Hours to be paid (B+D)	256 hours	180.80 hours	88.80 hours
F)	Wages rate per hour	₹75	₹75	₹75
G)	Total earnings (E×F)	₹19.200	₹12,060	₹6,660
H)	Earnings per hour (G+B)	₹75	₹100.50	₹277.50

Working Notes:

Calculation of bonus hours:

	Time saved 120 hours	**Time saved 216 hours**
For first 20% of time allowed i.e., 48 hours	12 (25% of 48 hours)	12 (25% of 45 hours)
For next 30% of time allowed i.e., 72 hours	28.80 (40% of 72 hours)	28.80 (40% of 72 hours)
For next 30% of time allowed i.e., 72 hours	-	21.60 (30% of 72 hours)
For next 20% of time allowed i.e., 48 hours	-	2.40 ((10% of 24 hours)
Bonus hours	40.80	64.80

33. A total of 108 labour hours have been put in a particular job card for repair work engaging a semi-skilled and skilled labour (Mr. Deep and Mr. Sam respectively).

The hours devoted by both the workers individually on daily basis for this particular job are given below:

Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
10.5	8.0	10.5	9.5	10.5

The skilled labour also worked on Saturday for 10 hours.

Sunday is a weekly holiday and each worker has to work for 8 hours on all week days and 5 hours on Saturdays; the workers are however paid full wages for Saturday (8 hours for 5 hours worked).

Semi-skilled and skilled worker is paid ordinary wage @ ₹400 and ₹600 respectively per day of 8 hours labour. Further, the workers are also paid dearness allowance @ 20%.

Extra hours worked over and above 8 hours are also paid at ordinary wage rate however, overtime premium of 100% of ordinary wage rate is paid if a worker works for more than 9 hours in a day AND 48 hours in a week.

You are required to COMPUTE the wages payable to Mr. Deep (Semi-skilled) and Mr. Sam (Skilled).

(RTP-May,2022)

Ans. **Calculation of total normal hours to be paid for Mr. Deep (Semi-skilled):**

Day	Normal hours	Extra hours	Overtime hours	Equivalent normal hours for overtime worked	Total normal hours
	A	**B**	**C**	**D = C×2**	**E = A+B+D**
Monday	8	1	1½	3	12
Tuesday	8	--	--	--	8
Wednesday	8	1	1½	3	12
Thursday	8	1	½	1	10
Friday	8	1	1½	3	12
Saturday	--	--	--	--	--
Total	40	4	5	10	54

Calculation of total normal hours to be paid for Mr. Sam (Skilled):

Day	Normal hours	Extra hours	Overtime hours	Equivalent normal hours for overtime worked	Total normal hours
	A	**B**	**C**	**D = C×2**	**E = A+B+D**
Monday	8	1	1½	3	12
Tuesday	8	---	---	---	8
Wednesday	8	1	1½	3	12
Thursday	8	1	½	1	10
Friday	8	1	1½	3	12
Saturday	5	3* + 1	1**	2	11
Total	45	8	6	12	65

*Mr. Sam will be paid for equivalent 8 normal working hours at ordinary wage rate, though 5 hours of working is required on Saturday. Further, extra 9th hour worked will also be paid at ordinary wage rate.

** Overtime of 1 hour worked over and above 9 hours will be paid at overtime rate.

Wages payable:

	Mr. Deep	Mr. Sam
Basic Wages per hour (₹ 400/8, ₹ 600/8) (₹)	50	75
Dearness allowance per hour (@ 20%) (₹)	10	15
Hourly rate (₹)	60	90
Total equivalent normal hours	54	65
Total Wages payable (₹)	**3,240**	**5,850**

34. HR Ltd. is progressing in its legal industry. One of its trainee executives, Mr. H, in the Personnel department has calculated labour turnover rate 24.92% for the last year using Flux method.

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

Employees	At the beginning	Joined	Left	At the end
Records clerk	810	1,620	90	2,340
Human Resource Manager	?	30	90	60
Legal Secretary	?	90	---	?
Staff Attorney	?	30	30	?
Associate Attorney	?	30	---	45
Senior Staff Attorney	6	---	---	18
Senior Records clerk	12	---	---	51
Litigation attorney	?	---	---	?
Employees transferred from the Subsidiary Company				
Senior Staff Attorney	---	12	---	---
Senior Records clerk	---	39	---	---
Employees transferred to the Subsidiary Company				
Litigation attorney	---	---	90	---
Associate Attorney	---	---	15	---

i) At the beginning of the year there were total 1,158 employees on the payroll of the company.

ii) The opening strength of the Legal Secretary, Staff Attorney and Associate Attorney were in the ratio of 3 : 3 : 2.

iii) The company has decided to abandon the post of Litigation attorney and consequently all the Litigation attorneys were transferred to the subsidiary company.

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

You are required to:

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

b) VERIFY the Labour turnover rate calculated under Flux method by Mr. H.

(RTP-Nov,2022)

Ans.

a) Calculation of Labor Turnover rate:

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

$$= \frac{165}{(1{,}158+2{,}694)/2} \times 100 = \frac{165}{1{,}926} \times 100 = 8.57\%$$

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

$$= \frac{315}{1{,}926} \times 100 = 16.36\%$$

b) Labor Turnover rate under Flux Method:

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

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

$$= \frac{1{,}851+315}{1{,}926} \times 100 = 112.46\%$$

Labour Turnover rate calculated by Mr. H is incorrect as it seems he has not taken the No. of new recruitment while calculating the labour turnover rate under Flux method.

Working Notes:

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

	At the Beginning of the year	At the end of the year
Records clerk	810	2,340
Human Resource Manager [Left- 90 + Closing- 60 – Joined- 30]	120	60
Legal Secretary*	45	135
Staff Attorney*	45	45
Associate Attorney*	30	45
Senior Staff Attorney	6	18
Senior Records clerk	12	51
Litigation attorney	90	0
Total	1,158	2,694

(*) At the beginning of the year:

Strength of Legal Secretary, Staff Attorney and Associate Attorney =

[1158 – {810 + 120 + 6 + 12 + 90} employees] or [1158 – 1038 = 120 employees]

[{Legal Secretary - 120 × $\frac{3}{8}$ 3 = 45, Staff Attorney - 120 × $\frac{3}{8}$ = 45 & Associate Attorney - 120 × $\frac{2}{8}$ = 30} employees]

At the end of the year:

[Legal Secretary -(Opening 45 + 90 Joining) = 135; Staff Attorney - (Opening 45 + 30 Joined – 30 Left) = 45]

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

Particulars	Separations	New Recruitment	Replacement	Total Joining
Records clerk	90	1,530	90	1,620
Human Resource Manager	90	--	30	30
Legal Secretary	--	90	--	90
Staff Attorney	30	--	30	30
Associate Attorney	15	15	15	30
Senior Staff Attorney	--	12	--	12
Senior Records clerk	--	39	--	39
Litigation attorney	90	--	--	--
Total	**315**	**1,686**	**165**	**1,851**

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

35. Archika Tyre Manufacturing Private Limited has four workers Ram, Shyam, Mohan & Kundan who are paid wages on the basis of ₹100 per day, ₹120 per day, ₹130 per day & ₹2500 per month respectively.

Standard working days in a week are six of 8 hours per day. For the month of October 2022, there was only one holiday other than Sunday for which no payment was made to employees except Kundan who was paid for full month. Sundays are considered paid holidays i.e. employees are paid for Sunday also even there is no working on that day. Provident fund contribution is 8% of monthly wages by employer and employee each. ESI contribution is 5% of monthly wages by employer and 4% of monthly wages by employee.

On the basis of above information, you are required to CALCULATE (regarding the month of October 2022):

i) Amount of net wages receivable by each employee from the employer.

ii) What is the total amount of Provident Fund required to be deposited by employer?

iii) What is the total amount of ESI required to be deposited by employer?

iv) What is the total labour cost to employer?

v) If total material cost is ₹ 20,000 for October 2022 and overheads are charged equal to labour cost, calculate total cost for the month.

(MTP Nov 2022)

Ans. **a)**

i) Calculation of net wages receivable by each employee from the employer (October 2022):

	Ram (₹)	Shyam (₹)	Mohan (₹)	Kundan (₹)	Total (₹)
Wages for October 2022	3,000 (₹100 x 30 days)	3,600 (₹120 x 30 days)	3,900 (₹130 x 30 days)	2,500	13,000
Less: Employee Contribution to PF @ 8% Less: Employee Contribution to ESI @ 4%	240 120	288 144	312 156	200 100	1,040 520
Net Wages Receivable	2,640	3,168	3,432	2,200	11,440

ii) Calculation of total amount of Provident Fund required to be deposited by employer (October 2022):

	(₹)
Total Wages for the month	13,000
Employer's Contribution to Provident Fund @8% of ₹13,000 Add: Employee's Contribution to Provident Fund @8% of ₹13,000	1,040 1,040
Total amount of Provident Fund required to be deposited by employer	2,080

iii) Calculation of total amount of ESI required to be deposited by employer (October 2022):

	(₹)
Total Wages for the month	13,000
Employer's Contribution to ESI @5% of ₹13,000 Add: Employee's Contribution to ESI @4% of ₹13,000	650 520
Total amount of ESI required to be deposited by employer	**1,170**

iii) Total labour cost to employer (October 2022):

	(₹)
Total Wages for the month Add: Employer's Contribution to Provident Fund @8% of ₹13,000 Add: Employer's Contribution to ESI @5% of ₹ 13,000	13,000 1,040 650
Total labour cost to employer	14,690

iv) Calculation of Total Cost for October 2022

	(₹)
Total Material Cost	20,000
Total Labour Cost	14,690
Total Overheads (Equal to Labour Cost)	14,690
Total Cost	**49,380**

b) Workings –

1) Fixed Production overheads (given) = ₹25 per unit

So, at 1,00,000 units capacity, it will be ₹25,00,000 (1,00,000 units × ₹25)

2) Selling and distribution overheads:

Given (1,00,000 units x ₹25) = ₹25,00,000
So, Fixed component = ₹25,00,000 x 20% = ₹5,00,000
Hence, variable component = ₹25,00,000 - ₹5,00,000 =
₹20,00,000 Variable per unit = ₹20,00,000/1,00,000 units
= ₹20 per unit

Flexible Budget

Particulars	**Per unit (₹)**	**Output Level**	
		60,000 units (₹)	**75,000 units (₹)**
Sales (A)	1,750	10,50,00,000	13,12,50,000
Variable costs:			
Direct Material	650	**3,90,00,000**	**4,87,50,000**
Direct Wages	325	**1,95,00,000**	**2,43,75,000**
Direct expenses	125	**75,00,000**	**93,75,000**
Variable overheads	50	**30,00,000**	**37,50,000**
Selling and distribution overheads	20	12,00,000	15,00,000
Total Variable cost (B)	1,170	7,02,00,000	8,77,50,000
Contribution (C = A - B)		**3,48,00,000**	**4,35,00,000**
Fixed costs:			
Production overheads		25,00,000	25,00,000
Administrative overheads		60,00,000	60,00,000
Selling and distribution overheads		**5,00,000**	**5,00,000**
Total Fixed cost (D)		90,00,000	90,00,000
Profit (C-D)		**2,58,00,000**	**3,45,00,000**

P/V Ratio = (₹3,48,00,000/₹10,50,00,000) × 100 = 33.143%

OR

P/V Ratio = (₹ 4,35,00,000/₹ 13,12,50,000) x 100 = 33.143%

Job Costing & Contract Costing
Assignment

Q. No. | **Questions & Answers**

1. A Shop floor supervisor of a small factory presented the following cost for Job No. 303. To determine the selling price.

Particulars	Per Unit (₹)
Materials	70
Direct Wages 18 hours @ ₹ 2.50 (Dept., X 8 hours; dept., Y 6 hours; dept., 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 20X1)

Particulars	(₹)	Particulars	(₹)
Materials used	1,50,000	Sales less returns	2,50,000
Direct Wages;			
– dept. X 10,000			
– dept. Y 12,000			
– dept. Z 8,000	30,000		
Special Stores Items	4,000		
Overheads			
– dept. X 5,000			
– dept. Y 9,000			
– dept. 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		50,000
Net Profit	30,000	Gross profit b/d	----
	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: -

1) Prepare a Job Cost Sheet.
2) Calculate the entire revised cost using 20X1 actual figures as basis.
3) Add 20% to total cost to Determine selling price.

(ICAI SM, Modified Nov-2019)

Ans. **Job Cost Sheet**

Customers Details ______________
Date of Commencement __________________
Job No.___________
Date of Completion____________

Particulars	(₹)
Direct Materials	70
Direct Wages;	
– Deptt. X ₹2.50 × 8 hours. = ₹ 20.00	
– Deptt. Y ₹ 2.50 × 6 hours = ₹ 15.00	

– Deptt. Z ₹ 2.50 × 4 hours, = ₹ 10.00	45
Chargeable expenses	5
Prime Cost	**120**
Overheads;	
– Deptt, X $= \frac{\text{₹ } 5,000}{\text{₹ } 10,000} \times 100 = 50\%$ of ₹ 20 = ₹ 10.00 – Deptt. Y $= \frac{\text{₹ } 9,000}{\text{₹ } 12,000} \times 100 = 75\%$ of ₹ 15 = ₹ 11.25 – Deptt. Z $= \frac{\text{₹ } 2,000}{\text{₹ } 8,000} \times 100 = 25\%$ of ₹ 10 = ₹ 2.50	23.75
Works Cost – Selling expenses $= \frac{\text{₹ } 20,000}{\text{₹ } 2,00,000} \times 100 = 10\%$ of work cost	**143.75** 14.38
Total Cost – Profit (20% of total cost)	158.13 31.63
Selling price	**189.76**

2. AP Ltd. received a job order for supply and fitting of plumbing materials. Following are the details related with the job work:

Direct Materials

AP Ltd. uses a weighted average method for the pricing of materials issues. Opening stock of materials as on 12th August 20X1:

- 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 20X1:

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

On 18th August 20X1:

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

On 27th August 20X1:

- 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 20X1:

- 20mm GI Pipe, 2 units of (15 feet size)
- Other fitting materials, 18 units

On 17th August 20X1:

- 15mm GI Pipe, 8 units of (15 feet size)
- Other fitting materials, 30 units

On 28th August 20X1:

- 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 20X1:

- Other fitting materials, 60 units
- Stainless Steel Faucet, 15 units

Direct Labour:

Plumber: 180 hours @ ₹100 per hour (includes 12 hours overtime) Helper: 192 hours @ ₹70 per hour (includes 24 hours overtime) Overtimes are paid at 1.5 times of the normal wage rate.

Overheads:

Overheads are applied @ ₹26 per labour hour.

Pricing policy:

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

You are required to

a) CALCULATE the total cost of the job.

b) CALCULATE the price to be charged from the customer.

(RTP Nov 2020, Modified MTP Nov 2019, Modified SM)

Ans.

a) Calculation of Total Cost for the 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 $15 \text{ units} \times \left(\frac{₹\,6 \times ₹\,204 + 15 \times ₹209}{21 \text{ units}}\right)$	3,113.57	
- Valve $6 \text{ units} \times \left(\frac{₹\,8 \times ₹\,404 \ \times 10 \times ₹\,402 + 14 \times ₹\,424}{32 \text{ units}}\right)$	2,472.75	23,091.95
Direct Labour:		
- Plumber [(180 hours × ₹100) + (12 hours × ₹50)]	18,600.00	
- Helper [(192 hours × ₹70) + (24 hours × ₹35)]	14,280.00	32,880.00
- Overheads [₹26 × (180 + 192) hours]		9,672.00
Total Cost		**65,643.95**

b) Price to be charged for the job work:

Particulars	Amount (₹)
Total Cost incurred on the job	65,643.95
Add: 25% Profit on Job Price $\left(\frac{65{,}643.95}{75\%} \times 25\%\right)$	21,881.32
	87,525.27

Working Note:

1) Cost of 15mm GI Pipe

Date		Amount (₹)
17-08-20X1	8 units × ₹ 600	4,800
28-08-20X1	$10 \text{ units} \left(\frac{4 \times ₹600 + 35 \times ₹628}{39 \text{ units}}\right)$	6251.28
		11,051.28

2) Cost of 20mm GI Pipe

Date		Amount (₹)
12-08-20X1	2 units × ₹ 660	1,320
28-08-20X1	$2 \text{ units} \left(\frac{8 \times ₹660 + 30 \times ₹610 + 20 \times ₹660}{58 \text{ units}}\right)$	1,268.28
		2,588.28

3) Cost of other fitting materials

Date		Amount (₹)
12-08-20X1	18 units × ₹ 26	468

17-08-20X1	30 units × ₹ 26	780
28-08-20X1	34 units $\left(\frac{12 \times ₹\,26 + 150 \times ₹28}{162 \text{ units}}\right)$	946.96
30-08-20X1	60 units $\left(\frac{12 \times ₹\,26 + 150 \times ₹28}{162 \text{ units}}\right)$	1,671.11
		3,866.07

3. SM Motors Ltd. is a manufacturer of auto components. Following are the details of expenses for the year 20X1-X2:

	₹
Opening Stock of Material	15,00,000
Closing Stock of Material	20,00,000
Purchase of Material	1,80,50,000
Direct Labour	90,50,000
Factory Overhead	30,80,000
Administrative Overhead	20,50,400

During the FY 20X2-X3, the company has received an order from a car manufacturer where it estimates that the cost of material and labour will be ₹80,00,000 and ₹40,50,000 respectively. The company charges factory overhead as a percentage of direct labour and administrative overheads as a percentage of factory cost based on previous years cost.
Cost of delivery of the components at customer's premises is estimated at ₹4,50,000.

You are required to:

i) CALCULATE the overhead recovery rates based on actual costs for 20X1-X2.

ii) PREPARE a Job cost sheet for the order received and the price to be quoted if the desired profit is 25% on sales.

(Modified May 2020, RTP May 2021 & Modified RTP May 2022)

Ans. **i) Calculation of Overhead Recovery Rate:**

Factory Overhead Recovery Rate = $\frac{\text{Factory Overhead in 20X1} - \text{X2}}{\text{Direct labour cost in 20X1} - \text{X2}} \times 100$

Factory Overhead Recovery Rate = $\frac{30{,}80{,}000}{90{,}50{,}000} \times 100 = 34\%$ of direct labour.

Administrative Overhead Recovery Rate = $\frac{\text{Administrative Overhead in 20X1} - \text{X2}}{\text{Factory cost in 20X1} - \text{X2 W.N.}} \times 100$

Administrative Overhead Recovery Rate = $\frac{20{,}50{,}400}{2{,}96{,}80{,}000} \times 100 = 6.91\%$ of Factory cost

Working Note:

Calculation of Factory cost in 20X1-X2

Particulars	Amount (₹)
Opening Stock of Material	15,00,000
Add: Purchase of Material	1,80,50,000
Less: Closing Stock of Material	(20,00,000)
Material Consumed	1,75,50,000
Direct Labour	90,50,000
Prime Cost	2,66,00,000
Factory Overhead	30,80,000
Factory Cost	2,96,80,000

ii) Job Cost Sheet for the order received in 20X2-X3

Particulars	Amount (₹)
Material	80,00,000
Labour	40,50,000
Factory Overhead (34% of ₹ 40,50,000)	13,77,000
Factory Cost	1,34,27,000
Administrative Overhead (6.91% of ₹ 1,34,27,000)	9,27,806
Cost of delivery	4,50,000

Total Cost	1,48,04,806
Add: Profit @ 25% of Sales or 33.33% of cost	49,34,935
Sales value (Price to be quoted for the order)	1,97,39,741

Hence the price to be quoted is ₹ 1,97,39,741

4. In a factory following the Job Costing Method, an abstract from the work-in-progress as on 30th September was prepared as under.

Job No.	Materials (₹)	Direct hours	Labour (₹)	Factory Overheads applied (₹)
115	1325	400 hours	800	640
118	810	250 hours	500	400
120	765	300 hours	475	380
	2,900		**1,775**	**1,420**

Materials used in October were as follows;

Materials Requisition No.	Job No.	Cost (₹)
54	118	300
55	118	425
56	118	515
57	120	665
58	121	910
59	124	720
Total		**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 being not suitable. A material transfer note issued in October indicated that material issued under Requisition No. 55 for Job 118 was directed to Job 124.

The hourly rate in shop A per labour hour is ₹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 jobs. It is the practice of the management to put a 10% on the factory cost to cover administration and selling overheads and invoice the job to the customer on a total cost plus 20% basis. Determine the invoice price of these three jobs?

(ICAI SM)

Ans.

Factory Cost Statement of Completed Job.

Month	Job No. (₹)	Materials (₹)	Direct labour (₹)	Factory Overheads (80% of direct labour cost) (₹)	Factory Cost (₹)
September	115	1,325	800	640	2765

October	115	----	125	100	225
Total		**1,325**	**925**	**740**	**2,990**
September	118	810	500	400	1,710
October	118	515	330	264	1,109
Total		**1,325**	**830**	**664**	**2,819**
September	120	765	475	380	1,620
October	120	665	245	196	1,106
Total		**1,430**	**720**	**576**	**2,726**

Invoice Price of Complete Job

Job No.	115 (₹)	118 (₹)	120 (₹)
Factory cost	2,990.00	2,819.00	2,726.00
Administration and selling overheads @ 10% of factory cost	299.00	281.90	272.60
Total cost	3,289.00	3,100.90	2,998.60
Profit (20% of total cost)	657.80	620.18	599.72
Invoice Price	3,946.80	3,721.08	3,598.32

Assumption: -
Indirect labor costs have been included in the factory overhead which has been recovered as 80% of the labour cost.

5. In the current quarter, a company has undertaken two jobs. The data relating to these jobs are as under;

Particulars	Job 1102	Job 1108
Selling price	₹ 1,07,325	₹ 1,57,920
Profit as percentage on cost	8%	12%
Direct Materials	₹ 37,500	₹ 54,000
Direct Wages	₹ 30,000	₹ 42,000

It is the policy of the company to charge Factory overheads as percentage on direct wages and selling and Administration overheads as percentage on Factory Cost.

The company has received a new order for manufacturing of a similar job. The estimate of direct materials and direct wages relating to the new order are ₹64,000 and ₹50,000 respectively. A profit of 20% on sales is required.

You are required to compute;

a) The rates of Factory overheads and Selling and Administration overheads to be charged;

b) The Selling price of the new order.

(Nov 2002)

Ans. **a) Computation of factory OH Rates & Selling & Distribution OH Rates;**
Let the factory OH Recovery Rate be ‘X’ &, Selling & Admin. OH Recovery Rate be ‘Y’.

Jobs Cost Sheet

Particulars	Job 1102	Job 1108
✓Direct Materials	37,500	54,000
✓Direct wages	30,000	42,000
Prime Cost	67,500	96,000
✓Factory O/Hs;		
✓Factory Exp.	30,000 X	42,000 X
Factory Cost (A).	67,500 + 30,000 X	96,000 + 42,000 X
✓Selling & Distribution O/Hs;		
✓Selling & Admin. Cost **(B)**	(67,500 + 30,000 X) y	(96,000 + 42,000 X) y
✓Total cost **C= (A+B)**	(67,500 + 30,000 x) + (67,500 + 30,000 X) y	(96,000 + 42,000 x) +(96,000 + 42,000 X) y

Please check this equation part -Done

Computation of Total Cost of Job No. 1102 & 1108

Job No. 1102:

Total cost when Profit is 8% on cost $= \frac{1,07,325}{108} \times 100$

= ₹ 99,375

Job No. 1108;

Total cost when Profit is 12% on cost $= \frac{1,57,920}{112} \times 100$

= ₹ 1,41,000

Job No. 1102

67,500 + 30,000 X + 67,500 y + 30,000 xy = 99,375

Or, 30,000 X + 30,000 xy + 67,500 y = 31,875………………… (1)

Job No. 1108;

96,000 + 42,000 X + 96,000 y + 42,000 xy = 1,41,000

Or, 42,000 X + 96,000 y + 42,000 xy = 45,000……………………..(2)

Multiplying equation (1) by 4.2 & equation (2) by 3 we get,

1,26,000 X + 1,26,000 Xy + 2,83,500 y = 1,33,875

1,26,000 X + 1,26,000 xy + 2,88,000 y = 1,35,000

(−) (−) (−)

− 4,500 y = − 1,125

∴ y = 0.25

Putting the value of 'y' in equation (1), we get

30,000 X + 30,000 X × 0.25 + 67,500 × 0.25 = 31,875

Or, 30,000 X + 75.00X + 16,875 = 31,875

37,500 X = 15,000

∴ X = 0.4

Hence, Factory OH Recovery Rate on Direct Wages = 40%, & Selling & Admin. OH Recovery Rate on Factory Cost = 25%.

b) Computation of Selling Price of New Order;

✓ Direct Materials	64,000
✓ Direct Wages	50,000
Prime Cost	1,14,000
✓ Factory OH (40% on 50 000)	20,000
Factory Cost	1,34,000
✓ Selling & Admin. OH (25% on 1,34,000)	33,500
Total Cost	1,67,500
✓ ***Add:*** Profits $\left(\frac{1,67,500}{80} \times 20\right)$	41,875
∴ Selling Price	**2,09,375**

6. A Firm uses Job Costing System and recovers OH based on Direct Labor. Three jobs were worked on during a month and their details are as follows;

Particulars	Job 1	Job 2	Job 3
Opening Work in Progress	₹ 8,500	Nil	₹ 46,000
Material Cost for the month	₹ 17,150	₹ 29,025	Nil
Labor Costs for the month	₹ 12,500	₹ 23,000	₹ 4,500

OH for the period were exactly as budgeted ₹1,40,000. Jobs 1 and 2 are incomplete at the end of the month. You are required to calculate the value of Closing WIP.

(RTP)

Ans.

1) Computation of OH Recovery Rate;

- ✓ Total Labour Cost for the month = ₹ 12,500 + ₹ 23,000 + ₹ 4,500 = ₹ 40,000
- ✓ So, OH Absorption Rate = $\frac{₹\ 1,40,000}{₹\ 40,000}$ = 350% of Direct Labour Cost

2) Valuation of Closing Work-in-Progress (Only for job 1 and 2, which are incomplete at the month end)

Particulars	Job 1 (₹)	Job 2 (₹)	Total (₹)
Opening Work in Progress Value	8,500	Nil	8,500
Material Costs for the month	17,150	29,025	46,175
Labour Costs for the month	12,500	23,000	35,500
OH absorbed at 350% of Direct Labour Cost	43,750	80,500	1,24,250
Total	**81,900**	**1,32,525**	**2,14,425**

7. A Company has been asked to quote for a Job. The company aims to make a net profit of 30% on sales. The estimated cost for the job is as follows;

i) Direct Materials 10kg @ ₹10 per kg
ii) Direct labour 20 hours @ ₹5 per hour

Variable production overheads are recovered at the rate of ₹2 per labour hour.

Fixed production overheads for the company are budgeted to be ₹1,00,000 each year and are recovered on the basis of labour hours.

There are 10,000 budgeted labour hours each year. Other costs in relation to selling, distribution and administration are recovered at the rate of ₹50 per job.

Determine quote for the job by the Company.

(RTP)

Ans.

Determination of quotation price for the job

Cost	(₹)
✓ Direct Material (10 kg × ₹ 10)	100
✓ Direct Labour (20 hours × ₹ 5)	100
✓ Variable production overhead (20 hours × ₹ 2)	40
✓ Fixed Overhead $\left(\frac{₹\ 1,00,000}{10,000\text{ budgeted hours}} \times 20\text{ hours}\right)$	200
✓ Other Costs	50
Total Costs	**490**

- ✓ Net profit is 30% of sales, therefore total costs represent 70% (₹490 × 100) ÷ 70 = ₹700 price to quote for job.
- ✓ To Check answer is correct; profit achieved will be ₹ 210 (₹ 700 –₹490) = ₹ 210 ÷ ₹700 = 30%

8. A Furniture making business manufactures quality furniture to customers' order. It has three Production Departments (A, B, and C) which have OH Absorption Rates (per Direct Labour Hour) of ₹12.86, ₹12.40 and ₹14.03 respectively.

Two pieces of furniture are to be manufactured for customers. Direct Costs are as follows;

Particulars	Job 1	Job 2
Direct Materials	**₹ 154**	**₹ 108**
Direct Labour;		
Department A Labour Rate ₹ 7.60 per hour	20 hours	16 hours
Department B Labour Rate ₹ 7.00 per hour	12 hours	10 hours
Department C Labour Rate ₹ 6.80 per hour	10 hours	14 hours

The Firm quotes prices to customers that reflect a required profit of 25% on Selling Price calculate the total cost and selling price of each job. **(RTP)**

Ans.

Job Cost Sheet

Particulars	Job 1	Job 2
Direct Materials	**154.00**	**108.00**
Direct Labour;		
Department A	20 hours × ₹ 7.60 = 152.00	16 hours × ₹ 7.60 = 121.60

Department B	12 hours × ₹ 7.00 = 84.00	10 hours × ₹ 7.00 = 70.00
Department C	10 hours × ₹ 6.80 = 68.00	14 hours × ₹ 6.80 = 95.20
Prime Cost	**458.00**	**394.80**
Add: Overheads;		
Department A	20 hours × ₹ 12.86 = 257.20	16 hours × ₹ 12.86 = 205.76
Department B	12 hours × ₹ 12.40 = 148.80	10 hours × ₹ 12.40 = 124.00
Department C	10 hours × ₹ 14.03 = 140.03	14 hours × 14.03 = 196.42
Total Cost	**1,004.03**	**920.98**
Add: Profit (25% i.e., 1/4th on Price = 1/3rd on Cost)	334.68	306.99
Quoted Selling Price	**1,338.71**	**1,227.97**

9. 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 realisable value of ₹ 2,000 only. The normal rate of spoilage is 2%. Record this in the costing journal.

(ICAI SM)

Ans. Actual loss due to spoilage = 8% of ₹1,00,000 = ₹8,000 and Normal loss = 2% of ₹1,00,000 = ₹2,000, therefore abnormal loss = ₹6,000.

The rejection has a realisable value of ₹2,000, which is to be apportioned between normal loss and abnormal loss in the ratio of 2:6.

The accounting entries necessary for recording the above facts would be:

		(₹)	**(₹)**
Material Control Account	Dr.	2,000	
Overhead Control Account	Dr.	1,500	
Costing Profit & Loss Control Account	Dr.	4,500	
To Work-in-Progress Control Account			8,000

In the case of defectives being inherent in the manufacturing process, the rectification cost may be charged to the specific jobs in which they have arisen. In case defectives cannot be identified with jobs, the cost of rectification may be treated as factory overheads. Abnormal defectives should be written off to the Costing Profit and Loss Account.

Ans.

Job Cost Sheet

Particulars	**Job 1**	**Job 2**
Direct Materials	**154.00**	**108.00**
Direct Labour;		
Department A	20 hours × ₹ 7.60 = 152.00	16 hours × ₹ 7.60 = 121.60
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Add: Profit (25% i.e., 1/4th on Price = 1/3rd on Cost)	334.68	306.99
Quoted Selling Price	**1,338.71**	**1,227.97**

10. Ispat Engineers Limited (IEL) undertook a plant manufacturing work for a client. It will charge a profit mark up of 20% on the full cost of the jobs. The following are the information related to the job:

Direct materials utilised – ₹1,87,00,000

Direct labour utilised – 2,400 hours at ₹80 per hour

Budgeted production overheads are ₹48,00,000 for the period and are recovered on the basis of 24,000 labour hours.

Budgeted selling and administration overheads are ₹18,00,000 for the period and recovered on the basis of total budgeted total production cost of ₹36,00,00,000.

Required:

CALCULATE the price to be charged for the job.

(RTP Nov 2019)

Ans. **Calculation of Job price**

Particulars	Amount (₹)
Direct materials	1,87,00,000
Direct wages (₹80 × 2,400 hours)	1,92,000
Production overheads $\left(\frac{\text{₹ } 48,00,000}{24,000 \text{ hours}} \times 2,400 \text{ hours}\right)$	4,80,000
Production cost	1,93,72,000
Selling and administration overheads $= \left(\frac{\text{₹ } 18,00,000}{36,00,00,000 \text{ hours}} \times \text{₹}1,93,72,000\right)$	96,860
Total cost of sales	1,94,68,860
Profit mark-up @ 20%	38,93,772
Price for the job	**2,33,62,632**

11. A Ltd. is an engineering manufacturing company producing job orders on the basis of specifications provided by the customers. During the last month it has completed three jobs namely A, B and C. The following are the items of expenditures which are incurred in addition to direct materials and direct employee cost:

i) Office and administration cost - ₹ 6,00,000
ii) Product blueprint cost for job A - ₹ 2,80,000
iii) Hire charges paid for machinery used in job work B - ₹ 80,000
iv) Salary to office attend ants - ₹ 1,00,000
v) One time license fee paid for software used to make computerized graphics for job C - ₹ 1,00,000.
vi) Salary paid to marketing manager - ₹ 2,40,000.

Required:

CALCULATE direct expenses attributable to each job.

(MTP July 2021)

Ans. **Calculation of Direct expenses**

Particulars	Job A (₹)	Job B (₹)	Job C (₹)
Product blueprint cost	2,80,000	--	--
Hire charges paid for machinery	--	80,000	--
License fee paid for software	--	--	1,00,000
Total Direct expenses	**s2,80,000**	**80,000**	**1,00,000**

Joint Products and by Products

Q. No. | **Questions and Answer**

1.

A company produces two joint product X and Y, from the same basic materials.

The processing is completed in three departments.

Materials are mixed in department I. At the end of this process X and Y get separated. After separation, X is completed in the department II and Y is finished in department III. During a period 2,00,000 kgs of raw material were processed in department I, at a total cost of ₹ 8,75,000, and the resultant 60% becomes X and 30% becomes Y and 10% normally lost in processing.

In department II 1/6 of the quantity received from department I is lost in processing. X is further processed in department II at a cost of ₹ 1,80,000.

In department III further new material added to the material received from department I and weight mixture is doubled, there is no quantity loss in the department and further processing cost (with material cost) is ₹ 1,50,000.

The details of sales during the year;

Particulars	Product – X	Product – Y
Quantity sold (kgs)	90,000	1,15,000
Sales price per kg (₹)	10	4

There were no opening stocks. If these products sold at split-off point, the selling price of X and Y would be ₹ 8 and ₹ 4 per kg respectively.

Required: -

i) Prepare a statement showing the apportionment of joint cost to X and Y in proportion of sales value at split off point.

ii) Prepare a statement showing the cost per kg. of each product indicating joint cost, processing cost and total cost separately.

iii) Prepare a statement showing the product wise profit for the year.

On the basis of profits before and after further processing of product X and Y, give your comment that products should be further processed or not.

(May 2005, Modified in May 2002 & RTP Nov 2021, ICAI SM Modified)

Ans.

1) <u>Apportionment of joint cost in the ratio of split off point</u>:

Joint cost = ₹ 8,75,000

<u>Calculation of ratio of sale value at split off point</u>:

Total quantity = 2,00,000 kg; Normal loss 2,00,000 × 10% = 20,000 kg

Total output = 1,80,000; Output ratio 60: 30 or 2:1

Output of X at Department I = 1,80,000 kg × 2/3 = 1,20,000kg

Output of Y at Department II = 1,80,000 kg × 1/3 = 60,000 kg

Sale value = 1,20,000 kg × ₹ 8 per kg = ₹ 9,60,000

Sale value = 60,000 kg × ₹ 4 per kg = ₹ 2,40,000

Ratio = 4:1

Apportionment of joint cost to product X = ₹ 8,75,000 × (4/5) = ₹ 7,00,000

Apportionment of joint cost to product Y = ₹ 8,75,000 × (1/5) = ₹ 1,75,000

2) Calculation of different cost per kg:

Joint Cost per unit

Joint cost of X = ₹ 7,00,000 ÷ (1,20,000 kg – 20,000* kg) = ₹ 7 per kg

Joint cost of Y = ₹ 1,75,000 ÷ 1,20,000* kg = ₹ 1.45833 per kg

*1/6 of the quantity is lost in the further processing i.e., 1,20,000 × 1/6 = 20,000 kg and weight mixture of Product Y is doubled i.e., 60,000 x 2 = 1,20,000 kg.

Processing cost per unit

For Product X = ₹ 1,80,000 ÷ 1,00,000 = ₹ 1.8 per unit

For Product Y = ₹ 1,50,000 ÷ 1,20,000 = ₹ 1.25 per unit

Total cost per unit

For Product X = ₹ 7 +₹ 1.8 = ₹ 8.8 per unit

For Product Y = ₹ 1.45833 + ₹ 1.25 = ₹ 2.70833 per unit

3) Statement showing the product wise profit for the year:

Sale value of product X = 90,000 kg × ₹ 10 per kg = ₹ 9,00,000

Sale value of product Y = 1,15,000 kg × ₹ 4 per kg = ₹ 4,60,000

Total cost of product X = 90,000 kg × ₹ 8.8 per kg = ₹ 7,92,000

Total cost of product Y = 1,15,000 kg × ₹ 2.70833 per kg = ₹ 3,11,458

Profit for X = ₹ 9,00,000 – ₹ 7,92,000 = ₹ 1,08,000

Profit for Y = ₹ 4,60,000 – ₹ 3,11,458 = ₹ 1,48,452

4) Calculation of Profit before and after further processing:

Profit for X after further processing = ₹ 1,08,000

Profit for Y after further processing = ₹ 1,48,452

Calculation of profit before further processing:

Sale value = 1,20,000 kg × ₹ 8 per kg = ₹ 9,60,000

Sale value = 60,000 kg × ₹ 4 per kg = ₹ 2,40,000

Total cost of X before further processing = ₹ 7,00,000

Total cost of Y before further processing = ₹ 1,75,000

Profit of X before further processing = ₹ 9,60,000 - ₹ 7,00,000 = ₹ 2,60,000

Profit of Y before further processing = ₹ 2,40,000 - ₹ 1,75,000 = ₹ 65,000

Advise: It can be clearly shown from the above calculation that profit in case of product Y is more after further processing but in case of Product X it is lower. Therefore, company should not further process product X but further processing product Y is beneficial.

2. A Ltd. Produces ‘M’ as a main product and gets two by products – ‘P’ and ‘Q’ in the course of processing.

Following information are available for the month of October, 20X1;

Particulars	M	P	Q
Cost after separation	----	₹ 60,000	₹ 30,000
No. of units produced	4,500	2,500	1,500
Selling price (per unit)	₹ 170	₹ 80	₹ 50
Estimated Net profit to sales	----	30%	25%

The joint cost of manufacture upto separation point amounts to ₹ 2,50,000. Selling expenses amounting to ₹ 85,000 are to be apportioned to the three products in the ratio of sales units.

There is no opening and closing stock. Prepare the statement showing;

a) Allocation of joint cost.

b) Product wise overall profitability and

c) Advise the company regarding results if the by-product 'P' is not further processed and is sold at the point of separation at ₹ 60 per unit without incurring selling expenses.

(Nov. 2017, Modified in May 2013, May 2015 & RTP)

Sol. **a)**

Statement Showing Allocation of Joint Cost

Particulars	**P**	**Q**
No. of units produced	2,500	1,500
Selling price per unit (₹)	80	50
Sales Value (₹)	2,00,000	75,000
Less: Estimated profit (P – 30%, Q – 25%)	60,000	18,750
Cost of sales	1,40,000	56,250
Less: Estimated Selling Expense (W.N-1)		
	25,000	15,000
Cost of Production	1,15,000	41,250
Less: Cost after separation	60,000	30,000
Joint Cost allocated	55,000	11,250

Working Note: -

1. Calculation of selling expense;

$P = \frac{85{,}000}{8{,}500} \times 2{,}500 = 25{,}000$

$Q = \frac{85{,}000}{8{,}500} \times 1{,}500 = 15{,}000$

$M = \frac{85{,}000}{8{,}500} \times 4{,}500 = 45{,}000$

b)

Statement of Profitability

Particulars	M (₹)	P (₹)	Q (₹)
✓ Sales value (A)	7,65,000 (4,500 × ₹ 170)	2,00,000 (2500 x 80)	75,000 (1500 x 50)
✓ **Less:** Joint Cost	1,83,750 (2,50,000 – 55,000 – 11,250)	55,000	11,250
Cost after separation	----	60,000	30,000
Selling Expenses	45,000	25,000	15,000
✓ Total cost (B)	2,28,750	1,40,000	56,250
✓ Profit (A – B)	5,36,250	60,000	18,750

*Overall profit = ₹ 5,36,250 + ₹ 60,000 + ₹ 18,750
= ₹ 6,15,000

c) If the by-product P is not further processed and is sold at the point of separation;

Particulars	Amount (₹)
✓ Sales value at the point of separation (2,500 units × ₹ 60)	1,50,000
✓ **Less:** Joint cost	55,000

✓ Profit	95,000
✓ Profit after further processing	60,000
✓ Incremental Profit	35,000

*If the by-product P is sold at the point of separation, it will give an additional profit of ₹ 35,000 to the company, hence, the company should sell by-product P without further processing.

3. 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 up to 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;

Particulars	**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: -

a) Show how joint cost of ₹ 1,00,000 would be apportioned between Caustic Soda and Chlorine under each of following methods;

- **i)** Sales Value at Split-off Pont;
- **ii)** Physical Unit Methods, and
- **iii)** Estimated Net Realisable Value

b) Life time 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?

(ICAI SM with modification, May 2000, Modified MTP Nov 2020)

Ans. **i) Sales Value at Split-off Point Method: -**

Products	**Sales (in Ton)**	**Selling Price per Ton (₹)**	**Sales Revenue (₹)**	**Joint Cost Apportioned (₹)**
✓ Caustic Soda	1,200	50	60,000	50,000
✓ Chlorine	800	75	60,000	50,000
Total			**1,20,000**	**1,00,000**

✓ **Apportionment of Joint Cost;**

$$= \frac{Total\ Joint\ Cost}{Total\ Sale\ Value} \times Sale\ revenue\ of\ each\ product$$

✓ **Joint Cost Apportioned to Caustic Soda**

$$= \frac{₹1,00,000}{₹1,20,000} \times ₹60,000$$

= **₹50,000**

✓ **Joint cost apportioned to Chlorine**

$= \frac{₹1,00,000}{₹1,20,000} \times ₹60,000$

= ₹50,000

ii) Physical Measures Method: -

Products	Sales (In Ton)	Joint Cost Apportioned (₹)
✓ Caustic Soda	1,200	60,000
✓ Chlorine	800	40,000
Total		**1,00,000**

✓ **Apportionment of Joint Cost;**

$= \frac{Total\ Joint\ Cost}{Total\ Physical\ Value} \times Physical\ Units\ of\ each\ Product$

✓ **Joint Cost Apportioned to Caustic Soda**

$= \frac{₹1,00,000}{₹2,000\ tonnes} \times 1,200\ tonnes$

= ₹60,000

✓ **Joint cost Apportioned to Chlorine**

$= \frac{₹1,00,000}{2,000\ tonnes} \times 800\ tonnes$

= ₹40,000

iii) Estimated Net Realisable Value Method: -

Particulars	Caustic Soda (₹)	Chlorine (₹)
✓ Sales Value	60,000 (₹ 50 × 1,200 tons)	1,00,000 (₹ 200 × 500 tons)
✓ **Less:** Post split-off cost (Further Processing cost)	----	(20,000)
Net Realizable Value	**60,000**	**80,000**
✓ Apportionment of Joint Cost of ₹ 1,00,000 in ratio of (60,000:80,000) 3 : 4	42,857	57,143

b) Incremental Revenue from further processing of Chlorine into PVC;

Particulars	(₹)
✓ (500 tons × ₹ 200–800 tons × ₹ 75)	₹ 40,000
✓ **Less:** Incremental cost of further processing of Chlorine into PVC	₹ 20,000
✓ Incremental operating income from further processing	₹ 20,000

The operating income of Inorganic Chemicals will be reduced by ₹ 20,000 in August if it sells 800 tons of Chlorine to Lifetime Swimming Pool products, Instead of further processing of Chlorine into PVC for sale.

4. 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 cost ₹ 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) 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.

(ICAI SM, Modified RTP 2015, Modified RTP May 2023)

Ans.

a) Statement Showing income forecast of the company assuming that none of its products are further processed;

Particulars	Products					Total (₹)
	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)	
✓ Sales Revenue	34,00,000 (₹ 17 × 2,00,000)	3,90,000 (₹ 13 × 30,000)	2,00,000 (₹ 8 × 25,000)	2,00,000 (₹ 10 × 20,000)	10,50,000 (₹ 14 × 75,000)	52,40,000
✓ **Less:** Apportioned Costs (Refer Working Note)	26,25,000	2,52,000	1,75,000	1,40,000	9,45,000	41,37,000
	7,75,000	**1,38,000**	**25,000**	**60,000**	**1,05,000**	**11,03,000**
✓ **Less:** Fixed Cost						4,73,000
Profit						**6,30,000**

b) Statement Showing income forecast of the company; assuming that products A, B,C and E are further processed (Refer to working note);

Particulars	Products					Total (₹)
	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)	
A) Sales Revenue	50,00,000	5,10,000	3,00,000	2,00,000	15,00,000	75,10,000
B) Apportioned Costs	26,25,000	2,52,000	1,75,000	1,40,000	9,45,000	41,37,000
C) Further Processing Cost	12,50,000	1,50,000	50,000	----	1,50,000	16,00,000
D) Total Processing Cost (B + C)	38,75,000	4,02,000	2,25,000	1,40,000	10,95,000	57,37,000
E) Excess of Sales Revenue (A–D)	11,25,000	1,08,000	75,000	60,000	4,05,000	17,73,000
F) Fixed Cost						**4,73,000**
G) Profit (E–F)						**13,00,000**

Suggested Production plan for maximising profits: -

On Comparing the figures of excess of revenue over cost of manufacturing in the above statements one observes that the concern is earning more after further processing of A, C and E products but is loosing a sum of ₹ 30,000 in the case of product B (if it is processed further), Hence the best production plan will be to sell A, C and E after further processing and B and D at the point of split off. The profit statement based on this suggested production plan is as below;

Profit Statement Based On Suggested Production Plan;

Particulars	Products					Total (₹)
	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)	
A) Sales Revenue	50,00,000	3,90,000	3,00,000	2,00,000	15,00,000	73,90,000
B) Apportioned Costs	26,25,000	2,52,000	1,75,000	1,40,000	9,45,000	41,37,000
C) Further Processing Cost	12,50,000	----	50,000	----	1,50,000	14,50,000
D) Total Processing Cost (B + C)	38,75,000	2,52,000	2,25,000	1,40,000	10,95,000	55,87,000
E) Excess of Sales Revenue (A–D)	11,25,000	1,38,000	75,000	60,000	4,05,000	18,03,000
F) Fixed Cost						**4,73,000**
G) Profit (E–F)						**13,30,000**

*Hence the profit of the company has increased by ₹ 30,000.

Working Notes: -

Apportionment of Joint costs on the basis of Net Realisable Value method.

Products	Sales Value (₹)	Post Separation Cost (₹)	Net Realizable Value (₹)	Apportioned Cost (₹)
A	50,00,000 (2,00,000 units × ₹ 25)	12,50,000	37,50,000	26,25,000
B	5,10,000 (30,000 units × ₹ 17)	1,50,000	3,60,000	2,52,000
C	3,00,000 (25,000 units × ₹ 12)	50,000	2,50,000	1,75,000
D	2,00,000 (20,000 units × ₹ 10)	----	2,00,000	1,40,000
E	15,00,000 (75,000 units × ₹ 20)	1,50,000	13,50,000	9,45,000
			59,10,000	**41,37,000**

- ✓ **Total Joint Cost** = Raw Material Cost + Manufacturing Expenses
  = ₹ 35,90,000 + ₹ 5,47,000 = ₹ 41,37,000
- ✓ Apportioned Joint Cost;
  $= \frac{Total\ Joint\ Cost}{Total\ Realisable\ Value}$ × Net Realisable Value of each product
- ✓ Apportioned Joint Cost for Product A;
  $= \frac{₹41,37,000}{₹59,10,000} \times ₹\ 37,50,000 = ₹\ 26,25,000$

*Similarly, the apportioned joint cost for products B, C, D and E are ₹2,52,000, ₹1,75,000, ₹ 1,40,000 and ₹ 9,45,000 respectively.

5. 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

(ICAI SM, Modified MTP May 2022)

Ans. The marginal cost (variable cost) of ₹ 4,400 is apportioned over the joint products A and B in the ratio of their physical quantity i.e., 100: 120

- ✓ Marginal Cost for Product A : ₹ 4,400 × $\frac{100}{220}$ = ₹2,000
- ✓ Marginal Cost for Product B : ₹ 4,400 × $\frac{120}{220}$ = ₹2,400

The fixed cost of ₹ 3,900 is apportioned over the joint products A and B in the ratio of their contribution margin i.e. 40 : 12(Refer to working note)

- ✓ Product A : ₹ 3,900 × 40/52 = ₹ 3,000
- ✓ Product B : ₹ 3,900 × 12/52 =₹ 900

Working Notes: -

Computation of Contribution margin ratio;

Products	**Sales Revenue (₹)**	**Marginal Cost (₹)**	**Contribution (₹)**
AB	6,000 3,600	2,000 2,400 (Refer to above)	4,000 1,200

*Contribution ratio is 40 : 12

6. 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?

(ICAI SM, Modified MTP May 2022)

Ans. **Calculation of Net Joint Costs to be allocated;**

Particulars	**(₹)**
✓ Joint Costs	10,00,000
✓ **Less:** Net Realizable value of by-product (50,000 × 5)	2,50,000
✓ Net Joint costs to be allocated	**7,50,000**

- ✓ Therefore, 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:

$$= \frac{Physical\ Quantity\ of\ Product-B}{Total\ Quantity} \times \text{ Net Joint Costs to be allocated}$$

$$= \frac{1{,}20{,}000\ units}{1{,}80{,}000\ units} \times ₹7{,}50{,}000 = ₹5{,}00{,}000$$

7. 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 Production 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?

(ICAI SM, Modified RTP Nov 2022)

Ans.

- ✓ Product A can be sold at the split-off point, because the question says that "Products B and C must be processed further before they can be sold. "Since Product A is not includedin that, we know that Product A can be sold at the split-off point. Further more, the cost to process Product A after the split-off point is ₹ 1,50,000. Whereas the additional revenueto be earned by processing it further is only ₹ 75,000 (₹ 50 increases in selling price per unit multiplied by the 1,500 units produced during September). Therefore, Product A willnot be processed further, and we use the sales value at split-off for A for allocating the joint costs. The Sales value at the split-off for A is ₹ 100 × 1,500 units, or ₹ 1,50,000.
- ✓ Since Product B must be processed further, we use its net realizable value for the joint cost allocation. The net realizable value of Product B is ₹ 5,25,000 (₹ 175 selling price after further processing × 3,000 units produced) – ₹ 1,50,000 in further processing Costs = ₹ 3,75,000.
- ✓ Product C, the by-product, must also be processed further to be sold. The net realizable value of Product C is ₹ 75,000 (₹ 50 sales price after further processing × 4,500 units produced–₹ 1,50,000 in further processing costs = ₹ 75,000.
- ✓ Joint Production costs total ₹ 8,40,000. Since the by-product C is accounted for as a reduction to the joint costs, the joint costs to be allocated are ₹ 7,65,000 (₹ 8,40,000 minus the ₹ 75,000 NRV of Product C), to be allocated between Product A (Sales value ₹ 1,50,000) and Product B (net realizable value ₹ 3,75,000). So, the total on which the allocation of the joint costs is based is ₹ 1,50,000 + 3,75,000 = ₹ 5,25,000 Product A represents 28.571% of the total (₹ 1,50,000 ÷ ₹ 5,25,000).

Since 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.

8. A Factory produces two products, 'A' and 'B' from a single process. The joint processing costs during a particular month are;

Particulars	(₹)
Direct Material	30,000
Direct Labour	9,600
Variable Overheads	12,000
Fixed Overheads	32,000

Sales; A – 100 units @ ₹600 per unit; **B** – 120 units @ ₹200 per unit Apportion joints costson the basis of;

a) Physical Quantity of each product.

b) Contribution Margin method, and

c) Determine Profit or Loss under both the methods.

(Nov. 2019, Modified MTP Dec 2021)

Sol. **a) Apportionment of Joint Cost on the basis of Physical Quantity of each product;**

- Total Cost = ₹ 30,000 + ₹ 9,600 + ₹ 12,000 + ₹ 32,000 = ₹ 83,600
- Total units = 100 units + 120 units
- = 220 units
- A = ₹ 83,600 × $\frac{100}{220}$ = ₹ 38,000
- B = ₹ 83,600 × $\frac{120}{220}$ = ₹ 45,600

b) Apportionment of Joint Cost on the basis of Contribution Margin Method;
Joint cost = 83,600, which includes,

- Total Variable Cost = ₹ 30,000 + ₹ 9,600 + ₹ 12,000 = 51,600
  (Apportionment as per units)
- A = ₹ 51,600 × $\frac{100}{220}$ = ₹ 23,455
- B = ₹ 51,600 × $\frac{120}{220}$ = ₹ 28,145

- Fixed Cost = ₹ 32,000
  (Apportioned over contribution margin)
  Contribution = Sales – Variable cost
  A = (600 X 100-23455) = 36,545
  B = (200 X 120-28145) = -4,145
  Fixed cost allocation-
  *A = 32,000
  B = Nil

*Since B does not have any contribution all the fixed cost is allocated to A only.

c) Profit or loss under both method;

1) Physical Quantity;

- A = (₹ 60,000 – ₹ 38,000) = 22,000
- B = (₹ 24,000 – ₹ 45,600) = (₹ 21,600)

2) Contribution Margin Method;

- A = (₹ 60,000 – ₹ 23,455 – ₹ 32,000) = ₹ 4,545
- B = (₹ 24,000 – ₹ 28,145) = (₹ 4,145) loss

9. ABC Ltd. operates a simple chemical process to convert a single material into three separate items, referred to here as X, Y and Z. All three end products are separated simultaneously ata single split-off point.

Product X and Y are ready for sale immediately upon split off without further processing or any other additional costs. Product Z, however, is processed further before being sold. There is no available market price for Z at the split-off point.

The selling prices quoted here are expected to remain the same in the coming year. During 200X-X1, the selling prices of the items and the total amounts sold were:

X – 186 tons sold for ₹3,000 per ton
Y – 527 tons sold for ₹2,250 per ton
Z – 736 tons sold for ₹1,500 per ton

The total joint manufacturing costs for the year were ₹12,50,000. An additional ₹ 6,20,000 was spent to finish product Z.

There were no opening inventories of X, Y or Z at the end of the year. The followinginventories of complete units were on hand:
180 tons
60 Tons
25 tons
There was no opening or closing work-in-progress.

Required:

COMPUTE the cost of inventories of X, Y and Z and cost of goods sold for year ended March 31, 20X1, using Net realizable value (NRV) method of joint cost allocation.

(RTP Nov 2020, MTP May 2023–I)

Ans. **Statement of Joint Cost allocation of inventories of X, Y and Z (By using Net Realizable Value Method)**

	Products			**Total**
	X	**Y**	**Z**	
	(₹)	**(₹)**	**(₹)**	**(₹)**
Final sales value, of total production (W.N-1)	10,98,000 (366 × ₹3,000)	13,20,750 (587 × ₹2,250)	11,41,500 (761 × ₹1,500)	35,60,250
Less: Additional cost	--	--	(6,20,000)	(6,20,000)
Net realizable value (at split-off point)	10,98,000	13,20,750	5,21,500	29,40,250
Joint cost allocated (Working Note 2)	4,66,797	5,61,496	2,21,707	12,50,000

Cost of goods sold as on March 31, 20X1 (By using Net Realizable Value Method)

	Products			**Total**
	X	**Y**	**Z**	
	(₹)	**(₹)**	**(₹)**	**(₹)**
Allocated joint cost	4,66,797	5,61,496	2,21,707	12,50,000
Additional costs	--	--	6,20,000	6,20,000
Cost of goods available for sale (CGAS)	4,66,797	5,61,496	8,41,707	18,70,000
Less: Cost of ending inventory (Working Note 1)	2,29,571 (CGAS×49.18%)	57,385 (CGAS×10.22%)	27,692 (CGAS×3.29%)	3,14,648
Cost of goods sold	2,37,226	5,04,111	8,14,015	15,55,352

Working Notes

1) Total production of three products for the year 20X0-20X1

Products	Quantity sold in tones	Quantity of ending inventory in tons	Total production	Ending inventory percentage (%)
(1)	**(2)**	**(3)**	**(4) = [(2) + (3)}**	**(5) = (3)/ (4)**
X	186	180	366	49.18
Y	527	60	587	10.22
Z	736	25	761	3.29

2) Joint cost apportioned to each product:

$= \frac{\text{Total Joint cost}}{\text{Total Net Realisable Value}} \times$ Net Realizable Value of each product

Total cost of Product X = $\frac{\text{₹ } 12,50,000}{\text{₹ } 29,40,250} \times \text{₹ } 10,98,000 = \text{₹ } 4,66,797$

Total cost of Product Y = $\frac{\text{₹ } 12,50,000}{\text{₹ } 29,40,250} \times \text{₹ } 13,20,750 = \text{₹ } 5,61,496$

Total cost of Product Z = $\frac{\text{₹ } 12,50,000}{\text{₹ } 29,40,250} \times \text{₹ } 5,21,500 = \text{₹ } 2,21,707$

10. OPR Ltd. purchases crude vegetable oil. It does refine of the same. The refining process results in four products at the split-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. Other details are as follows:

Product	Further processing costs (₹)	Sale 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.

(July 2021, ICAI SM)

Ans. **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 maximizing 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 ProductS 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

Apportionment of joint cost = $\frac{\text{Total joint Cost}}{\text{Total Sale Value at Split-off point}}$ × Sale 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

Share of S in joint cost = $\frac{₹\ 40,000}{₹\ 80,000}$ × ₹20,000 = ₹10,000

Share of P in joint cost = $\frac{₹\ 40,000}{₹\ 80,000}$× ₹12,000 = ₹6,000

Share of N in joint cost = $\frac{₹\ 40,000}{₹\ 80,000}$ × ₹28,000 = ₹14,000

Share of A in joint cost = $\frac{₹\ 40,000}{₹\ 80,000}$ × ₹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 maximizing 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 ProductS 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.

11. Pokemon Chocolates manufactures and distributes chocolate products. It purchases Cocoa beans and processes them into two intermediate products;

i) Chocolate powder liquor base.

ii) Milk-Chocolate liquor base.

These two intermediate products become separately identifiable at a single split off point. Every 500 pounds of cocoa beans yields 20 gallons of chocolate-powder liquor base and 30 gallons of milk-chocolate liquor base.

The chocolate powder liquor base is further processed into chocolate powder. Every 20 gallons of chocolate-powder liquor base yields 200 pounds of chocolate powder. The milk-chocolate liquor base is further processed into milk-chocolate. Every 30 gallons of milk-chocolate liquor base yields 340 pounds of milk-chocolate.

Production and sales data for October, 20X2 are;

Cocoa beans processed 7,500 pounds.

Costs of processing Cocoa beans to split off point;(Including purchase of beans) = ₹ 7,12,500;

Particulars	Production	Sales	Selling Price
✓ Chocolate Powder	3,000 pounds	3,000 pounds	₹ 190 per pound
✓ Milk Chocolate	5,100 Pounds	5,100 Pounds	₹ 237.50 Per pound

The October, 202X separable costs of processing chocolate-powder liquor into chocolate powder are ₹ 3,02,812.50. The October, 202X separable costs of processing milk-chocolate liquor base into milk-chocolate are ₹ 6,23,437.50.
Pokémon fully processes both of its intermediate products into chocolate powder or milk-chocolate. There is an active market for these intermediate products. In October, 202X, Pokémon could have sold the chocolate powder liquor base for ₹ 997.50 a gallon and the milk-chocolate liquor base for ₹ 1,235 a gallon.

Required: -

a) Calculate how the joint cost of ₹ 7,12,500 would be allocated between the chocolate powder and milk-chocolate liquor bases under the following methods;
  i) Sales value at split off point.
  ii) Physical measure (gallons)
  iii) Estimated net realizable value, (NRV) and
  iv) Constant gross-margin percentage NRV.

b) What is the gross-margin percentage of the chocolate powder and milk-chocolate liquor bases under each of the methods in requirement (i)?

c) Could Pokemon have increased its operating income by a change in its decision to fully process both of its intermediate products? Show your computations.

(Nov. 2004)

Sol. **a)** **Calculation of Allocation of Joint cost between Chocolate powder liquor base and Milk-chocolate liquor base at split off point:**

Total material introduced = 7500 pounds
Output of Chocolate powder liquor base = (7500 ÷ 500) × 20 = 300 gallonsOutput of milk chocolate liquor base = (7500 ÷ 500) × 30 = 450 gallons
Sale value of Chocolate powder liquor base = 300 gallons × ₹ 997.50 per gallon = ₹ 2,99,250
Sale value of Chocolate powder milk base = 450 gallons × ₹ 1235 per gallon = ₹ 5,55,750
Allocation of joint cost to Liquor base = ₹ 7,12,500 × (2,99,250 ÷ 8,55,000) = ₹ 2,49,375
Allocation of joint cost to milk base = ₹ 7,12,500 × (5,55,750 ÷ 8,55,000) = ₹ 4,63,125

Allocation of joint cost on the basis of Physical quantity:
Joint cost for Liquor base = ₹ 7,12,500 × (300/750) = ₹ 2,85,000Joint cost for milk base = ₹ 7,12,500 × (450/750) = ₹ 4,27,500

Allocation of joint cost on the basis of net Realisable value: **Calculation of Net Realizable value**
Net Realizable value = Sales – Further processing Cost
Net Realizable value of Liquor base = (3,000 pounds × ₹ 190 per pound) – ₹ 3,02,812.50
Net Realizable value of Liquor base = ₹ 5,70,000 – ₹ 3,02,812.50 = ₹ 2,67,187.5
Net Realizable value of milk base = (5100 pounds × ₹ 237.50 per pound) – ₹ 6,23,437.50
Net Realizable value of Liquor base = ₹ 12,11,250 – ₹ 6,23,437.50 = ₹ 5,87,812.5Allocation of joint cost to liquor base = ₹ 7,12,500 × (₹ 2,67,187.5 ÷₹ 8,55,000) Allocation of joint cost

to liquor base = ₹ 2,22,656.25
Allocation of joint cost to milk base = ₹ 7,12,500 × (₹ 5,87,812.5 ÷₹ 8,55,000)
Allocation of joint cost to milk base = ₹ 4,89,843.75

Calculation of gross margin percentage to Net Realizable method:
Total sales value = (3,000 × 190) + (5,100 × 237.50)
Total sales value = ₹ 17,81,250
Total cost = ₹ 7,12,500 + ₹ 6,23,437.5 + 3,02,812.5 = ₹ 16,38,750
Profit = ₹ 17,81,250 – ₹ 16,38, 750 = ₹ 1,42,500
Gross percentage margin = (1,42,500 ÷ 17,81,250) x 100 = 8%
Sale value for liquor base = ₹ 5,70,000
Gross margin = 5,70,000 × 8% = 45,600
Cost of goods sold = 5,70,000 – 45,600 = ₹ 5,24,400
Joint cost allocable for liquor base = ₹ 5,24,400 – ₹ 3,02,812.50 = ₹ 2,21,587.50
Joint cost for milk base = 12,11,250 – (8% of 12,11,250) – 6,23,437.50 = ₹ 4,90,912.50

b) Chocolate powder liquor base (Amount in ₹)

Particulars	Sales value at Split off	Physical Measure	Estimated net Realisable Value	Constant Gross Margin NRV
Final sale value ofChocolate powder	5,70,000	5,70,000	5,70,000	5,70,000
Less: Separable costs	3,02,812.50	3,02,812.50	3,02,812.50	3,02,812.50
Less: Joint costs	2,49,375	2,85,000	2,22,656.25	2,21,587.50
Gross Margin	17,812.50	-17,812.50	44,531.25	45,600
Gross Margin %	3.13%	-3.13%	7.81%	8.00%

Milk chocolate liquor base (Amount in ₹)

Particulars	Sales value at split off	Physical measure	Estimated net realisable	Constant Grossmargin NRV
Final sale value of milk chocolate	12,11,250	12,11,250	12,11,250	12,11,250
Less: Separable costs	6,23,437.50	6,23,437.50	6,23,437.50	6,23,437.50
Less: Joint costs	4,63,125	4,27,500	4,89,843.75	4,90,912
Gross Margin	1,24,687.50	1,60,312.50	97,968.75	96,900.50
Gross Margin %	10.29%	13.24%	8.09%	8.00%

c) Further processing of Chocolate powder liquor base into Chocolate powder

Particulars	Amount in (₹)
Incremental revenue {₹ 5,70,000 - (₹ 997.50 × 300 gallon)}	2,70,750
Less: Incremental costs	3,02,812.50
Incremental operating income	(32,062.50)

Further processing of Milk Chocolate liquor base into Milk Chocolate.

Particulars	**Amount in (₹)**
Incremental revenue {₹12,11,250 - (₹ 1,235 × 450 gallon)}	6,55,500.00
Less: Incremental cost	6,23,437.50
Incremental operating income	32,062.50

The above computations show that Pokemon Chocolates could increase operating income by ₹32,062.50 if chocolate liquor base is sold at split off point and milk chocolate liquor base is processed further.

12. A Company produces two joint products A and Q in 70 : 30 ratio from basic raw materials in department A. The input output ratio of department P is 100 : 85. Product P can be sold at the split of stage or can be processed further at department B and sold as product AR. The input output ratio is 100 : 90 of department B. The department B is created to process product A only and to make it product AR.

The selling prices per kg. are as under;

Particulars	**(₹)**
Product P	85
Product Q	290
Product AR	115

The production will be taken up in the next month.
Raw materials 8,00,000 kgs.
Purchase price ₹ 80 per kg.

Particulars	**Deptt. A (₹ in Lacs)**	**Deptt. B (₹ in Lacs)**
Direct Materials	35.00	5.00
Direct Labour	30.00	9.00
Variable Overheads	45.00	18.00
Fixed Overheads	40.00	32.00
Total	**150.00**	**64.00**

Selling Expenses;

Particulars	**(₹) in Lacs**
✓ **Product P**	24.60
✓ **Product Q**	21.60
✓ **Product AR**	16.80

Required: -

a) Prepare a statement showing the apportionment of joint costs.

b) State whether it is advisable to produce product AR or not. **(May 2007)**

Ans.

- Input in Department 'A' is 80,000 kgs, & Yield is 85%
- ∴ Output = 85% of 8,00,000 = 6,80,000 kgs.
- Ratio of output for P and Q = 70 : 30.
- Product of P = 70% of 6,80,000 = 4,76,000 kgs.
- Product of Q = 30% of 6,80,000 = 2,04,000 kgs.

a) Statement showing apportionment of joint cost

Particulars	P	Q	Total
✓ Product kgs.	4,76,000	2,04,000	
✓ Selling price per kg.	85.00	290.00	
	(₹) in Lacs	**(₹) in Lacs**	**(₹) in Lacs**
✓ Sales	404.60	591.60	996.20
✓ **Less:** Selling expenses	24.60	21.60	46.20
✓ Net sales	380	570	950
✓ Ratio in (%)	40%	60%	100%

Particulars	(₹) in Lakhs
✓ Raw Materials (8,00,000 kgs. × ₹ 80)	640
✓ Process cost of department 'A'	150
	790

Apportionment of Joint Cost (In the ratio of Net Sales i.e., P:Q., is 40% : 60%)

- ∴ Joint Cost of 'P' = ₹ 316 Lakhs
- ∴ Joint Cost of 'Q' = ₹ 474 Lakhs

b) Statement showing the profitability of further processing of Product 'P' and converted into product 'AR'

Product AR;

Particulars	(₹) in Lakhs
✓ Output 90% of 4,76,000 kgs. = 4,28,400 kgs.	
✓ Joint costs	316.00
✓ Cost of Department B	64.00
✓ Selling expenses	16.80
Total Cost	**396.80**
✓ Sales Value (₹ 115 × 4,28,400)	492.66
✓ Profit (SV – TC) (492.66 – 396.80)	95.86

If 'P' is not processed, then profitability is as under;

Particulars	(₹) in Lakhs
Sales	380.00
Less: Joint expenses	316.00
Profit	64.00

Advice: -

*Further processing of product 'P' and converting into product 'AR' is beneficial to the company because the profit increases by ₹ 31.86 lakhs (i.e., 95.86 – 64.00).

13. 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;

Particulars	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.

(May 2016)

Ans.

Statement Showing the Apportionment of Joint Cost;

Particulars	A	B	Total
✓ Sales value after further processing	16,000	8,000	24,000
✓ **Less:** Estimated Profit	4,000	1,600	5,600
✓ Total Cost of Sales	12,000	6,400	18,400
✓ **Less:** Selling & Distribution Expenses	266.67	133.33	400
✓ Total Cost of Good sold	11,733.33	6,266.67	18,000
✓ **Less:** Further Processing Costs	5,000	3,000	8,000
✓ Joint Cost	6,733.33	3,266.67	10,000

Statement Showing Cost of Production

Particulars	A	B	Total
✓ Joint Costs	6,733.33	3,266.67	10,000
✓ Further Processing Cost	5,000.00	3,000.00	8,000
✓ Cost of Production	11,733.33	6,266.67	18,000
✓ **Add:** Selling Expenses	266.67	133.33	400
Cost of Sales	**12,000.00**	**6,400.00**	**18,400.00**

Working Note:

Calculation of selling & Distribution expenses:

Total sales (16,000 + 8,000)	= 24,000
Less: Profit (4,000 +1,600)	= 5,600
Cost of sales =	18,400
Less: Cost of production	
Joint cost	(10,000)
Further processing cost	(8,000)

Selling & Distribution expenses = 400

14. **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;

a) Apportionment of joint cost among products 'M' and 'N' and

b) Total cost of the product's 'M' and 'N'.

(Nov. 2020)

Ans. **a) Apportionment of joint costs between the joint products**

Labour cost in the ratio of 100:80	1,48,500	**82,500**	**66,000**
		$\left(\frac{1,48,500 \times 100}{180}\right)$	$\left(\frac{1,48,500 \times 80}{180}\right)$
Other joint costs (including material) [(6,750X80)+(225000-148500)]	6,16,500	**5,36,087**	**80,413**
In the ratio of output (5,400:810)		$\left(\frac{6,16,500 \times 5,400}{6,210}\right)$	$\left(\frac{6,16,500 \times 810}{6,210}\right)$
b) Total product cost	**7,65,000**	**6,18,587**	**1,46,413**

*No. of units produced of Product M = 6750 units × 80% = 5400 units.

No. of units produced of Product N = 6750 units × 12 % = 810 units.

Comprehensive Cost Statement;

Particulars	Total Cost (₹)	Product-M (₹)	Product-N (₹)
✓ No. of units produced *		5,400 units	810 units
✓ Cost of raw material (₹ 80 × 6,750 units)	5,40,000		
✓ Processing cost			
✓ Labor cost (₹ 2,25,000 × 66%)	1,48,500		
✓ Other costs (₹2,25,000 – 1,48,500)	76,500		
Total Joint Cost	7,65,000		

15. 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 202X-X1;

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
Particulars	**Product**		
	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;

a) Statement showing the allocation of joint costs.

b) Calculate the Cost of goods sold of each product and the cost of each item ininventory.

c) A comparative statement of Gross profit.

(Jan 2021)

Ans. **a) Statement showing the allocation of joint cost by using the NRV method;**

Particulars	Product X	Product Y	Product Z
✓ Sales (Litres) (a)	10,000	15,000	22,500
✓ Selling Price (₹) (b)	30	64	50
✓ Sales Value (₹) (a × b)	3,00,000	9,60,000	11,25,000
✓ **Less:** Further Processing cost			
✓ Direct labour	----	4,50,000	6,50,000
✓ Manufacturing overheads	----	2,10,000	4,50,000
✓ Net Realisable value	3,00,000	3,00,000	25,000
✓ Allocation of Joint cost (12:12:1) (₹)	2,87,040	2,87,040	23,920

- Total joint cost = 4,80,000 + 70,000 + 48,000 = ₹ 5,98,000
- Joint cost for Product X = ₹ 5,98,000 × $\frac{12}{25}$ = ₹ 2,87,040
- Joint cost for Product Y = ₹ 5,98,000 × $\frac{12}{25}$ = ₹ 2,87,040
- Joint cost for Product Z = ₹ 5,98,000 × $\frac{1}{25}$ = ₹ 23,920

b) Statement showing the computation of cost of each item in Inventory;

Particulars	Product X	Product Y	Product Z
✓ Joint cost	2,87,040	2,87,040	23,920
✓ **Add:** Further Processing cost			
✓ Direct labour	----	4,50,000	6,50,000
✓ Manufacturing Overheads	----	2,10,000	4,50,000
Total cost (a) (₹)	**2,87,040**	**9,47,040**	**11,23,920**
✓ Quantity Produced * (Litres) (b)	15,000	15,000	30,000
(Sales + Closing Stock)	(10,000+5000)	(15,000+0)	(22,500+7,500)
✓ Cost per litre (a ÷ b = c) (₹)	19.136	63.136	37.464
✓ Quantity in closing stock (d)	5,000	NIL	7,500
✓ Value of closing stock (d × c) (₹)	95,680	NIL	2,80,980

***Quantity Produced = Sales + Closing stock**

Statement Showing the computation of cost of goods sold;

Particulars	Product X	Product Y	Product Z
✓ Quantity Sold (Litres) (a)	10,000	15,000	22,500
✓ Cost per unit (₹) (b)	19.136	63.136	37.464
✓ Cost of goods sold (₹) (a × b)	1,91,360	9,47,040	8,42,940

c) Statement showing the computation of Gross profit;

Particulars	Product X	Product Y	Product Z
✓ Quantity Sold (Litres) (a)	10,000	15,000	22,500
✓ Cost per unit (₹) (b)	19.136	63.36	37.464
✓ Cost of goods sold (₹) (a × b) (₹)	1,91,360	9,47,040	8,42,940
✓ Sale value (computed above) (₹)	3,00,000	9,60,000	11,25,000
✓ Gross profit (Sales – COGS) (₹)	1,08,640	12,960	2,82,060

16. JKL Limited produces two products---J and K --- together with a by-product L from a single main process (process I). Product J is sold at the point of separation for ₹ 55 per kg. whereas product k is sold for ₹ 77 per kg after further processing into product k2. By-product L is sold without further processing for ₹ 19.25 per kg.

Process I is closely monitored by a team of chemists, who planned the output per 1,000 kgof input materials to be as follows;

Product J - 500 kg
Product K - 350 kg
Product L - 100 kg
Toxic waste - 50 kg

The toxic waste is disposed at a cost of ₹16.50 per kg, and arises at the end of processing. Process II which is used for further processing of product K into product K2, has thefollowing cost structure.

Fixed costs	₹ 2,64,000 per week
Variable cost	₹ 16.50 per kg processed

The following actual data relate to the first week of the month;

Process I;	
Opening work-in-progress	Nil
Material input	40,000 kg costing ₹ 6,60,000
Direct Labour	₹ 4,40,000
Variable Overheads	₹ 1,76,000
Fixed Overheads	₹ 2,64,000
Outputs;	
Product J	19,200 kg
Product K	14,400 kg
Product L	4,000 kg
Toxic waste	2,400 kg
Closing Work-in-progress	Nil
Process II;	
Opening Work-in-progress	Nil
Input of product K	14,400 kg
Output of product K	13,200 kg
Closing Work-in-progress (50% converted and conversion costs were incurred in accordance with the planned cost structure)	1,200 kg

Required: -

a) Prepare Process I account for the first week of the month using the final sales value method of attribute the pre-separation costs to join products.

b) Prepare the toxic waste account and Process II account for the first week of themonth.

c) Comment on the method used by the JKL Limited to attribute the pre-separationcosts to joint products.

d) Advise the management of JKL Limited whether or not, on purely financial grounds,it should continue to process product K into product, K2;

  i) If product K could be sold at the point of separation for ₹ 47.30 per kg; and

  ii) If the 60% of the weekly fixed costs of Process II were avoided by not processing product K further.

(May 2004)

Ans. **a)**

Dr. **Process – I A/c** **Cr.**

Particulars	Unit	Rate	Amount	Particulars	Unit	Rate	Amount
To Material Input	40,000	16.50	6,60,000	By Product L Sales	4,000	19.25	77,000
To Direct labour	----	----	4,40,000	By Normal loss	2,000	16.50	(33,000)
To Variable overheads	----	----	1,76,000	By Abnormal loss	400	44	17,600
To Fixed Overheads	----	----	2,64,000	By Joint production j (W.N.3)	19,200		7,21,171
				By Joint Production K (W.N.3)	14,400		7,57,229
	40,000		**15,40,000**		**40,000**		**15,40,000**

Valuation of abnormal loss per kg;

- (Using physical measure method)
- $= \frac{15,40,000-77,000+33,000}{40,000 \text{ kg} \times 0.85}$
- $= \frac{₹14,96,000}{34,000\ kg}$
- = ₹44 kg.

b)

Dr. **Toxic waste A/c** **Cr.**

Particulars	Unit	Rate	Amount	Particulars	Unit	Rate	Amount
To Process I A/c	2,000	16.50	(-) 33,000	By Balance	2,000	16.50	(-) 33,000

Dr. **Process – II A/c** **Cr.**

Particulars	Unit	Rate	Amount	Particulars	Unit	Rate	Amount
To Process I A/c (Production of k)	14,400	52.585	7,57,229	By Product k2 A/c **(W.N-5)**	13,200		11,73,918
To variable O/Hs			2,37,600	By Closing WIP (W.N.4)	1,200		84,911
To fixed its			2,64,000				
	14,400		**12,58,829**		**14,400**		**12,58,829**

Working Notes: -

1) Calculation of joint cost of the output;

= ₹ 15,40,000 – ₹ 77,000 – ₹ (–) 33,000 – ₹ 17,600

= ₹ 14,78,400.

2)

Statement of Equivalent Production-

Input	**Particulars**	**Output**	**Material**		**Lab & oh.**	
			%	**1 Unit**	**%**	**1 Unit**
14,400	Input					
	WIP	1,200	100%	1,200	50%	600
	Finished goods	13,200	100%	13,200	100%	13,200
14,400		**14,400**		**14,400**		**13,800**

3) Allocation of joint cost over joint products J & K;

Products	**Units (₹)**	**Salves Value**	**Joint Cost**
J	19,200	10,56,000 (19,200 × 55)	7,21,171
K	14,400	1,108,800 (14,400 × 77)	7,57,229
		21,64,800	**14,78,400**

4) Valuation of 1200 kgs of closing WIP;

Material I	100% Complete (1,200 kg × ₹52.585)	₹63,102
Fixed & Variable O/H	$\left(\frac{\text{₹}5,01,600}{13,800} \times 600\ units\right)$	₹21,809
Total value of 1,200 kgs of closing WIP		**84,911**

5) Valuation of Finished goods of 13,200 Kg's –

Material	100% Complete (13,200 kg × ₹52.585)	₹6,94,122
Fixed & Variable O/H	$\left(\frac{\text{₹}5,01,600}{13,800} \times 13200\ units\right)$	₹4,79,796
Total value of 1,200 kgs of closing WIP		**11,73,918**

c) Comment on the method used by the JKL Ltd;

(For attribute the pro-separation costs to joint Products) attributing the joint costs over joint products J & K, L Ltd used the basis of final sales value. This is one of the popular method used in the industry.

Other methods can also be used for the purpose, some are;

- Physical Measure method (if both products are equally complex)
- Constant gross margin (%) method.
- Net realizable value method.

d) Advise to the Management of JKL Ltd.

Particulars	**(₹)**
Incremental sales revenue/kg from further processing	29.70
Less: Incremental variable cost/kg from further processing	16.50
Incremental contribution/kg from further processing	13.20

At an output of 14,4,000 kgs the incremental contribution (14,400 × 13.20)	1,90,080
Less: Avoidable fixed cost	1,58,400
(60% of 264000)	
Net benefit	**31,680**

$$\text{Break-even point} = \frac{\text{Avoidable Fixed Cost}}{\text{Incremental Contribution/kg}}$$

$$= \frac{1{,}58{,}400}{₹13.20} = 12{,}000 \text{ kg}$$

*Hence, further processing should be undertaken only if output is expected to exceed 12,000 kgs per week.

17. 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 Statement apportioning the joint cost amongst the products on the basis of the physical unit method. **(ICAI SM)**

Ans.

Particulars	**Products**					**Total**
	Coke	**Tar**	**Sulphate of ammonia**	**Benzole**	**Wastage**	
✓ Output (in ton)	3,500	1,200	52	48	200	5,000
✓ Wastage (in ton) (Refer Note-1)	146	50	2	2	(200)	----
✓ Input (in-ton)	3,646	1,250	54	50	----	5,000
✓ Share of Joint Cost @ ₹ 1,100 per ton (in ₹)	40,10,600	13,75,000	59,400	55,000	----	55,00,000

Note: Apportionment of wastage of 200 tons over the four products on the basis of physical weights (3,500; 1,200; 52;48) is as follows;

- ✓ Coke; $\frac{200}{4{,}800} \times 3{,}500\ tons\ = 146\ tons$
- ✓ Tar; $\frac{200}{4{,}800} \times 1{,}200\ tons\ = 50\ tons$
- ✓ Sulphate of ammonia; $\frac{200}{4{,}800} \times 52\ tons\ = 2\ tons$
- ✓ Benzole; $\frac{200}{4{,}800} \times 48\ tons\ = 2\ tons$

18. Find out the cost of joint products A, B and C using average unit cost method from the following data;

i) Pre-Separation Joint Cost ₹ 60,000

ii) Production data

Products	**Units Produced**
A	500
B	200
C	300
	1,000

(ICAI SM)

Ans.

Average Cost per unit = $\frac{Total\ Joint\ Costs}{Units\ Produced} = \frac{₹60,000}{1,000\ units} = ₹60$

The Joint costs apportioned @ ₹ 60 are as follows: -

Products	Units	Cost per unit (₹)	Value (₹)
A	500	60	30,000
B	200	60	12,000
C	300	60	18,000
			60,000

19.

A factory is engaged in the production of 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 20X1 the following are the summarized cost date:

	Joint Expenses (₹)	Separate Expenses (₹)	
		Bomex	**Cromex**
Material	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 realizable value method for apportionment of joint cost to by-products.

You are required to prepare statements showing:

i) Joint cost allocation to Cromex

ii) Product wise and overall profitability of the factory for April 20X1

(May 2019)

Ans.

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 to Cromex	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 of 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 (**) 1,00,000 + 50,000 + 30,000

Student Note: The question says that, "The factory uses <u>net realizable value method</u> for appointment of joint cost to by-products". However, the answer of ICAI is based on "Reverse Cost Method." This method is now deleted from the ICAI module, but it is used here.

20.

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 pricing per kg.	₹45	₹5
Further processing cost	₹1,01,000	--

You are required to find out:

i) Profit earned to 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.

(Nov. 2022)

Ans.

i) Cost Sheet for Main Product		
Quantity Produced and sold	10,000 units	
		Total
Joint Production Cost	400,000	
(-) Net Realizable Value of By Product (200 × 5)	(1000)	3,99,000
(+) Further Processing Cost		1,01,000
COP/COGS/COS		5,00,000
(+) Profit/(loss)		(50,000)
Sales		4,50,000
ii) SP to get profit of ₹100,000		
Cost as above		5,00,000
(+) Profit		1,00,000
Sales		6,00,000
÷ Number of units		10,000
SP		60

21. 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 costs 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'.

(May 2023)

Ans.

Statement showing apportionment of joint cost (Basis of Sale value at split off point)

Joint costs:

Particulars	**Amount**
Material – (W.N)	
J - 10,000 X 15	1,50,000
K – 10,000 X 9	90,000
L – 5,000 X 7	35,000
Total Material cost	**2,75,000**
Variable cost -	
R – 25,000 X 5	1,25,000
S – 22,500 X 4.5	1,01,250
T – 20,250 X 3.4	68,850
Total variable costs	**2,95,100**
Fixed cost	
R -	42,000
S -	5,000
T -	4,800
Total Fixed cost	**51,800**
Total Joint cost	**6,21,900**

Apportionment:

Particulars	**Product X**	**By product Z**
Sale value	8,74,800 (14,580 X 60)	1,09,350 (*3,645 X 30)
Joint cost apportioned (Ratio = 874800:109350)	5,52,800	69,100

***14,580/80% X 20% = 3,645**

Statement showing profitability:

Particulars	**Product X**	**By product Z**
Sale value	8,74,800 (14580 X 60)	1,09,350 (*3645 X 30)
Less: Joint cost apportioned (Ratio = 874800:109350)	5,52,800	69,100
Profit	**3,22,000**	**40,250**

Working Note:

Calculation of Material at the beginning –

	R	**S**	**T**
Output at process T (Equivalent to 90%)			18,225 (14,580+3,645)
Output at process S (18225 / 90%)		20,250	
Output at process R (20250/90%)	22,500		

Material Input at process R = 22,500 / 90% = 25,000 Kg's
J – 40% = 10,000
K – 40%= 10,000
L -20% = 5,000

Marginal Costing
Assignment

Q. No. | **Question / Answers**

1. **You are given the following data: -**

Date	Sales	Profit
Year 20X1	₹ 1,20,000	8,000
Year 20X2	₹ 1,40,000	13,000

Find out: -

a) P/V ratio,

b) B.E. Point,

c) Profit when sales are ₹ 1,80,000.

d) Sales required earn a profit of ₹ 12,000,

e) Margin of safety in year 20X2.

(ICAI SM, May 2014, May 2018, Modified Nov. 2022, Modified MTP May 2019)

Ans.

Particulars	Sales	Profit
Year 20X1	₹ 1,20,000	8,000
Year 20X2	₹ 1,40,000	13,000
Difference	₹ 20,000	5,000

a) Computation of P/V ratio

$$\text{P/V Ratio} = \frac{\text{Difference in profit}}{\text{Difference in Sales}} \times 100 = \frac{5{,}000}{20{,}000} \times 100 = 25\%$$

Contribution in 20X1 (1,20,000 × 25%)	30,000
Less: Profit	8,000
Fixed Cost*	22,000

*Contribution = Fixed Cost + Profit

∴ Fixed Cost = Contribution – Profit

b) Computation of Break-even point

$$\text{Break-even point} = \frac{\text{Fixed Cost}}{\text{P/V ratio}} = \frac{22{,}000}{25\%} = ₹\ 88{,}000$$

c) Profit when sales are ₹ 1,80,000 **(₹)**

	(₹)
Contribution (₹ 1,80,000 × 25%)	45,000
Less: Fixed Cost	22,000
Profit	23,000

d) Sales to earn a profit of ₹ 12,000

$$\frac{\text{Fixed cost + Desired profit}}{\text{P/V ratio}} = \frac{22{,}000+12{,}000}{25\%} = ₹1{,}36{,}000$$

e) Margin of safety in year 20X2

Margin of Safety = Actual Sales – Break-even Sales

= 1,40,000 – 88,000 = ₹ 52,000.

2. 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 of ₹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 is no beginning or ending inventories.

Required: -

a) Estimate breakeven sales level quantity and cash breakeven sales level quantity.

b) Estimate the P/V ratio.

c) Estimate the number of units that must be sold to earn an income (EBIT) of ₹ 2,50,000.

d) Estimate the sales level to achieve an after-tax income (PAT) of ₹ 2,50,000. Assume 40% corporate income Tax rate.

(ICAI SM, Nov. 2010, Modified RTP Nov 2019 Modified May 2023)

Ans.

a) **Break even Sales**$= \frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{₹\,35,00,000}{₹20} = 1,75,000$ units

Cash Break even Sales $= \frac{\text{Cash Fixed Cost}}{\text{Contribution per unit}}$

$= \frac{₹\,20,00,000}{₹\,20}$

$= 1,00,000$ units

b) **P/V ratio**$= \frac{\text{Contribution unit}}{\text{Selling Price/unit}} \times 100 = \frac{20}{37.50} \times 100 = 53.33\%$

c) **Number of units that must be sold to earn an income (EBIT) of ₹ 2,50,000**

$\frac{\text{Fixed Cost+Desired EBIT level}}{\text{Contribution per unit}} = \frac{35,00,000+2,50,000}{20}$

$= 18,7500$ units

d) **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$= \frac{\text{Fixed Cost+Desired Profit}}{\text{P/V ratio}}$

$= \frac{₹\,35,00,000+₹\,4,16,667}{53.33\%} = ₹\,73,44,210/-$

3. Prisha Limited manufactures three different products and the following information has been collected from the books of accounts: -

Particulars	**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: -

Particulars	**Products**		
	A	**B**	**C**
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: -

a) Calculate the total contribution to sales ratio and present break-even sales at existing sales mix.

b) Calculate the total contribution to sales ratio and present break-even sales at proposed sales mix.

c) State whether the proposed sales mix is accepted or not?

(ICAI SM, May 2021 RTP, Modified MTP Dec 2021, Modified RTP May 2022)

Ans.

a) Calculation of Contribution to Sales ratio at existing sales mix: -

Particulars	**Products**			**Total**
	A	**B**	**C**	
Selling Price (₹)	300	400	200	
Less: Variable Cost (₹)	150	200	120	
Contribution per unit (₹)	150	200	80	
P/V Ratio	50%	50%	40%	
Sales Mix	40%	35%	25%	
Contribution per rupee of sales (P/V Ratio × Sales Mix)	20%	17.5%	10%	47.5%
Present Total Contribution (₹ 60,00,000 × 47.5%)				₹ 28,50,000
Less*:* Fixed Costs				₹ 18,00,000
Present Profit				₹10,50,000
Present Break-Even Sales (₹ 18,00,000/0.475)				₹ 37,89,473.68

b) Calculation of Contribution to sales ratio at proposed sales mix: -

Particulars	**Products**			**Total**
	A	**B**	**E**	
Selling Price (₹)	300	400	300	
Less: Variable Cost (₹)	150	200	150	
Contribution per unit (₹)	150	200	150	
P/V Ratio	50%	50%	50%	
Sales Mix	45%	30%	25%	
Contribution per rupee of sales (P/V Ratio × Sales Mix)	22.5%	15%	12.5%	50%
Proposed Total Contribution (₹ 64,00,000 × 50%)				₹ 32,00,000
Less: Fixed Costs				₹ 18,00,000
Proposed Profit				₹14,00,000
Proposed Break-Even Sales (₹ 18,00,000/0.50)				₹ 36,00,000

c) The proposed sales mix increases the total contribution to sales ratio from 47.5% to 50% and the total profit from ₹ 10,50,000 to ₹ 14,00,000. Thus, the proposed sales mix should be accepted.

4. A Company manufactures a product, currently utilizing 80% capacity with a turnover of ₹ 8,00,000 at ₹ 25 per unit. The cost data are as under:

i) Material cost ₹7.50 per unit, Labour cost ₹ 6.25 per unit. Semi-variable cost (Including variable cost of ₹ 3.75 per unit) ₹ 1,80,000.

ii) Fixed cost ₹ 90,000 up to 80% level of output, beyond this an additional ₹ 20,000 will be incurred.

<u>Calculate: -</u>

a) Activity level at Break-Even-Point

b) Number of units to be sold to earn a net income of 8% of sales.

c) Activity level needed to earn a profit of ₹ 95,000.

d) What should be the selling price per unit, if break-even-point is to be brought down to 40% activity level?

(Nov. 2000, Modified Nov-2017, MTP July 2021, Modified MTP May 2019)

Ans.

a) Activity level at Break-Even Point: -

- ✓ Break-even point (units)
- ✓ $= \frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{₹\ 1,50,000}{₹\ 7.50} = 20,000\text{ units}$
- ✓ Activity level at Break-even Point
- ✓ $= \left\{\frac{\text{Break Even Point (units)}}{\text{No.of units at 100\% capacity level}} \times 100\right\}$
- ✓ $= \frac{20,000\text{ units}}{40,000\text{ units}} \times 100 = \mathbf{50\%}$

b) Number of units to be sold to earn a net income of 8% of sales: -

- ✓ Let X be the number of units sold to earn a net income of 8% sales. Mathematically, it means that:
- ✓ (Sales revenue of X units) = Variable cost of X units + Fixed Cost + Net Income
- ✓ Or ₹ 25 X = ₹ 17.5 X + ₹ 1,50,000 + $\frac{8}{100}$ × (₹ 25X)
- ✓ Or ₹ 25 X = ₹ 17.5 X + ₹ 1,50,000 + ₹ 2X
- ✓ Or X = (₹ 1,50,000/₹ 5.5) units
- ✓ Or X = **27, 273 units**.

c) Activity level needed to earn a profit of ₹ 95,000: -

- ✓ The profit at 80% capacity level, is ₹ 90,000 which is less than the desired profit of ₹ 95,000, therefore the needed activity level would be more than 80%. Thus the fixed cost to be taken to determine the activity level needed should be ₹ 1,70,000 units to be sold to earn a profit of ₹ 95,000.
- ✓ $= \frac{\text{Fixed Cost+Desired Profit}}{\text{Contribution per unit}}$
- ✓ $= \frac{₹\ 1,70,000+₹\ 95,000}{₹\ 7.5}$
- ✓ = 35,333,33 units
- ✓ Activity level needed to earn a profit of ₹ 95,000
- ✓ $= \frac{35,333,33\text{ units}}{40,000\text{ units}} \times 100$
- ✓ $= \mathbf{88.33\%}$

d) Selling price per unit, if break-even Point is to be brought down to 40% (16,000 units) activity level: -

- ✓ Let X be the selling price per unit
- ✓ Units at Break-even-Point = 16,000 units
- ✓ Break-even-Point = $\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$
- ✓ At 16,000 units = $\frac{₹\ 1,50,000}{(X - ₹\ 17.50)}$
- ✓ 16,000(X-17.50) = 1,50,000
- ✓ 16,000X – 2,80,000 = 1,50,000
- ✓ 16,000 X = 4,30,000
- ✓ X = 26.875
- ✓ S.P, (per unit) = ₹ **26.875**

Working Notes: -

1)

a) Number of units sold at 80% capacity: -

– $= \frac{\text{Turnover}}{\text{Selling price p.u.}} = \frac{₹\,8{,}00{,}000}{₹25} = 32{,}000$ units.

b) Number of units sold at 100% capacity: -

– $= \left\{\frac{32{,}000 \text{ units}}{80} \times 100 = 40{,}000 \text{ units.}\right\}$

2) Component of fixed cost included in semi-variable cost of 32,000 units: -

– Fixed cost = {Total semi variable cost − Total Variable cost}
= ₹ 1,80,000 − 32,000 units × ₹ 3.75
= ₹1,80,000 − ₹ 1,20,000
= ₹ **60,000**

3)

a) Total fixed cost at 80% capacity: -

– = Fixed cost + Component of fixed cost included in semi − variable cost
– = ₹ 90,000 + ₹ 60,000 = ₹ **1,50,000**

b) Total fixed cost beyond 80% capacity: -

– = Total fixed cost at 80% capacity + Additional fixed cost to be incurred
– = ₹ 1,50,000 + ₹ 20,000 = ₹ **1,70,000**

4) Variable cost and contribution per unit: -

– Variable cost per unit = Material cost + Labour cost + Variable cost component in semi variable cost
– = ₹ 7.50 + ₹ 6.25 + ₹3.75 = ₹ 17.50
– Contribution per unit
– = Selling price per unit − Variable cost per unit
– = ₹ 25 − ₹ 17.50 = ₹ **7.50**

e) Profit at 80% capacity level: -

– = Sales revenue − Variable Cost − Fixed Cost
– = ₹ 8,00,000 − ₹ 5,60,000 (32,000 units × ₹17.50) − ₹ 1,50,000
= ₹ **90,000**

5. Zed Limited sells its product at ₹30 per unit. During the quarter ending on 31st March, 20X1, it produced and sold 16,000 units and suffered a loss of ₹ 10 per unit. If the Volume of sales is raised to 40,000 units, it can earn a profit of ₹ 8 per unit.

You are required to Calculate: -

a) Break Even Point in Rupees.
b) Profit if the sale volume is 50,000 units.
c) Minimum level of production where the company needs not to close the production if unavoidable fixed cost is ₹ 1,50,000.

(Nov. 2014, Nov. 2019, Modified ICAI SM)

Ans.

a) Break Even Point $= \frac{\text{Fixed Cost}}{\textbf{Contribution Per unit}}$

✓ $= \frac{4{,}80{,}000}{20}$
✓ = 24,000 units
✓ = 24,000 × 30
✓ = ₹7,20,000

b) Profit when sales = 50,000 units

- ✓ $50{,}000 = \frac{\text{Fixed Cost+Profit}}{\text{Contribution}}$
- ✓ $50{,}000 = \frac{4{,}80{,}000+P}{20}$
- ✓ $P = 10{,}00{,}000 - 4{,}80{,}000 = 5{,}20{,}000.$

Note: -

Total sales – Total variable cost = Fixed cost + (-) Profit/(Loss)

- ✓ Suppose, Variable Cost=X
- ✓ Fixed Cost =Y
- ✓ $30 \times 16{,}000 - 16{,}000X = y - 1{,}60{,}000$ ………..(1)
- ✓ $30 \times 40{,}000 - 40{,}000X = y + 3{,}20{,}000$ ………..(2)

Putting the value of equation 2 in to 1.

- ✓ $4{,}80{,}000 - 16{,}000X = 12{,}00{,}000 - 40{,}000X - 3{,}20{,}000 - 1{,}60{,}000$
- ✓ $4{,}80{,}000 - 16{,}000X = 7{,}20{,}000 - 40{,}000X$
- ✓ $-16{,}000 + 40{,}000X = 2{,}40{,}000$
- ✓ $X = \frac{2{,}40{,}000}{24{,}000}$
- ✓ $X = 10$
- ✓ $Y = 4{,}80{,}000$

Note: -

- Contribution= $S - V$
- $= 30 - 10$
- $= 20$

c) Minimum level of production where the company needs not to close the production, if unavoidable fixed cost is ₹ 1,50,000: -

- ✓ $= \frac{\text{Avoidable fixed cost}}{\text{Contribution per unit}}$
- ✓ $= \frac{\text{Total fixed cost}-\text{Unavoidable fixed cost}}{\text{Contribution per unit}}$
- ✓ $= \frac{₹\,4{,}80{,}000-₹1{,}50{,}000}{20}$
- ✓ $= \frac{₹\,3{,}30{,}000}{₹20} = 16{,}500$ units

At production level ≥ 16,500 units, company needs not to close the production.

6. J Ltd. Manufactures a Product-Y. Analysis of income statement indicated a profit of ₹ 250 lakhs on a sales volume of 5,00,000 units. Fixed costs are ₹ 1,000 lakhs which appears to be high. Existing selling price is ₹680 per unit. The company is considering revising the profit target to ₹ 700 lakhs. You are required to Compute: -

a) Break-even point at existing levels in units and in rupees.
b) The number of units required to be sold to earn the target profit.
c) Profit with 10% increase in selling price and drop in sales volume by 10%.
d) Volume to be achieved to earn target profit at the revised selling price as Calculated in (ii) above, if a reduction of 10% in the variable costs and ₹ 170 lakhs in the fixed cost is envisaged.

(Nov. 2020 RTP, Nov. 2014)

Ans. Sales Volume 5,00,000 Units.

Computation of existing Contribution

Particulars	**Per unit (₹)**	**Total (₹ in lakhs)**
Sales	680	3,400
Fixed Cost	200	1,000
Profit	50	250
Contribution = Profit + Fixed Cost	250	1,250
Variable Cost (Sales – Contribution)	430	2,150

a) **Break-even sales in units** $= \frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{₹\ 10{,}00{,}00{,}000}{₹\ 250} = 4{,}00{,}000$ units.

- Break-even sales in rupees $= 4{,}00{,}000$ units $\times ₹\ 680 = ₹\ 2{,}720$ lakhs

– Or

- P/V Ratio$= \frac{250}{680} \times 100 = 36.76\%$.
- Break. -Even Point (Rupees) $= \frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{10{,}00{,}00{,}000}{36.76\%} =$

  ₹ 2,720 lakhs (approx.)

b) **Number of units sold to achieve a target profit of ₹ 700 lakhs: -**

- Desired Contribution $=$ Fixed Cost $+$ Target Profit

  $= 1{,}000\text{L} + 700\text{L} = 1{,}700\text{L}$
- Number of units to be sold $= \frac{\text{Desired Contribution}}{\text{Contribution per unit}} = \frac{17{,}00{,}00{,}000}{250} =$

  6,80,000 units.

c) **Profit if selling price is increased by 10% and sales volume drops by 10%** :-

- Existing Selling Price per unit = ₹ 680
- Revised Selling Price per unit = ₹ 680 × 110% = ₹ 748
- Existing Sales Volume = 5,00,000 units
- Revised sales volume = 5,00,000 units – 10% of 5,00,000 =4,50,000 units.

Statement of Profit at sales volume of 4,50,000 units @ ₹ 748 per unit

Particulars	**Per unit (₹)**	**Total (₹ in lakhs)**
Sales	748	3,366
Less: Variable Costs	430	1,935
Contribution	318	1,431
Less: Fixed Cost		1,000
Profit		**431**

d) Volume to be achieved to earn target profit of ₹ 700 lakhs with revised selling price and reduction of 10% in variable costs and ₹ 170 lakhs in fixed cost: -

Revised Selling Price per unit	= ₹ 748
Variable Costs per unit existing	= ₹ 430
Revised Variable Costs	
Reduction of 10% in variable costs	$= ₹\ 430 - 10\%\ of\ 430$
	$= ₹\ 430 - ₹43$
	= ₹ 387
Total Fixed Cost (existing)	= ₹ 1,000 lakhs
Reduction in fixed Cost	= ₹ 170 lakhs
Revised fixed Cost	= ₹ 1,000 lakhs − ₹ 170 lakhs = ₹ 830 lakhs
Revised Contribution (unit)	= Revised selling price per unit − Revised Varaible Costs per units

Revised Contribution per unit	= ₹ 748 – ₹ 387 = ₹ 361
Desired Contribution	= Revised Fixed Cost + Target Profit
	= ₹ 830 lakhs + ₹ 700 lakhs = ₹ 1,530 lakhs
No. of units to be sold	$= \frac{\text{Desired Contribution}}{\text{Contribution per unit}} = \frac{₹\ 15,30,00,000}{₹\ 361}$ = 4,23,823 units.

7. **The following information is given by Star Ltd.: -**

Particulars	(₹)
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.

(ICAI SM, Nov. 2015, Modified MTP May 2020)

Ans.

Margin of Safety (%) $= \frac{3,750 \text{ units}}{3,750 \text{ units} + 1,250 \text{ units}} \times 100$

= 75%

Total Sales $= \frac{₹\ 1,87,500}{0.75} = ₹\ 2,50,000$

Profit = Total Sales – Total Cost

= ₹ 2,50,000 – ₹ 1,93,750

= ₹ 56,250

P/V Ratio $= \frac{\text{Profit}}{\text{Margin of Safety (₹)}} \times 100$

$= \frac{₹56,250}{₹1,87,500} \times 100$

= 30%

Break-even Sales = Total Sales × [100 – Margin of Safety %]

= ₹ 2,50,000 × 0.25

= ₹ 62,500

Fixed Cost = Sales × P/V Ratio – Profit

= ₹ 2,50,000 × 0.30 – ₹ 56,250

= ₹ 18,750

8. 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 the determining sales price for the financial year 20X0-X1. 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:
   ₹130 per Toy
   ₹129 per Toy

(Jan 2021, Modified Dec 2021, Modified MTP Nov 2022)

Ans.

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.

9. 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.

Particulars	Total annual costs	Percent of Total Annual Cost which is variable
Material	2,10,000	100%
Labour	1,50,000	80%
Factory Overheads	92,000	60%
Administration Expenses	40,000	35%

The 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: -

a) Compute the sale price per bottle to enable the management to realize an estimated 10% profit on sale proceeds in Bhutan.

b) 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 bottle.

(ICAI SM, Modified MTP Nov 2020)

Ans.

a) Computation of Sale Price per Bottle **Output: -40,000 Bottles**

Particulars	(₹)
Variable Cost: -	
Material	2,10,000
Labour (₹ 1,50,000 × 80%)	1,20,000
Factory Overheads (₹ 92,000 × 60%)	55,200
Administrative Overheads (₹ 40,000 × 35%)	14,000
Commission (8% on ₹ 6,00,000) (W.N.-1)	48,000
Fixed Cost: -	
Labour (₹ 1,50,000 × 20%)	30,000
Factory Overheads (₹ 92,000 × 40%)	36,800
Administrative Overheads (₹ 40,000 × 65%)	26,000
Total Cost	5,40,000
Profit (W.N-1)	60,000
Sales Proceeds (W.N.-1)	6,00,000
Sales Price per bottle $\left(\frac{₹\ 6,00,000}{40,000\ \text{Bottles}}\right)$	15

b) Calculation of Break-even Point if Sale price is ₹14.

Sales Price per Bottle = ₹ 14

Variable Cost per Bottle $= \frac{₹\ 4,44,000\ (W,N,-2)}{40,000\ \text{Bottles}} = ₹\ 11.10$

Contribution per Bottle $= ₹\ 14 - 11.10 = ₹\ 2.90$

Break-even Point:

(in number of Bottles) $= \frac{\text{Fixed Costs}}{\text{Contribution per Bottle}}$

$= \frac{₹92,800}{₹2.90} = 32,000$ Bottles

(In Sales Value) = 32,000 Bottles × ₹14

= ₹ 4,48,000

Working Notes: -

W.N.-1 Computation of Sales Price

Let the Sales Price be 'X'

Commission $= \frac{8x}{100}$

Profit$= \frac{10x}{100}$

x$= 4{,}92{,}000 + \frac{8x}{100} + \frac{10x}{100}$

$100x - 8x - 10x = 4{,}92{,}00{,}000$

$82x = 4{,}92{,}00{,}000$

$x = 4{,}92{,}00{,}000/82 = ₹\ 6{,}00{,}000$

W.N.-2 Computation of Total Variable Cost

Total Variable Cost	(₹)
Material	2,10,000
Labour	1,20,000
Factory Overheads	55,200
Administrative Overheads	14,000
Commission [(40,000 Bottles × ₹14) × 8%]	44,800
	4,44,000

10. 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')

Particulars	**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: -

a) The fixed costs.

b) Break-even sales.

(ICAI SM, RTP Nov-2021)

Ans.

a) Calculation of fixed cost

Fixed Cost = (Actual sales × P/V ratio) – Profit

North = (1,100 × 45%) – 135 = 360

East = (1,450 × 60%) – 210 = 660

South = (1,200 × 55%) – 330 = 330

Total Fixed Cost 1,350

b) Calculation break-even sales (in ₹ '000')

Break-Even Sales $= \frac{\text{Fixed Cost}}{\text{P/V ratio}}$

North $= \frac{360}{45\%} = 800$

East $= \frac{660}{60\%} = 1{,}100$

South $= \frac{330}{55\%} = 600$

Total 2,500

Working notes

Calculation of P/V Ratio **(₹ '000')**

Particulars	Sales	Profit
North: - Actual	1,100	135
Add: - Under budgeted	400	180
Budgeted	1,500	315

$$\text{P/V ratio} = \frac{\text{Difference in Profit}}{\text{Difference in Sales}} = \frac{315-135}{1,500-1,100} = \times 100 = \frac{180}{400} \times 100 = 45\%.$$

(₹ '000')

Particulars	Sales	Profit
East: - Actual	1,450	210
Less: - Over budgeted	(150)	(90)
Budgeted	1,300	120

$$\text{P/V ratio } = \frac{90}{150} \times 100 = 60\%$$

(₹ '000')

Particulars	Sales	Profit
South: - Actual	1,200	330
Add: - Under budgeted	200	110
Budgeted	1,400	440

$$\text{P/V ratio} = \frac{110}{200} \times 100 = 55\%$$

11. The following are cost data for three alternative ways of processing the clerical work for cases brought before the LC Court System: -

Particulars	A Manual (₹)	B Semi-Automatic (₹)	C Fully-Automatic (₹)
Monthly fixed costs;			
Occupancy	15,000	15,000	15,000
Maintenance Contract	----	5,000	10,000
Equipment lease	----	25,000	1,00,000
Unit variable costs (per report)			
Supplies	40	80	20
Labour	₹200 (5hrs × ₹40)	₹60 (1hr × ₹60)	₹20 (0.25 hr × ₹ 80)

Required: -

a) Calculate cost indifference points, Interpret your results.

b) 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?

(ICAI SM, Modified July 2021)

Ans. **i) Cost Indifference Point**

Particulars	A and B (₹)	A and C (₹)	B and C (₹)
Differential Fixed Cost (I)	₹ 30,000 (₹ 45,000 – ₹ 15,000)	₹ 1,10,000 (₹ 1,25,000 – ₹ 15,000)	₹ 80,000 (₹ 1,25,000 – ₹ 45,000)

Differential Variable Costs (II)	₹ 100 (₹ 240 – ₹ 140)	₹ 200 (₹ 240 – ₹ 40)	₹ 100 (₹ 140 – ₹ 40)
Cost Indifference Point (I/II)	300	550	800
(Differential Fixed Cost / Differential Variable Costs per case)	Cases	Cases	Cases

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 Cases	Alternative to be Chosen
Cases ≤ 300	Alternative 'A'
300 ≥ Cases ≤ 800	Alternative 'B'
Cases ≥ 800	Alternative 'C'

Present case load is 600. Therefore, alternative B is suitable. As the number of cases is expected to go upto 850 cases, alternative C is most appropriate.

12. A 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
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 Determine 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.

(Assume that Administration Overhead is related with Production activity)

(May 2020 RTP, Modified MTP Dec 2021)

Ans.

a) Break -Even Sales: -

$$= \frac{\text{Fixed Costs}}{\text{P/V Ratio}} = \frac{\text{₹ } \mathbf{3,69,000}}{\mathbf{53.41\%}} = ₹6,90,882$$

b) Profit earned during the last year: -

$$= (\text{Sales} - \text{Total Variable Costs}) - \text{Total Fixed Costs}$$
$$= (₹9,25,000 - ₹4,31,000) - ₹\ 3,69,000$$
$$= ₹\ 1,25,000$$

c) Margin of Safety (%): -

$$= \frac{\text{Sales} - \text{Breakeven Sales}}{\text{Sales}} \times 100$$
$$= \frac{₹\ 9,25,000 - ₹\ 6,90,882}{₹\ 9,25,000} \times 100 = 25.31\%$$

d) Profit if the sales were 10% less than the actual sales: -

Profit $= 90\%\,(₹\,9{,}25{,}000 - ₹\,4{,}31{,}000) - ₹\,3{,}69{,}000$

$= ₹\,4{,}44{,}600 - ₹\,3{,}69{,}000 = ₹\,75{,}600$

Working Notes: -

1) Calculation of Cost of Goods Sold: -

Let the Cost of Goods sold be x

x = Direct Material + Direct Labour + Factory Overhead + Admin. Overhead

$x = \{0.3x + 0.15x + (0.10x + ₹\,2{,}30{,}000) + (0.02x + ₹\,71{,}000)\}$

$x = 0.57x + ₹\,3{,}01{,}000$

$x = \frac{₹\,3{,}01{,}000}{0.43}$

∴ Cost of goods sold = ₹7,00,000

2) Calculation of Cost of Sales: -

Cost of Sales = Cost of goods sold + Selling & Distribution Overhead

Cost of Sales = ₹ 7,00,000 + (0.04 Cost of Sales + ₹ 68,000)

Cost of Sales $= \frac{₹\,7{,}68{,}000}{0.96} = ₹\,8{,}00{,}000$

3) Calculation of Variable Costs: -

Direct Material-	(0.30 × ₹ 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
Administration OH-	(0.02 × ₹ 7,00,000)	₹ 14,000
Selling & Distribution OH	(0.04 × ₹ 8,00,000)	₹ 32,000
		₹ 4,31,000

4) Calculation of total Fixed Costs: -

Factory Overhead: -	₹ 2,30,000
Administration OH-	₹ 71,000
Selling & Distribution OH	₹ 68,000
	₹ 3,69,000

5) Calculation of P/V Ratio: -

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Sales} - \text{Variable Costs}}{\text{Sales}} \times 100$$

$$= \frac{(₹185 \times 5{,}000\ \text{Units}) - ₹\,4{,}31{,}000}{₹185 \times 5{,}000\ \text{Units}} \times 100 = 53.41\%$$

13. 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: -

a) Break-even sales

b) Total Sales

c) Total Variable Costs

d) Current profit

e) New ‘margin of safety’ if the sales volume is increased by 7 ½ %.

(ICAI SM, Modified May 2023)

Ans.

a) P/V Ratio = 40%

Break-even Sales $= \frac{\text{Fixed cost}}{\text{P/V ratio}} = \frac{500000}{40\%} = ₹12{,}50{,}000$

b) Margin of Safety = 37.5%

Break-even sales = 62.5%

Total sales × 62.5% = Break-even sales
Total sales = ₹ 20,00,000

c) Contribution to Sales Ratio = 40%
Therefore, Variable cost to Sales Ratio = 60%
Variable Cost = 60% of Sales = 60% of 20,00,000
Variable Cost = 12,00,000

d) Current Profit = Total contribution – Fixed cost
= ₹ 20,00,000 × 40% – 5,00,000 = ₹ 3,00,000

e) If Sales Value is increased by 7.5%
New Sales Value = ₹ 20,00,000 × 1.075 = ₹ 21,50,000
New Margin of Safety = New Sales Value – BES
= ₹ 21,50,000 – ₹ 12,50,000 = ₹ 9,00,000

14. A company can make any one of the 3 products X, Y or Z in a year. It can exercise its option only at the beginning of each year.

Relevant information about the products for the next year is given below.

Particulars	**X**	**Y**	**Z**
Selling Price (₹/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.

(ICAI SM, Modified MTP May 2020)

Ans.

Particulars	**X**	**Y**	**Z**
i) Contribution per unit (₹)	4	3	5
ii) Units (lower of production/Market Demand)	2,000	2,000	900
iii) Possible Contribution (₹) [(i)×(ii)]	8,000	6,000	4,500
iv) Opportunity Cost* (₹)	6,000	8,000	8,000

(*) Opportunity cost is the maximum possible contribution forgone by not producing alternative product i.e. If Product X is produced then opportunity cost will be maximum of (₹ 6,000 from Y, ₹ 4,500 from Z).

15. 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 40,000 units per year. The budget for the year 20X1-X2 projects a sale of 30,000 units.

The Costs of each unit are expected as under: -

Particulars	**(₹)**
Materials	12
Wages	9
Overheads	6

Margin of Safety is ₹ 4,12,500.

You are required to: -

a) Calculate fixed cost and break-even point.

b) Calculate the volume of sales to earn profit of 20% on sales.

c) If management is willing to invest ₹ 10,00,000 with an expected return of 20%, Calculate units to be sold to earn this profit.

d) 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 C.

(Nov. 2018, MTP May 2023–II)

Ans.

Margin of Safety $= \frac{\text{Profit}}{\text{P/V ratio}} = ₹\ 4{,}12{,}500$

$= \frac{\text{Profit}}{\frac{45-(12+9+6)}{45}} = ₹\ 4{,}12{,}500$

$= \frac{\text{Profit}}{\frac{18}{45}} = 4{,}12{,}500$

Profit = 1,65,000

P/V ratio = 18/45 X 100 = 40%

a) Fixed Cost

Profit $= \left(\text{Contribution} = \text{Sales} \times \frac{P}{V}\text{Ratio}\right) - \text{Fixed Cost}$

1,65,000 $= \left((30{,}000 \times 45) \times 40\%\right) - \text{Fixed Cost}$

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 $= \frac{18}{45} = 40\%$

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 $= \frac{\text{Fixed Cost}}{\text{P/V ratio}} = \frac{3{,}75{,}000}{\frac{18}{45}} = \frac{3{,}75{,}000}{40\%} = ₹\ 9{,}37{,}500$ OR 20,833.33 units.

b) 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 = 3,75,000

So, S $= \frac{3{,}75{,}000}{9}$ units.

Volume of sales $= \frac{3{,}75{,}000 \times 45}{9}$ = ₹ 18,75,000 or 41666.67 units

So, ₹ 18,75,000 sales are required to earn profit on 20% of sales

c)

Contribution = Fixed Cost + Desired Profit

18 S = 3,75,000 + Return on Investment

18 S = 3,75,000 + 2,00,000

S $= \frac{5{,}75{,}000}{18}$ units $=$ **31,945** units (approx.)

So, 31,945 units to be sold to earn a return of ₹ 2,00,000.

d)

Revised Contribution = Fixed Cost + Desired Profit

17 S = 3,75,000 + 2,00,000

S $= \frac{5{,}75{,}000}{17}$ units

S = **33.824** units (approx.)

∴ Additional Sales to be sold to achieve the same profit is 33,824 Units.

16. ABC Limited started its operations in the year 20X1 with a total production capacity of 2,00,000 units. The following information, for two years, are made available to you: -

Particulars	**Year (20X1)**	**Year (20X2)**
Sales (units)	80,000	1,20,000
Total cost (₹)	34,40,000	45,60,000

There has been no change in the cost structure and selling price and it is anticipated that it will remain unchanged in the year 20X3 also. Selling Price is ₹ 40 per unit.

Calculate: -

a) Variable cost per unit
b) Profit Volume Ratio
c) Break-Even Point (in units)
d) Profit if the firm operates at 75% of the capacity.

(May 2015, May 2013)

Ans. **a) Calculation for variable cost per unit**

Particulars	**20X1**	**20X2**	**Difference**
Sale 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 (₹)			$\frac{11,20,000}{40,000} = ₹\ 28$

Fixed Cost: -

✓ $= 45,60,000 - 1,20,000 \times 28$
✓ $= ₹\ 12,00,000$
Or
✓ $= 34,40,000 - 80,000 \times 28$
✓ $= ₹\ 12,00,000$

Variable cost per unit = **₹ 28**

b) Calculation of P/V Ratio: -

✓ PV Ratio $= \frac{\text{Contribution}}{\text{Sales}} \times 100$
✓ Sales $= 32,00,000$
✓ V.C. $= (28 \times 80,000)$
✓ $= (22,40,000)$
✓ Contribution $= 9,60,000$
✓ PV Ratio $= \frac{9,60,000}{32,00,000} \times 100$
✓ PV Ratio = **30%**

c) Calculation for Break-even Points (in units): -

✓ Break-even point (₹ in units) $= \frac{\text{Fixed cost}}{\text{Contribution per unit}}$
✓ $= \frac{12,00,000}{₹\ (40-28)}$
✓ $= \frac{12,00,000}{12}$
✓ Break-even point = 1,00,000 units

d) Profit if the firm operates at 75% of the capacity: -

✓ Capacity at 75% $= 2,00,000 \times 75\%$
✓ $= 1,50,000$ units

- ✓ Contribution per unit = ₹ 12
- ✓ Contribution (₹) = 1,50,000 × ₹ 12
- ✓ = ₹ 18,00,000
- ✓ Fixed Cost = ₹ 12,00,000
- ✓ Profit = Contribution − Fixed Cost
- ✓ = ₹ 18,00,000 − ₹ 12,00,000
- ✓ = **₹ 6,00,000**

17. LNP Ltd. and MNT Ltd. are engaged in manufacturing of identical products. Existing revenue and cost data is as follows:

	LNP Ltd. (₹)	MNT Ltd. (₹)
Sales	13,60,000	17,00,000
Variable Cost	10,88,000	10,20,000
Fixed Cost	1,72,000	5,80,000

You are required to calculate:

i) Break-even point (in Value) for each company

Sales at which each company will earn a profit of ₹5,00,000.

Sales at which both companies will have same profits.

(MTP May 2023-I, RTP May 2023)

Ans. **Income Statement**

	LNP Ltd. (₹)	**MNT Ltd. (₹)**
Sales (₹)	13,60,000	17,00,000
Less: Variable Cost	10,88,000	10,20,000
Contribution	2,72,000	6,80,000
P.V. Ratio $\left(\frac{\text{Contribution}}{\text{Sales}} \times 100\right)$	20%	40%
Fixed Cost (₹)	1,72,000	5,80,000
Profit (₹)	1,00,000	1,00,000

i) Break-Even Point = $\frac{\text{Fixed Cost}}{\text{P.V.Ratio}}$

LNP Ltd. = $\frac{₹1,72,000}{20\%}$ = ₹8,60,000

MNT Ltd. = $\frac{₹5,80,000}{40\%}$ = ₹14,50,000

ii) Sales value to earn a profit of ₹5,00,000

Sales = $\frac{\text{Fixed Cost+Desired Profit}}{\text{P.V.Ratio}}$

LNP Ltd. = $\frac{1,72,000+5,00,000}{40\%}$ = ₹33,60,000

MNT Ltd. = $\frac{5,80,000+5,00,000}{40\%}$ = ₹27,00,000

iii) Sales value at which both companies will earn same profit

Let S = Sales value and P = Profit
Sales – Variable cost = Fixed cost + Profit
or, Contribution = Fixed cost + Profit
LNP Ltd.:
20% S = ₹1,72,000 + P
or, 0.20S = ₹1,72,000 + P……………………………….(i)
MNT Ltd.
40% S = ₹5,80,000 + P
or, 0.40S = ₹5,80,000 + P……………………………….(ii)
By solving these equations, we will get the value of 'S' and 'P'

$$\begin{array}{l} 0.20S = 1,72,000 + P \\ 0.40S = 5,80,000 + P \\ \underline{\quad - \qquad\quad - \qquad\qquad -} \\ -\,0.20S = -4,08,000 \end{array}$$

or, S = ₹20,40,000

Putting the value of 'S' in equation no. (i) we will get the value of 'P'

0.20 × 20,40,000 = 1,72,000 + P

or, P = ₹2,36,000

Therefore, at Sale value of ₹20,40,000 both the companies will earn same profit of ₹2,36,000

18. **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 20X1-X2: -

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: -

a) Number of units to be sold of 'BLACK' and 'WHITE' to Break even during the financial year 20X1-X2.

b) Amount of reduction in fixed cost product-wise to achieve desired profit mentioned at (iv) above.

(May 2019)

Ans. **a) 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 unit	**3,15,000**	**1,57,500**
Or		
Break-Even Sales (In ₹), 70% of total sales	**56,70,000**	**37,80,000**

b) Statement Showing Fixed Cost Reduction

Profit to be maintained (₹)	8,26,200	7,45,200
Margin of Safety (30% of Sales) (₹)	24,30,000	16,20,000
P/V Ratio (Profit / Margin of Safety) × 100	34%	46%
Contribution (Sales × 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**

19. Prepare a profit graph for products A, B and C and find break-even point from the following data: -

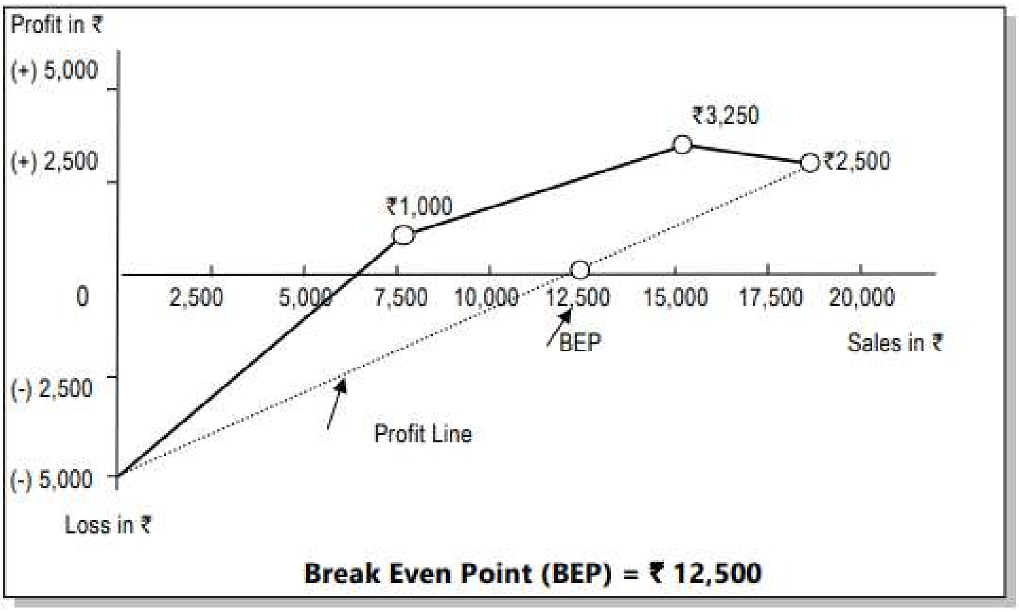
Products	A	B	C	Total
Sales (₹)	7,500	7,500	3,750	18,750
Variable Cost (₹)	1,500	5,250	4,500	11,250
Fixed Cost (₹)	----	----	----	5,000

(ICAI SM)

Ans.

Statement showing Cumulative Sales & Profit

Products	Sales	Cumulative Sales	Variable Cost	Contribution	Cumulative Contribution	Cumulative Profit
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
A	7,500	7,500	1,500	6,000	6,000	1,000
B	7,500	15,000	5,250	2,250	8,250	3,250
C	3,750	18,750	4,500	(750)	7,500	2,500



Break Even Point (BEP) = ₹ 12,500

20. ABC Motors assembles and sells motor, vehicles. It uses an actual costing system, in which unit costs are Calculated on a monthly basis. Data relating to March and April, 20X1 are: -

Particulars	March	April
Unit data: -		
Beginning Inventory	0	150
Production	500	400
Sales	350	520
Variable-cost data: -		
Manufacturing Costs per unit Produced	₹10,000	₹10,000
Distribution Costs per unit sold	3,000	3,000
Fixed-Cost data: -		
Manufacturing Costs	₹20,00,000	₹20,00,000
Marketing Costs	6,00,000	6,00,000
The Selling Price per motor Vehicle is ₹ 24,000.		

Required: -

i) Present income statements for ABC Motors in March and April of 20X1 under (a) variable costing, and (b) absorption costing.

ii) Explain the differences between (a) and (b) for March and April.

(May 2000)

Ans. **i)**

A) Income statement for ABC Motors (Under Variable Costing)

(₹'000')

Particulars	**March 20X1**		**April 20X1**	
	Per unit (₹)	**Total (₹)**	**Per unit (₹)**	**Total (₹)**
Contribution margin (W.N.1)	11	3,850 (350 units × ₹11)	11	5,720 (520 units × ₹11)
Less: Total fixed cost		2,600		2,600
Operating income		1,250		3,120

B) Income statement for ABC Motors (Under Absorption Costing)

(₹'000')

Particulars	**March 20X1**		**April 20X1**	
	Per unit (₹)	**Total (₹)**	**Per unit (₹)**	**Total (₹)**
Manufacturing Cost				
Variable	10	5,000 (500 units × ₹10)	10	4,000 (400 units × ₹10)
Fixed	4	2,000 (500 units × ₹4)	5	2,000 (400 units × ₹5)
Total manufacturing cost	14	7,000 (500 units × ₹14)	15	6,000 (400 units × ₹15)
Add: Beginning inventory	- -		14	2,100 (150 units × ₹14)
		7,000		**8,100**
Less: Closing inventory (W.N.2)	14	2,100 (150 units × ₹ 14)	15	450 (30 units × ₹15)
		4,900		7,650
Add: Variable distribution Costs	3	1,050 (350 units × 3)	3	1,560 (520 units × 3)
Add: Fixed Marketing Costs		600		600
Cost of Sales (A)		6,550		9,810
Sales: (B)	24	8,400	24	12,480
Operating income: {(B) – (A)}		1,850		2,670

Working Notes: -

(₹'000')

1) Contribution margin (per unit): -	**March 20X1**	**April 20X1**
✓ Selling price (per unit) (₹)	24	24
✓ **Less:** Manufacturing costs (per unit) (₹)	10	10
✓ **Less:** Distribution cost (per unit) (₹)	3	3
✓ Contribution margin (per unit) (₹)	11	11
2) Closing inventory units: -		
✓ Beginning inventory (units)	0	150
✓ **Add:** Production (units)	500	400
✓ Total (units)	500	550
✓ **Less:** units sold	350	520
✓ Closing inventory (units)	150	30

ii) Difference between operating income under variable costing and absorption costing is due to fixed cost. Under absorption costing the closing inventory has the component of fixed cost, due to which its profit increases under it.

$$\begin{pmatrix}\text{Absorption}\\\text{Costing}\\\text{operating}\\\text{income}\end{pmatrix}\begin{pmatrix}\text{Variable}\\\text{Costing}\\\text{operating}\\\text{income}\end{pmatrix}=\begin{pmatrix}\text{Fixed}\\\text{Manufacturing}\\\text{Cost in}\\\text{ending}\\\text{inventory}\end{pmatrix}\begin{pmatrix}\text{Fixed}\\\text{manufacturing}\\\text{cost in}\\\text{begining}\\\text{inventory}\end{pmatrix}$$

- ✓ March 2000: (₹'000')
- ✓ ₹ 1,850 – ₹ 1,250 = ₹ 600 – ₹0
- ✓ April 20X1: (₹'000)
- ✓ ₹ 2,670 – ₹ 3,120 = ₹ 150 – ₹600.

21. 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.

(ICAI SM)

Ans.

i) Contribution per unit = Selling Price – Variable Cost

= ₹40 – ₹16 = ₹24

Break-even Point = $\frac{\text{₹}4{,}80{,}000}{\text{₹}24}$ = 20,000 units

Percentage Margin of Safety = $\frac{\text{Actual Sale} - \text{Break even Sales}}{\text{Actual Sales}}$

Or, 60% = $\frac{\text{Actual Sales} - 20{,}000\text{ units}}{\text{Actual Sales}}$

∴ Actual Sales = 50,000 units

Particulars	(₹)
Sales Value (50,000 units × ₹40) **Less:** Variable Cost (50,000 units × ₹16)	20,00,000 8,00,000
Contribution **Less:** Fixed Cost	12,00,000 4,80,000
Profit **Less:** Income Tax @ 40%	7,20,000 2,88,000
Net Return	4,32,000

Rate of Net Return on Sales = 21.6% $\left(\frac{₹\ 4,32,000}{₹20,00,000} \times 100\right)$

ii) Products

Particulars	X (₹)	Y (₹)
Selling Price	40	50
Less: Variable Cost	16	10
Contribution per unit	24	40
Sales Ratio	7	3
Contribution in Sales Ratio	168	120

Based on Weighted Contribution: -

Weighted Contribution $= \frac{24\times7+40\times3}{10} =$ ₹ 28.8 per unit

Total Break-even Point $= \frac{\text{Total Fixed Cost}}{\text{Weighted Cost}} = \frac{6,66,600}{28.80} = 23,145.80$ units

Break-even Point

X $= \frac{7}{10} \times 23,145.80 = 16,202$ units

Or 16,202 × ₹40 = ₹ 6,48,080

Y $= \frac{3}{10} \times 23,145.80 = 6,944$ units or $6,944 \times$ ₹50 = ₹ 3,47,200

Based on distributing fixed cost in the weighted Contribution Ratio: -

Fixed Cost

X $= \frac{168}{288} \times 6,66,600 =$ ₹ 3,88,850

Y $= \frac{120}{288} \times 6,66,600 =$ ₹2,77,750

Break-even Point

X $= \frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{3,88,850}{24} = 16,202$ units or ₹ 6,48,000

Y $= \frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{2,77,750}{40} = 6,944$ units or ₹ 3,47,200

22. 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: -

Particulars	Part A	Part B
Per unit		
Alloy usage	1.6 kgs.	1.6 kgs.
Machine Time: Machine P	0.6 hrs	0.25 hrs.
Machine Time: Machine Q	0.5 hrs.	0.55 hrs.
Target Price (₹)	145	115

Total hours available Machine P 4,000 hours
Machine Q 4,500 hours

Alloy available is 13,000 kgs. @ ₹ 12.50 per Kg.
Variable overheads per machine hours Machine P: ₹ 80
Machine Q: ₹ 100

Required: -

a) Identify the spare part which will optimize contribution at the offered price.

b) 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?

(ICAI SM)

Ans.

a)

Particulars	**Part A (₹)**	**Part B (₹)**
Raw material usage	20 (12.5×1.6)	20 (12.5×1.6)
Variable Overhead: Machine "P"	48 (80×.6)	20 (80×.25)
Variable Overhead: Machine "Q"	50 (100×.5)	55 (100×.55)
(B) Total Variable Cost per unit	118	95
(A) Sales Price	145	115
Contribution per unit (A – B)	27	20

b) Since, machine hours and raw material are limited we need to verify maximum possible production of both products.

Particulars	**Part A**	**Part B**
Allow usage Machine P Machine Q	8125 $\left(\frac{13000}{1.6kg}\right)$ 6666 $\left(\frac{4000}{0.6}\right)$ 8800 $\left(\frac{4400}{.5}\right)$	8125 $\left(\frac{13000}{1.6kg}\right)$ 16000 $\left(\frac{4000}{.25}\right)$ 8000 $\left(\frac{4400}{.55}\right)$
	6666 units	8000 units

Total contribution; A = 27 × 6666 = ₹1,79,982
B = 20 × 8000 = ₹1,60,000

Product A should be produced.
Revised Contribution from Part A = 145 – 10% of 145 = ₹130.5
Contribution per unit = Revised sales price – Variable cost = 130.5 – 118 = ₹12.5

On producing 6666 units of Part A, machine hours of machine A will get completely utilised but machine hours of B: -
⇒6666 × 0.5 = 3333 hours will utilise
Balance hours = 4500 – 3333 = 1167 hours
Total contribution = 6666×12.5+1167×60
= ₹83,325 + ₹70,020 = ₹1,53,345

23. 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: -

Particulars	(₹)
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.

(ICAI SM)

Ans. **Statement showing "Cost and Profit for the Next Year"**

Particulars	Existing Volume, etc.	Volume, Costs, etc. after 10% increase	Estimated Sale, Cost, Profit, etc.*
	(₹)	(₹)	(₹)
Sales	5,00,000	5,50,000	5,72,000
Less: Direct Materials	2,50,000	2,75,000	2,69,500
Direct Labour	1,00,000	1,10,000	1,07,800
Variable Overheads	40,000	44,000	43,120
Contribution	1,10,000	1,21,000	1,51,580
Less: Fixed Cost#	60,000	60,00	58,800
Profit	50,000	61,000	92,780

(*) for the next year after increase in selling price @ 4% and overall cost reduction by 2%.

(#) Fixed Cost = Existing Sales – Existing Marginal Cost – 12.5% on ₹ 4,00,000

= ₹ 5,00,000 – ₹ 3,90,000 – ₹50,000 = ₹ 60,000

Percentage Profit on Capital Employed equals to 23.19% $\left(\frac{₹92,780}{₹ 4,00,000} \times 100\right)$

Since the Profit of ₹92,780 is more than 23% of capital employed, the proposal of the Sales Manager can be adopted.

24. 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
Particulars	**(₹)**	**(₹)**
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?

(ICAI SM)

Ans. **a)**

Fixed production costs absorbed: -	**(₹)**
Budgeted fixed production costs	1,60,000
Budgeted output (normal level of activity 800 units)	
Therefore, the absorption rate: - 1,60,000/800	200 per unit
During the first quarter, the fixed production Cost absorbed by ZEST would be (220 units × ₹200)	44,000

b)

Under/ over-recovery of overheads during the period: -	**(₹)**
Actual fixed production overhead	40,000
(1/4 of ₹ 1,60,000)	
Absorbed fixed production overhead	44,000
Over-recovery of overheads	4,000

c) Profit for the quarter (Absorption Costing)

Particulars		**(₹)**
Sales revenue (160 units × ₹ 2,000): (A)		3,20,000
Less: Production costs:		
– Variable cost (220 units × ₹800)	1,76,000	
– Fixed overheads absorbed (220 units × ₹200)	44,000	
–	2,20,000	
Add: Opening Stock	-	
Less: Closing Stock $\left(\frac{₹\ 2,20,000}{220\ \text{units}} \times 60\ \text{units}\right)$	(60 000)	
Cost of Goods sold	1,60,000	
Less: Adjustment for over-absorption of fixed production overheads	(4,000)	
	156000	
Add: Selling & Distribution Overheads:		
– Variable (160 units × ₹400)	64,000	

– Fixed (1/4th of ₹ 2,40,000)	60,000	
Cost of Sales (B)		2,80,000
Profit {(A) – (B)}		40,000

d) Profit for the Quarter (Marginal Costing)

Particulars		(₹)
Sales revenue (160 units × ₹ 2,000): (A)		3,20,000
Less: Production costs:		
– Variable cost (220 units × ₹ 800)	1,76,000	
Add: Opening Stock	--	
Less: Closing Stock $\left(\frac{₹\ 1,76,000}{220\ \text{units}} \times 60\ \text{units}\right)$	(48,000)	
Variable Cost of goods sold	1,28,000	
Add: Selling & Distribution Overheads: -		
– Variable (160 units × ₹ 400)	64,000	
Cost of Sales (B)	1,92,000	
Contribution {(C) = (A) – (B)}		1,28,000
Less: Fixed Costs:		
– Production cost	(40,000)	
– Selling & distribution cost	(60,000)	(1,00,000)
Profit		28,000

25. 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.

(ICAI SM)

Ans. **Capacity Sales** = ₹ 3,00,000 ÷ 0.60 = ₹ 5,00,000

Computation of Profit of 75% Capacity

75% of capacity Sales (i.e., ₹ 5,00,000 × 75%) = ₹ 3,75,000
Less: Variable cost (i.e. ₹ 3,75,000 × 70%) = ₹ 2,62,500
= ₹ 1,12,500
Less: Fixed Cost = ₹ 90,000
Profit = ₹ 22,500

Working-

Variable cost to sales = 70%, P/V Ratio = 30%,
Break-even Sales × P/V Ratio = Fixed Cost
Break-even Sales × 0.30 = ₹ 90,000
Break-even Sales = ₹ 3,00,000
It is given that break-even occurs at 60% capacity

26. **You are required to: -**

Particulars	(₹)
i) Determine profit, when sales	2,00,000
Fixed Cost	40,000
Break-Even Point	1,60,000
ii) Determine sales, when fixed cost	20,000
Profit	10,000
Break-Even Point	40,000

(ICAI SM)

Ans.

i) We Know that: Break-Even Sales × P/V Ratio = Fixed Cost
Or ₹ 1,60,000 × P/V ratio = ₹ 40,000
P/V ratio = 25%
We also know that Sales × P/V Ratio = Fixed Cost + Profit
Or ₹ 2,00,000 × 0.25 = ₹ 40,000 + Profit
Or Profit = ₹ 10,000

ii) Again, Break-Even Sales × P/V ratio = Fixed Cost
Or ₹ 40,000 × P/V Ratio = ₹ 20,000
Or P/V ratio = 50%
We also know that: Sales × P/V ratio = Fixed Cost + Profit
Or Sales × 0.50 = ₹ 20,000 + ₹ 10,000
Or Sales = ₹ 60,000.

27.

A Company manufactures radios, which are sold at ₹ 1,600 per unit. The total cost is composed of 30% for direct materials, 40% for direct wages and 30% for overheads. Increase in material price by 30% and in wages rates by 10% is expected in the forthcoming year, as a result of which the profit at current selling price may decrease by 40% of the Present profit per unit.

You are required to prepare a statement showing current and future profit at present Selling Price.

How much Selling Price should be increased to maintain the present rate of profit?

(May 2001)

Ans.

Let X be the cost, Y be the profit and ₹ 1,600 selling price per unit of radio manufactured by a company.

Hence

X+Y=1,600 …….(i)

Statement of present and future cost of a radio

Particulars	Present Cost (₹)	Increase in Cost (₹)	Anticipated future cost (₹)
	(a)	**(b)**	**(c)=(a)+(b)**
Direct material	0.3X	0.09X	0.39X
Direct labour	0.4X	0.04X	0.44X
Overheads	0.3X	-	0.30X
Total	**X**	**0.13X**	**1.13X**

- ✓ An increase in material price and wages rates resulted into a decrease in current profit by 40 percent at present selling price; therefore, we have;
- ✓ 1.13X + 0.6Y = 1600 …………………(ii)
- ✓ On Solving (i) and (ii) we get;
- ✓ X = ₹ 1,207.55
- ✓ Y = ₹ 392.45
- ✓ Current profit ₹ 392.45 or 32.5% of cost
- ✓ Future profit ₹ 235.47 (392.45*60%)
- ✓ Revised selling price to maintain same level of profit= Revised cost-plus original profit = 1207.55×1.13+392.45=1756.98
- ✓ Increase in selling price = 1756.98-1600=156.98
- ✓ % Increase in selling price = 156.98/1600=9.8%

28.

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

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?

(ICAI SM)

Ans.

a) Total Sales $= 2{,}40{,}000 \times \frac{100}{40} = ₹\ 6{,}00{,}000$

Contribution $= 6{,}00{,}000 \times 30\% = ₹\ 1{,}80{,}000$

Profit $= MOS \times \frac{P}{V}\text{ratio} = 2{,}40{,}000 \times 30\% = ₹72{,}000$

Fixed Cost $=$ Contribution $-$ Profit

$= 1{,}80{,}000 - 72{,}000 = ₹\ 1{,}08{,}000$

1) Break-even Sales $= \frac{\text{Fixed Cost}}{\text{P/V ratio}} = \frac{1{,}08{,}000}{30\%} = ₹\ 3{,}60{,}000$

2) Profit $=$ (Sales × P/V ratio) $-$ Fixed Cost

$= (9{,}00{,}000 \times 30\%) - 1{,}08{,}000 = ₹1{,}62{,}000$

b) P/V ratio $= \frac{\text{Contribution}}{\text{Sales}} = \frac{2{,}00{,}000}{8{,}00{,}000} = 25\%$

Margin of Safety $= \frac{\text{Profit}}{\text{P/V ratio}} = \frac{1{,}50{,}000}{25\%} = ₹\ 6{,}00{,}000$

Alternatively: -

Fixed Cost $=$ Contribution $-$ Profit

$= ₹\ 2{,}00{,}000 - ₹1{,}50{,}000 = ₹50{,}000$

B.E. Point $= ₹\ 50{,}000 \div 25\% = ₹2{,}00{,}000$

Margin of Safety $=$ Actual Sales $-$ B. E. Sales

$= 8{,}00{,}000 - 2{,}00{,}000 = 6{,}00{,}000$

29. **The product mix of a Gama Ltd. Is as under: -**

Particulars	**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 costs respectively are ₹ 18 and ₹ 9. Fixed Cost is ₹ 15,000.

(ICAI SM)

Ans.

N = 18,000 Units

O = 9,000 Units

Ratio (N : O) = 2 : 1

Let

t = No. of Units of 'O' for BEP

2t = No. of units of 'N' for BEP

Contribution = Selling price – Variable cost

Contribution of 'N' = ₹ 10.5 per unit (15 – 4.50)

Contribution of 'O' = ₹ 9 per unit (18 – 9)

At Break Even point:

Contribution – Fixed cost = 0

⇒ (10.5 × (2t) + 9 × t)- 15,000 = 0

⇒ 30t = 15,000

⇒ t 500 units

BEP of 'N' = 2t = 1,000 units

BEP of 'O' = t = 500 units

30. Mr. X has ₹ 2,00,000 investments in his business firm. He wants a 15 percent 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 percent 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?

(ICAI SM)

Ans.

i) Break-even point= Fixed Cost ÷ P/V ratio = 80,000 ÷ 40 % or ₹ 2,00,000

Particulars	**(₹)**
Suppose sales	100
Variable cost	60
Contribution	40
P/V ratio	40%
Fixed cost	= ₹ 80,000

ii) 15% return on ₹ 2,00,000	30,000
Fixed Cost	80,000
Contribution required	1,10,000

Sales volume required = ₹ 1,10,000 ÷ 40% or ₹ 2,75,000

iii) Avoidable fixed cost if business is locked up = ₹ 80,000 – ₹ 25,000 = ₹ 55,000

Minimum sales required to meet this cost: ₹ 55,000 ÷ 40%

₹ 1,37,500

Mr. X will be better off by locking his business up, if the sale is less than ₹ 1,37,500.

31. A company had incurred fixed expenses 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: -

i) The profit-volume ratio, break-even point and margin of safety for the first half year.

ii) Expected sales volume for the second half year assuming that selling price and fixed expenses remained unchanged during the second half year.

iii) The break-even point and margin of safety for the whole year.

(ICAI SM)

Ans.

i) In the First half year: -

Contribution = Fixed Cost + Profit

= 4,50,000 + 3,00,000 = ₹ 7,50,000

P/V ratio $= \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{7{,}50{,}000}{15{,}00{,}000} \times 100 = 50\%$

Break-even point $= \frac{\text{Fixed Cost}}{\text{P/V ratio}} = \frac{4{,}50{,}000}{50\%} \times 100 = ₹\ 9{,}00{,}000$

Margin of Safety = Actual Sales − Break even point

= 15,00,000 – 9,00,000 = ₹ 6,00,000

ii) In the second half year: -

Contribution = Fixed cost – Loss

= 4,50,000 – 1,50,000 = ₹ 3,00,000

Expected sales volume $= \frac{\text{Fixed cost}-\text{Loss}}{\text{P/V ratio}} = \frac{3,00,000}{50\%} =$ ₹ 6,00,000

iii) For the whole year: -

B.E. point $= \frac{\text{Fixed Cost}}{\frac{P}{V}\text{ratio}} = \frac{4,50,000 \times 2}{50\%} =$ ₹ 18,00,000

Margin of safety $= \frac{\text{Profit}}{\text{P/V ratio}} = \frac{3,00,000-1,50,000}{50\%} =$ ₹ 3,00,000

32. A single product company sells its product at ₹ 60 per unit. In 20X1, the company operated at a margin of safety of 40%. The fixed costs amounted to ₹ 3,60,000 and the variable cost ratio to sales was 80%.

In 20X2, 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 20X2 to earn the same P/V ratio as in 20X1.

ii) Assuming the same selling price of ₹ 60 per unit in 20X2, Find the number of units required to be produced and sold to earn the same profit as in 20X1.

(ICAI SM)

Ans.

i) Profit earned in 20X1:

Particulars	(₹)
Total Contribution (50,000 × ₹ 12)	6,00,000
Less: Fixed Cost	3,60,000
Profit	2,40,000
Selling price to be fixed in 20X2: -	
Revised Variable cost (₹ 48 × 1.10)	52.80
Revised fixed cost (3,60,000 × 1.05)	3,78,000
P/V Ratio (Same as of 2019)	20%
Variable cost ratio to selling price	80%
Therefore, revised selling price per unit= ₹ 52.80 ÷ 80% = ₹ 66	

ii) No. of units to be produced and sold in 20X2 to earn the same profit: -

We Know that Fixed Cost-plus profit =	Contribution
	(₹)
Profit in 20X1	2,40,000
Fixed cost in 20X2	3,78,000
Desired Contribution in 20X2	6,18,000
Contribution per unit = Selling price per unit – Variable Cost per unit. = ₹ 60 – ₹ 52.80 = ₹ 7.20.	
No. of units to be produced in 20X2 = ₹ 6,18,000 ÷ ₹ 7.20 = 85,834 units.	

Workings: -

1) P/V Ratio in 20X1

Particulars	(₹)
Selling price per unit	60
Variable Cost (80% of Selling Price)	48
Contribution	12
P/V Ratio	20%

2) No. of units sold in 20X1

Break-even point = Fixed Cost ÷ Contribution per unit

= ₹ 3,60,000 ÷ ₹ 12 = 30,000 units.

Margin of Safety is 40%. Therefore, break-even sales will be 60% of units sold.

No. of units sold = Break-even point in units ÷ 60% = 30,000 ÷ 60% = 50,000 units.

33. **a)** You are given the following data for the coming year for a factory.

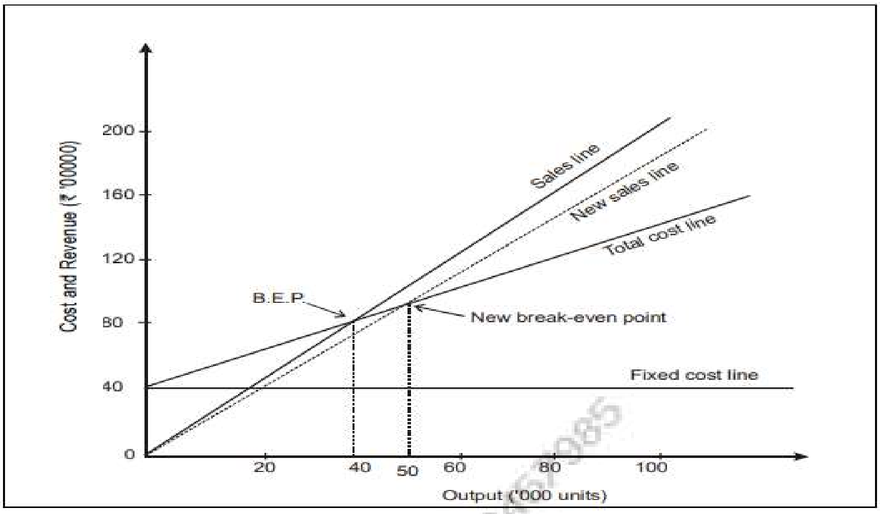
Budgeted output	8,00,000 units
Fixed expenses	₹ 40,00,000
Variable expenses per unit	₹ 100
Selling price per unit	₹ 200
Draw a break-even chart showing the break-even point.	

b) If price is reduced to ₹ 180. What will be the new break-even point?

(ICAI SM)

Ans. **a)** Contribution = Sales – Variable Cost = ₹ 200 – ₹ 100 = ₹ 100 per unit.

Break-Even Point $= \frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{40,00,000}{₹\ 100} = 40,000$ unit.



b) When selling price is reduced

New selling price = ₹ 180

New Contribution = ₹ 180 – ₹ 100 = ₹ 80 per unit.

New Break-Even Point $= \frac{₹\ 40,00,000}{₹\ 80} = 50,000$ units.

34. An automobile manufacturing company produces different models of Cars. The budget in respect of model 007 for the month of March, 20X1 is as under: -

Budgeted Output			40,000 units
		₹ in lakhs	**₹ in lakhs**
Net Realisation			2,10,000
Variable Costs: -			
Materials		79,200	
Labour		15,600	
Direct expenses		37,200	1,32,000
Specific Fixed Costs		27,000	
Allocated Fixed Costs		33,750	60,750
	Total Costs		1,92,750
	Profit		17,250
	Sales		2,10,000

Calculate: -

a) Profit with 10 percent increase in selling price with a 10 percent reduction in sales volume.

b) Volume to be achieved to maintain the original profit after a 10 percent rise in material costs, at the originally budgeted selling price per unit.

(ICAI SM)

Ans.

a) Statement of Calculation of Profit: **-**

Particulars	**(₹ in lakhs)**
Sales 36,000 units at ₹ 5,77,500	2,07,900
Less: - Variable cost: 36,000 × ₹ 3,30,000	<u>1,18,800</u>
Contribution	89,100
Less: - fixed costs	<u>60,750</u>
Profit	<u>28,350</u>

Budgeted selling price = 2,10,000 lakhs / 40,000 units = ₹ 5,25,000 per unit.
Budgeted variable cost = 1,32,000 lakhs/ 40,000 units = ₹ 3,30,000 per unit.
Increased selling price = ₹ 5,25,000 + 10% = ₹ 5,77,500 per unit
New volume 40,000 – 10% = 36,000 units.

b) Budgeted Material Cost = 79,200 Lakhs/40,000 units = ₹1,98,000 per unit

Increased material cost = ₹ 1,98,000 × 110% =	2,17,800
Labour cost 15,600 lakhs /40,000 units =	39,000
Direct expenses, 37,200 lakhs/40,000 units =	<u>93,000</u>
Variable cost per unit	3,49,800
Budgeted selling price per unit	<u>5,25,000</u>
Contribution per unit (5,25,000 – 3,49,800)	<u>1,75,200</u>

$$\text{Sales Volume} = \frac{\text{Fixed costs+Profit}}{\text{Contribution Per Unit}} = \frac{60{,}750\text{ lakhs}+17{,}250\text{ lakhs}}{₹\ 1{,}752\text{ lakhs}}$$

= 44,521 units are to be sold to maintain the original profit of ₹ 17,250 lakhs.

35. 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, 20X1, 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.

a) Calculate the Profit for the year: -
  i) By absorption costing method and
  ii) By marginal costing method.

b) Explain the difference in the profits.

(ICAI SM)

Ans.

a)

i) Income Statement (Absorption Costing) for the year ending 30th June 20X1

Particulars		**(₹)**
Sales (1,50,000 units @ ₹ 20)		<u>30,00,000</u>
Production Costs: -		
Variable (1,60,000 units @ ₹ 11)	17,60,000	
Add: Increase	<u>35,000</u>	17,95,000
Fixed (1,60,000 units @ ₹ 2*) * Fixed overhead Rate = 3,60,000/(2,00,000 X 90%)		<u>3,20,000</u>

Cost of Goods Produced		21,15,000
Add: - Opening Stock (10,000 units @ ₹ 13) ** **Total cost Per unit = Variable (11) + Fixed (2) = 13		1,30,000
		22,45,000
Less: Closing Stock $\left(\frac{₹\ 21,15,000}{1,60,000\ \text{units}} \times 20,000\ \text{units}\right)$		2,64,375
Cost of Goods Sold		19,80,625
Add: Under absorbed fixed production overhead (3,60,000 – 3,20,000)		40,000 20,20,625
Add: Non-production costs: -		
Variable selling costs (1,50,000 units @ ₹3)		4,50,000
Fixed selling costs		2,70,000
Total cost		27,40,625
Profit (Sales – Total Cost)		2,59,375

Working Notes: -

1) Fixed production overhead is absorbed at a pre-determined rate based on normal capacity, i.e., ₹ 3,60,000 ÷ 1,80,000 units = ₹2.
2) Opening stock is 10,000 units, i.e., 1,50,000 units + 20,000 units – 1,60,000 units. It is valued at ₹ 13 per unit, i.e., ₹11 +₹2 (Variable + Fixed.)

ii) Income Statement (Marginal Costing) for the year ended 30th June, 20X1

Particulars		**(₹)**
Sales (1,50,000 units @ ₹ 20)		30,00,000
Variable production cost (1,60,000 units @ ₹11 + ₹ 35,000)		17,95,000
Variable selling cost (1,50,000 units @ ₹ 3)		4,50,000
		22,45,000
Add: Opening Stock (10,000 units @ ₹11)		1,10,000
		23,55,000
Less: Closing stock $\left(\frac{₹\ 17,95,000}{1,60,000\ \text{units}} \times 20,000\ \text{units}\right)$		2,24,375
Variable Cost of goods sold		21,30,625
Contribution (Sales – Variable cost of goods sold)		8,69,375
Less: Fixed cost – Production	3,60,000	
– Selling	2,70,000	6,30,000
Profit		2,39,375

b) Reasons for Difference in Profit: -	**(₹)**
Profit as per absorption costing	2,59,375
Add: - Op. stock under – valued in marginal costing (₹ 1,30,000 – 1,10,000)	20,000
	2,79,375
Less: Cl. Stock under – valued in marginal closing	40,000
(₹ 2,64,375 – 2,24,375)	
Profit as per marginal costing	2,39,375

36. Jolly Fabrics manufactures quality napkins at its unit in Tirupur. The unit has a capacity of 60,000 napkins per month. Present monthly production for April is 40,000 napkins. Costs incurred for production are as below: - (per unit).

Direct Material	₹6	No fixed cost
Direct Labour	₹2	Fixed cost 75%
Manufacturing overhead	₹4	Variable 25%
Total	₹12	

The marketing costs per unit is ₹ 7 (₹ 5 is variable). Marketing costs include distribution costs and customer service costs. Present selling price is ₹ 22.50 per unit.

Due to a strike at its existing napkin supplier, a hotel group has offered to buy 10,000 napkins from jolly Fabrics @ ₹11 per napkin for the month of June. No further sales to the hotel are anticipated.

Fixed manufacturing costs and marketing costs are tied to the 60,000 napkins. The acceptance of the special order is not expected to affect the selling price to regular customers.

No marketing costs involved in special order.

Prepare: -

a) Budgeted income statement for June.

b) Actual income statement under absorption costing for April.

c) Should Jolly Fabrics accept the special order from the hotel or not?

(Nov. 2003)

Ans. **a) Budgeted Income Statement for June of M/s. Jolly Fabrics**

Particulars	**Production in April 40,000**		**Production in June Incremental 50,000 napkins (after accepting special order)**	
(a)	**Per napkin (₹) (b)**	**Total (₹) (C)= 40,000 × (b)**	**Total (₹) (d)**	**(₹) (e)=(d) −(C)}**
Revenue (A)	22.50	9,00,000	10,10,000	1,10,000
			{40,000×₹22.50} 10,000×₹11.00	
Variable costs;				
Manufacturing costs				
(W.N.1)	7.50	3,00,000	3,75,000	75,000
			50,000 × ₹7.50	
Marketing Costs	5.00	2,00,000	2,00,000	
			(No marketing cost involved on special order)	
Total Variable Costs (B)	**12.50**	**5,00,000**	**5,75,000**	**75,000**
Contribution (C)={(A)−(B)}	10.00	4,00,000	4,35,000	35,000
Fixed Costs: -				
Manufacturing (W.N.2)				
Marketing (W.N.2)		2,70,000	2,70,000	
Total fixed costs: (D)		1,20,000	1,20,000	
Operating profit: {(C)−(D)}		3,90,000	3,90,000	
		10,000	45,000	35,000

b) **Actual Income Statement for April 20X1**
(Under absorption costing)

Particulars	(₹)
Revenue: (A)	9,00,000
(40,00 units × ₹22.50)	
Cost goods sold;	
Manufacturing costs	5,70,000
(40,000 napkins × ₹ 7.50 + ₹ 2,70,000)	
Marketing costs	3,20,000
(40,000 napkins × ₹5 + ₹1,20,000)	
Total costs: (B)	**8,90,000**
Profit: {(A) – (B)}	10,000

c) Decision of M/s. Jolly about the acceptance of special order of 10,000 napkins from the hotel:
M/S. Jolly, Fabrics would earn an additional operating profit of ₹ 35,000 on accepting the special order. Hence this order must be accepted.

Working Notes: -

1) Variable and fixed cost components of manufacturing cost per unit: -

Particulars	Variable cost per napkin	Fixed cost per napkin (₹)	Total cost per napkin (₹)
Direct material	6.00	-	6.00
Direct labour	0.50	1.50	2.00
Manufacturing overhead	1.00	3.00	4.00
Manufacturing cost per unit	7.50	4.50	12.00

2) Total fixed cost (tied up with 60,000 napkins): -

Particulars	(₹)
Manufacturing fixed cost	2,70,000
60,000 napkins × ₹ 4.50	
Marketing fixed cost	1,20,000
60,000 napkins × ₹2.00	
Total fixed cost	**3,90,000**

37. XY Ltd. Makes two products X and Y, whose respective fixed costs are F_1 and F_2. You are given that the unit contribution of Y is one fifth less than the unit contribution of X, that the total of F_1 and F_2 is ₹ 1,50,000, that the BEP of X is 1,800 units (for BEP of X, F_2 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 build-up as whatever is produced is sold.

Required: -

Find out the values F_1 and F_2 and units' contributions of X and Y.

(ICAI SM)

Ans. Let C_x be the Contribution per unit of Product X.

Therefore, Contribution per unit of Product Y $=C_y=4/5C_x = 0.8C_x$

Given $F_1 + F_2 = 1,50,000$.

$F_1 = 1,800\ C_x$ (Break even Volume × Contribution per unit)

Therefore, $F_2 = 1,50,000 – 1,800\ C_x$.

At 3000 units both X and Y gives the equal profits therefore,

3,000 C_x – F_1=3,000 × 0.8 C_x – F_2 or 3,000 C_x – F_1 = 2,400 C_x – F_2 (Indifference point)

i.e. 3,000 C_x – 1,800 C_x = 2,400 C_x – 1,50,000 + 1,800 C_x

i.e., 3,000 C_x = 1,50,000, Therefore, C_x = ₹ 50/- (1,50,000/3,000)

Therefore, Contribution per unit of X = ₹50

Fixed Cost of X = F_1 = ₹ 90,000 (1,800 × 50)

Therefore, Contribution per unit of Y is ₹ 50 × 0.8 = ₹ 40 and

Fixed Cost of Y = F_2 = ₹ 60,000 (1,50,000 – 90,000)

The Value of F_1 = ₹ 90,000, F_2 = ₹ 60,000 and X = ₹ 50 and Y = ₹40

38. Two manufacturing companies A and B are planning to merge. The details are as follows: -

Particulars	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: -

a) Break-Even sales of the merged plant and the capacity utilization at that stage.

b) Profitability of the merged plant at 80% capacity utilization.

c) Sales Turnover of the merged plant to earn a profit of ₹ 60,00,000.

d) 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.

(Jan. 2021)

Ans. At the break-even sales profit is nil and contribution are equal to the Fixed cost and for combined breakeven point fixed cost of both the plant is need to be recovered which is computed in the following manner.

a) Computation of Break-Even sales of Plant A & B.

Particulars	Amount (₹) A	Amount (₹) B
Sales **Less:** Variable cost	63,00,000 39,60,000	48,00,000 22,50,000
Contribution **Less:** Fixed Cost	23,40,000 13,00,000	25,50,000 15,00,000
Profit	10,40,000	10,50,000
P/V Ratio = (Contribution ÷ Sales) × 100	37.1428%	53.125%
Sales at 100% capacity	70,00,000	80,00,000
Variable cost	44,00,000	37,50,000
Contribution	26,00,000	42,50,000
Merged contribution	68,50,000	
Merged sales	1,50,00,000	
P/V ratio of merged plant (68,50,000 ÷ 1,50,00,000) × 100	45.6667%	
Breakeven sales of merged plant (28,00,000 ÷ 45.66666%)	61,31,386.8614	

Computation of Capacity utilization of the merged plant: -

- ✓ Sales at 100% capacity utilization of Plant A and B
- ✓ For Plant A= $\frac{63,00,000}{90\%}$ = ₹ 70,00,000; For Plant B= $\frac{48,00,000}{60\%}$ = ₹ 80,00,000
- ✓ Break-even sales = 61,31,386.8614
- ✓ Capacity utilization of merged Plant = $\frac{61,31,386.8614}{150,00,000} \times 100 = 40.8759\%$

b) Computation of Profitability of the merged plant at 80% capacity utilization: -

Particulars	Amount (₹)
Sales (150,00,000 × 80%)	120,00,000
Less: Variable cost (120,00,000 × 54.33333%)	65,20,000
Contribution (120,00,000 × 45.66667%)	54,80,000
Less: Fixed Cost	28,00,000
Profit	**26,80,000**

c) Computation of sales to earn a desired profit of ₹60,00,000:

- ✓ Required Sales= $\frac{\text{Fixed Cost+Desired Profit}}{\text{Profit Volume Ratio}} \times 100$
- ✓ Required Sales= $\frac{28,00,000+60,00,000}{45.67} \times 100$ = ₹ 1,92,68,667

d) Percentage increase in selling price –

Increase in fixed cost
= ₹28,00,000 × 5% = ₹1,40,000
Therefore, percentage increase in sales price
= $\frac{₹1,40,000}{₹1,92,68,667}$×100 = 0.726% (approx.)

39. During a particular period, ABC Ltd has furnished the following data: -

- **i)** Sales ₹10,00,000
- **ii)** Contribution to Sales ratio 37% and
- **iii)** 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: -

- **a)** Revised Fixed Cost.
- **b)** Revised Sales
- **c)** New Break-Even Point.

(Jan. 2021)

Ans.

a) Revised fixed cost = 2,70,000 – 1,08,000 = ₹ 1,62,000
b) Revised sales = ₹ 9,00,000
c) New Breakeven point= $\frac{\text{Revised Fixed cost}}{\text{P/V } Ratio} \times 100$
New Breakeven point= $\frac{1,62,000}{30\%}$ = ₹ 5,40,000

Working:

1) Sales = ₹ 10,00,000

Contribution to sales ratio = 37%;
Margin of safety = 25%

- ✓ Contribution = ₹10,00,000 × 37% = 3,70,000; Margin of Safety = 10,00,000 × 25% = ₹ 2,50,000
- ✓ Breakeven sales = Total sales – Margin of Safety
- ✓ Breakeven sales = 10,00,000 – 2,50,000 = ₹ 7,50,000
- ✓ At Breakeven point, Fixed Cost = Contribution
- ✓ Contribution = 7,50,000 × 37% = ₹ 2,77,500
- ✓ Current fixed cost = ₹ 2,77,500
- ✓ Variable cost = 10,00,000 – 3,70,000 = ₹ 6,30,000
- ✓ After decrease in the selling price, variable cost amount will remain same i.e., ₹ 6,30,000
- ✓ Now, percentage of variable cost after decrease in selling price 100% - 30% = 70% of sales
- ✓ So, the revised Sales = $\frac{₹6,30,000}{70\%}$ = ₹ 9,00,000
- ✓ Revised sales = ₹ 9,00,000
- ✓ Margin of Safety = 40% i.e., 9,00,000 × 30% = ₹ 2,70,000

  Please check the line in grey if MOS is given 40% then reason for calculating by 30%
- ✓ Contribution at Margin of Safety = 3,60,000 × 30% = ₹ 1,08,000

Please provide proper working note numbers – Please replace the above workings and solution with this one.

a) Contribution to sales ratio (P/V ratio) = 37%

Variable cost ratio = 100% – 37% = 63%

Variable cost = ₹10,00,000 × 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 = $\frac{₹6,30,000}{70\%}$ = ₹9,00,000

Revised, Break–even sales ratio = 100% – 40% (revised Margin of safety) = 60%

i) Revised fixed cost = revised breakeven sales × revised contribution to sales ratio
= ₹5,40,000 (₹9,00,000 × 60%) × 30%
= ₹1,62,000

ii) Revised sales = ₹9,00,000 (as calculated above)

iii) Revised Break–even point = Revised sales × Revised break–even sales ratio
= ₹9,00,000 × 60%
= ₹5,40,000

40. A Pharmaceutical company produces formulations having a shelf life of one year. The company has an opening stock of 30,000 boxes on 1st January, 20X2 and expected to produce 1,30,000 boxes as was in the just ended year of 20X1. Expected sale would be 1,50,000 boxes.

Costing department has worked out escalation in cost by 25% on variable cost and 10% on fixed cost. Fixed cost for the year 20X1 is ₹ 40 per unit. New price announced for 20X2 is ₹ 100 per box. Variable cost on opening stock is ₹ 40 per box.

You are required to compute Break-even volume for the year 20X2.

(Nov. 2005)

Ans.

Here, it is assumed that company is following FIFO method for valuing its inventory. Units available for rate are 30,000 units from opening stock and 1,20,000 units from current year production. Thus, making a total of 1,50,000 units. Now-

1) Total contribution from opening stock= No. of units of opening stock × (Sale price−Variable cost)

$$= 30{,}000(100 - 40) = ₹\ 18{,}00{,}000/-$$

2) New variable cost per unit $= VC + Escalation$

$$= 40 + (25\% \text{ of } ₹\ 40)$$

$$= 50 - \text{per unit.}$$

3) Current years contribution per unit= sale price per unit−new variable cost per unit

$$= 100 - 50$$

$$= ₹\ 50 - \text{per unit.}$$

4) Fixed cost in current year = FC in previous year + Escalation

$$= (1{,}30{,}000 \times 40) + 10\% \text{ of } ₹\ 52{,}00{,}000 =$$

$$= \mathbf{57,20,000}$$

(FC in previous year was 1,30,000 units×40/- because Production in previous year was same as planned for this year)

Break-Even Point (in units) = units from opening stock (Total fixed Cost−Total Contribution from opening Stock.

$$= 30{,}000 + \frac{57{,}20{,}000 - 18{,}00{,}000}{50}$$

$$= 30{,}000 + \frac{39{,}20{,}000}{50}$$

$$= 30{,}000 + 78{,}400$$

$= 1{,}08{,}400$ units.

Break-Even Point (in ₹)

$$= \frac{\text{Units from SP stock} - (\text{Total FC} - \text{Total Contribution from opening stock})}{\text{Current year's contribution per unit}} \times \text{price}$$

$$= 30{,}000 + \frac{57{,}20{,}000 - 18{,}00{,}000}{50} \times 100 = ₹\ 1{,}08{,}40{,}000/-$$

41.

X Ltd. Manufactures a semiconductor for which the cost and price structure is given below:-

Particulars	(₹) per unit
Selling Price	500
Direct Material	150
Direct Labour	100
Variable overhead	50
Fixed cost = ₹ 2 lacs.	

The product is manufactured by a machine, whose spare part costing ₹ 2,000 needs replacement after every 100 pieces of output. This is in addition to the above costs. Assume that no defectives are produced and that the spare part is readily available in the market at all times at ₹ 2,000.

a) Prepare the profitability statement for production levels of 2,000 units and 3,000 units, when fixed cost = ₹ 1 lacs.
b) What is the break-even point for the above data?
c) Comment on the BEP. If the fixed cost can be reduced to ₹ 1,80,000 from the existing level of 2 lacs.

(Nov. 2006)

Ans.

a) X Ltd. Profitability statement (Volume level)

Particulars	**2,000 units (₹'000)**	**3,000 units (₹'000)**
Sales	1000	1500
Variable Costs		
Direct Material	300	450
Direct Labour	200	300
Variable Overhead	100	150
Part Costs*	40	60
Fixed cost	100	100
Total cost	740	1060
Profit	260	440

* Part cost: $\frac{2,000}{100} \times 2,000 = 40,000$; $\frac{3,000}{100} \times 2,000 = ₹\ 60,000$

b)

- ✓ **For computing the BEP: -** Parts cost although a step fixed cost can be considered as variable for the limited purpose of computing the range in which BEP occur. The variable parts cost per unit is ₹ $20\left(\frac{2,000}{100}\right)$
- ✓ Range in which the BEP occur $\frac{1,00,000}{(200-20)} - 555.55$, $\frac{2,00,000}{(200-20)} - 1,111.11$

Range	501 – 600	1,101 – 1,200
General Fixed Cost	₹ 1,00,00	₹ 2,00,000
Parts cost	(6 × 2,000) = ₹ 12,000	(12 × 2,000) = ₹ 24,000
Total Fixed Cost	₹ 1,12,000	₹ 2,24,000
Gross	₹ 200	₹ 200
Contribution/unit*		
Break-Even Point	560 units	1,120 units

*Gross Contribution per unit

Sales – Direct Material – Direct Labour – Variable Overheads

= ₹ 500 – ₹ 150 – ₹ 100 – ₹50 = ₹200

c) When fixed cost is ₹ 1,80,000. Range of Break-Even Point will be $\frac{1,80,000}{180} = 1,000$ (901 – 1,000)

- ✓ Since the Break-Even Point of 1,000 falls on the upper most limits in the range (901–1,000) there will be one more Break-Even Point in the subsequent range in 1,001–1,100.

Range	**901–1,000 (₹)**	**1,001–1,100 (₹)**
Gross fixed cost	1,80,000	1,80,000
Parts cost	20,000	22,000
	(10×2,000)	(11×2,000)
Total fixed cost	2,00,000	2,02,000
Gross contribution/unit	200	200
BEP	1,000 units	1,010 units

42. A company has introduced a new product and marketed 20,000 units. Variable cost of the product is ₹ 20 per unit and fixed overheads are ₹ 3,20,000.

You are required to: -

a) Calculate selling price per unit to earn a profit of 10% on sales value, BEP and Margin of Safety.

b) If the selling price is reduced by the company by 10%, demand is expected to increase by 5,000 units, then what will be its impact on profit, BEP and Margin of Safety?

c) Calculate Margin of Safety it profit is ₹ 64,000.

(Nov. 2016)

Ans.

a) Calculation of selling price per unit to earn a profit of 10% on sales value: -

✓ Let sales value per unit is X.
✓ $\therefore$ Sales=Variable Cost+Fixed Cost+ Profit
✓ $\therefore$ 20,000X=4,00,000+3,20,000+(10% of 20,000X)
✓ $\therefore$ 20,000X−2,000X=7,20,000
✓ $\therefore X=\frac{7,20,000}{18,000}$
✓ $\therefore$ **X=40**

Hence, Sales price per unit is ₹40.

Calculation of Break-Even Point: -

Break-Even Point (in units)$=\frac{\text{Fixed Cost}}{\text{Contribution P.U}}$
✓ $=\frac{₹\ 3,20,000}{₹\ 40-₹20}$
✓ $=\frac{₹\ 3,20,000}{₹20}$
✓ 16,000 units

Calculation of Margin of Safety: -

✓ Margin of Safety = Total Sales−Break-even Sales
✓ $= ₹(20,000 \times 40) - ₹(16,000 \times 40)$
✓ $= ₹\ 8,00,000 - ₹\ 6,40,000$
✓ $= ₹\ 1,60,000$

b) Calculation of New Profit, Break-Even Point & Margin of Safety: -

✓ Profit= Sales − Varibale Cost − Fixed Cost
✓ $= (25,000 \times 36) - (25,000 \times 20) - 3,20,000$
✓ $= ₹\ 9,00,000 - ₹\ 5,00,000 - ₹\ 3,20,000$
✓ $= ₹\ 80,000$

Thus, there is no change in profit if selling price is reduced by 10%.

Break-Even Point $=\frac{\text{Fixed Cost}}{\text{Contribution p.u.}}$

$=\frac{₹\ 3,20,000}{16} = 20,000$ units

Thus, Break-even point of sales is increase from 16,000 units to 20,000 units it S.P. reduced by 10%.

✓ Margin of Safety = Total Sales − Break − Even Point
✓ $= ₹\ (25,000 \times 36) - ₹(20,000 \times 36)$
✓ $= ₹\ 9,00,000 - ₹\ 7,20,000$
✓ $= ₹\ 1,80,000$

Thus, Margin of Safety is also increase by ₹ 20,000 in case of reduction in S.P.

c) Calculation of Margin of Safety if profit is ₹ 64,000: -

✓ Margin of Safety = Total Sales−Break-even Sales

Or

✓ Margin of Safety $=\frac{\text{Profit}}{\text{P/V Ratio}}$

- ✓ $\therefore$ P/V Ratio $= \frac{\text{Contribution}}{\text{Sales}} \times 100$
- ✓ $= \frac{₹\ 4,00,000}{₹\ 8,00,000} \times 100 = 50\%$
- ✓ Now, Margin of Safety $= \frac{\text{Profit}}{\text{P/V Ratio}}$
- ✓ $= \frac{₹\ 64,000}{50\%}$
- ✓ = ₹ 1,28,000 or 3200 units.

43. A Company, which manufactures and sells three products, furnishes the following details for a month: -

Products	A	B	C
No. of units budgeted	1,00,000	38,000	46,000
Selling Price per unit (₹)	50	80	60
Variable costs per unit (₹)	34	52	24

It has been proposed that an intensive advertisement campaign involving an expenditure of ₹ 1,20,000 per month and reduction of selling prices will increases the sales of product C as under: -

- **i)** If the selling price is reduced to ₹ 55 per unit. The sales will increase to 59,000 units per month.
- **ii)** If the selling Price is reduced to ₹ 51 Per unit. The sales will increase to ₹ 65,000 units per month.

The fixed cost of the company amounts to ₹34,20,000 per month.

- **a)** Calculate the current monthly break-even sales value of the company.
- **b)** Evaluate the two proposals and advise which of the proposals should be implemented.
- **c)** Calculate the sales units required per month of product C to justify the expenditure on advertisement in respect of your decision in (b) above.

(May 2002)

Ans. **i) Current monthly break-even sales value of the company:**

Product	A	B	C
No. of units budgeted	1,00,000	38,000	46,000
Selling price per unit (₹)	50	80	60
Variable costs per unit (₹)	34	52	24
Contribution per unit (₹)	16	28	36
P/V ratio [contribution ÷ sales]	32%	35%	60%

Budgeted sales value of A	= ₹50 p.u. × 1,00,000 units	= ₹50,00,000
Budgeted sales value of B	= ₹80 p.u. × 38,000 units	=₹30,40,000
Budgeted sales value of C	= ₹60 p.u. × 46,000 units	=₹27,60,000
Total budgeted sales		=₹1,08,00,000

Current sales mix of the products = 500:304:276

Composite P/V ratio = $\frac{500}{1080}$×32% + $\frac{304}{1080}$×35% + $\frac{276}{1080}$ × 60% = 40%

Break even sales value = $\frac{\text{Fixed cost}}{\text{Composite}\frac{P}{V}\text{ratio}} = \frac{₹34,20,000}{40\%}$ = ₹85,50,000

At BEP, sales of A = $\frac{500}{1080}$ × ₹85,50,000 = ₹39,58,333

At BEP, sales of B = $\frac{304}{1080}$× ₹85,50,000 = ₹24,06,667

At BEP, sales of C = $\frac{276}{1080}$× ₹85,50,000 = ₹21,85,000

= ₹85,50,000

ii) Evaluation of the two proposals to increase sales of product C:

Particulars		Current	Proposal 1	Proposal 2
a)	Selling price p.u. (₹)	60	55	51
b)	Variable cost p.u. (₹)	24	24	24
c)	Contribution p.u. (₹) [a-b]	36	31	27
d)	Units sold (units)	46,000	59,000	65,000
e)	Total contribution (₹) [c×d]	16,56,000	18,29,000	17,55,000
f)	Extra Fixed cost (₹)	-	1,20,000	1,20,000
g)	Profit (₹) [e-f]	16,55,000	17,09,000	16,35,000

Since the profit is maximum under proposal 1, the same should be implemented.

iii) Sales units required per month of product C to justify advertisement expenditure in respect of decision taken above:

In (iii) above, if is suggested that proposal 1 should be implemented. The minimum number of additional units to be sold p.m. to justify the extra expenditure of ₹1,20,000 under this proposal

$= \frac{\text{Additional fixed cost}}{\text{contribution p.u.}} = \frac{₹1,20,000}{₹31 \text{ p.u.}} = 3,871$ units.

Total number of units sold of product C should be = 46,000 + 3,871 = 49,871 units

44. The following particulars are taken from the records of a company engaged in manufacturing two products, A and B, from a certain material: -

Particulars	Product A (Per unit) (₹)	Product B (Per unit) (₹)
Sales	2,500	5,000
Material Cost (₹ 50 per kg.)	500	1,250
Direct labour (₹ 30 per hour)	750	1,500
Variable overhead	250	500
Total fixed overheads: - ₹ 10,00,000		

Comment on the profitability of each product when: -

a) Total sales in value are limited.

b) Raw materials are in short supply.

c) Production capacity is the limiting factor.

d) Total availability of raw materials is 20,000 kg. and maximum sales potential of each product is 1,000 units, find the product mix to yield maximum profits.

(Nov. 1998)

Ans. **a) Comment on the profitability of each product when total sales in value is limited:-**

- ✓ P/V ratio $= \frac{\text{Contribution}}{\text{Sales}} \times 100$
- ✓ P/V ratio of Product A $= \frac{₹\ 1,000}{₹\ 2,500} \times 100 = 40\%$
  (Refer to working note 1)
- ✓ P/V ratio of Product B $= \frac{₹\ 1,750}{₹\ 5,000} \times 100 = 35\%$
  (Refer to working note 1)
- ✓ Product A is more profitable as P/V ratio is more than that of B.

b) Comment on the profitability of each product when raw materials is in short supply: -

- ✓ Contribution per kg. of raw materials quantity used in the product
- ✓ $= \frac{\text{Contribution of the product}}{\text{Raw material required in kg.per unit}}$
- ✓ Contribution per kg. of raw material quantity used in product A $= \frac{₹\ 1{,}000}{10\ kg.} = ₹\ 100$

  (Refer to working notes 1 and 2)
- ✓ Contribution per kg. of raw material quantity used in product B $= \frac{₹\ 1{,}750}{25\ \text{kg.}} = ₹\ 70$

  (Refer to working notes 1 and 2)
- ✓ Since the raw material is in short supply and the contribution per kg of raw material used in product A is more than that of product B, therefore product A is more profitable.

c) Comment on the profitability of each product when production capacity is the limiting factor: -

- ✓ Contribution per direct labour hour
- ✓ In the case of the product $= \frac{\text{Contribution of the product}}{\text{Labour Hrs.required per unit}}$
- ✓ Contribution per labour hour in the case of Product A
- ✓ $= \frac{₹\ 1{,}000}{25\ \text{hours}} = ₹\ 40$

  (Refer to working notes 1 and 3)
- ✓ Contribution per labour hour in the case of product B
- ✓ $= \frac{₹\ 1{,}750}{50\ \text{hours}} = ₹\ 35$

  (Refer to working notes 1 and 3)
- ✓ Since the production capacity is the limiting factory and the contribution per labour hour in the case of product A is more than that of product B therefore product A is more profitable.

d) Statement of product mix to yield maximum profits
(When total availability of raw material is 20,000 kg)

Products **(a)**	**Units to be made** **(b)**	**Raw material consumed (kg.)** **(c)**	**Contribution per unit (₹)** **(d)**	**Total Contribution (₹)** **(e)=(b)×(d)**	**Fixed Cost (₹)** **(f)**	**Profit (₹)** **G= (e)−(f)**
A	1,000	10,000	1,000	10,00,000		
		(1,000 units×10 kg.)				
B	400	(400 units×25kg.)	1,750	7,00,000		
		20,000		17,00,000	10,00,000	7,00,000

Working Notes: -

1) Contribution per unit: -

Particulars	**Product A**		**Product B**	
	(₹)	**(₹)**	**(₹)**	**(₹)**
		2,500		5,000
Sales				
Less: Variable Cost				

Material Cost	500		1,250	
Direct labour	750		1,500	
Variable overhead	250	1,500	500	3,250
Contribution per unit		1,000		1,750

2) Material in kg. per unit: -

- ✓ Product A:$\frac{\text{₹ } 500}{\text{₹ } 50} = 10$ kg.
- ✓ Product B:$\frac{\text{₹ } 1{,}250}{\text{₹ } 50} = 25$ kg.

3) Labour hours per unit: -

- ✓ Product A: $\frac{\text{₹ } 750}{\text{₹ } 30} = 25$ hours.
- ✓ Product B: $\frac{\text{₹ } 1{,}500}{\text{₹ } 30} = 50$ hours

45. Moon Ltd. produces products 'X', 'Y' and 'Z' and has decided to analyse its 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 the coming 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.

(Nov 2020, ICAI SM)

Ans. **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 × Hours)	24	40	20
Dept. B (Rate × 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 6hrs. + 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**

46. When volume is 4,000 units; average cost is ₹ 3.75 per unit. When volume is 5,000 units, average cost is ₹ 3.50 per unit. The Break-Even point is 6,000 units.

Calculate:

i) Variable Cost per unit

ii) Fixed Cost and

iii) Profit Volume Ratio.

(Nov 2019)

Ans.

i) Variable cost per unit = $\frac{\text{Change in Total cost}}{\text{Change in unit}}$

Variable cost per unit = $\frac{(₹\,3.5 \times 5{,}000\text{ units}) - (₹\,3.75\ X\ 4{,}000\text{ units})}{5{,}000 - 4{,}000}$

Variable cost per unit = $\frac{₹17{,}500 - ₹\,15{,}000}{1{,}000}$ = ₹ 2.50

ii) Fixed cost = Total Cost – Variable cost (at 5,000 units level)

Fixed cost = ₹17,500 – ₹2.5 × 5,000 = ₹5,000

iii) Contribution per unit = $\frac{\text{Fixed Cost}}{\text{Break Even Point (in unit)}} = \frac{₹\,5{,}000}{6{,}000\text{ (in unit)}}$ = 0.8333

P/V Ratio = $\frac{\text{Contribution Per unit}}{\text{Sales Price per unit}} = \frac{0.8333}{2.5+0.833}$ = 25%.

47. 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 5,000 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 2,000 sticks in the next year.
Calculate the lowest price that can be quoted so that the Company can earn the same profit as it has earned in the current year?

(Nov 2019)

Ans.

Selling Price = ₹ 500
Profit = ₹ 125
No of Sticks = 5,000

Particulars	**Current Year (₹)**	**Next Year (₹)**
Direct Material	150	157.50 (150 + 5%)
Direct Wages	50	60 (50 + 20%)
Works Overheads	62.50	62.50
Selling Expenses	12.50	12.50
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

48.

Mega Company has just completed its first year of operations. The 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 fix: overhead. Budgeted variable overhead was ₹ 20,000 less than the actual variable overhead. The company used an expected actual activity level: 72,000 direct labour hours to compute the predetermine overhead rates.

Required:

i) Compute the unit cost and total income under:
  a) Absorption costing
  b) Marginal costing.

ii) Under or over absorption of overhead.

iii) Reconcile the difference between the total income at absorption and marginal costing.

(Nov 2009)

Ans. **i)**

Computation of Unit and Total Income

Unit Cost	Absorption Costing (₹)	Marginal Costing (₹)
Direct Material	16.00	16.00
Direct Labour	54.00	54.00
Variable Overhead	12.00	12.00
Fixed Overhead	18.00	--
Unit Cost	100	82

Income Statements

Absorption Costing		
Sales (21,500 × ₹168)		36,12,000
Less:		
[Cost of goods sold (21,500 × 100)-Over Absorption (28,000)]		21,22,000
		14,90,000
Less: Selling & Distribution Expenses [(21,500X20) +7,60,000]		11,90,000
Profit		3,00,000

Marginal Costing		
Sales (21,500 × ₹168)		36,12,000
Less:		
[Cost of goods sold (21,500 × 82) +Under absorption (20,000)]		17,83,000
		18,29,000
Less: Selling & Distribution Expenses		4,30,000
Contribution		13,99,000
Less: Fixed Factory and Selling & Distribution Overhead (3,84,000 +7,60,000)		11,44,000
Profit		2,55,000

ii)

Under or over Absorption of Overhead

	₹
Budgeted Fixed Overhead (72,000 Hrs. × ₹6)	4,32,000
Less: Actual Overhead was less than Budgeted Fixed Overhead	48,000
∴ Actual Fixed Overhead	3,84,000
Budgeted variable Overhead (72,000 Hrs. × ₹4)	2,88,000

Add: Actual Overhead was higher than budgeted	20,000
∴ Actual Variable Overhead	3,08,000
Both Fixed & Variable Overhead applied (72,000 Hrs. × ₹10)	7,20,000
Actual Overhead (3,84,000 + 3,08,000)	6,92,000
∴ Over absorption	28,000

iii) Reconciliation of Profit

Difference in Profit: ₹3,00,000 – 2,55,000 = ₹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.

49. **PQR Ltd. Has furnished the following data for the two years: -**

Particulars	20X1	20X2
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 20X2 due to the restructuring process. The company could maintain its sales quantity level of 20X1 in 20X2 by reducing selling price.

You are required to Calculate the following: -

a) Sales for 20X2 in Value.

b) Fixed Cost for 20X2 in Value.

c) Break-even sales for 20X2 in Value.

(ICAI SM)

Ans. In 20X1, PV ratio = 50%

Variable cost ratio = 100% – 50% = 50%

Variable cost in 20X1 = ₹ 8,00,000 × 50% = ₹ 4,00,000

Variable cost is based on per unit basis and since, sales of both years (in terms of quantity) will be same. Therefore, variable cost of both the years will also be same.

In 20X2, P/V ratio = 37.50%

Thus, Variable cost ratio = 100% – 37.5% = 62.5%

a) Thus, Sales in 20X2 = $\frac{4,00,000}{62.5\%}$ = ₹ 6,40,000

b) Fixed cost = Break-Even Sales × P/V ratio

= 5,00,000 × 37.50% = ₹ 1,87,500.

c) In 20X2, Break-even sales = 100% – 21.875% (Margin of safety) = 78.125%

Break-even sales = 6,40,000 × 78.125% = ₹ 5,00,000

50. A company manufactures a single product with a capacity of 1,50,000 units per annum. The summarised profitability statement for the year is as under

	₹	₹
Sales: 1,00,000 units @ ₹15 per unit		15,00,000
Cost of Sales:		
Direct Materials	3,00,000	
Direct Labour	2,00,000	

Production Overhead:	Variable	60,000	
	Fixed	3,00,000	
Administration Overheads (Fixed)		1,50,000	
Selling and Distribution Overheads:	Variable	90,000	
	Fixed	1,50,000	12,50,000
	Profit		2,50,000

You are required to evaluate the following options:

i) What will be the amount of sales required to earn a target profit of 25% on Sales, if the packing is improved at a cost of Re. 1 per unit?

ii) There is an offer from a large retailer for purchasing 30,000 units per annum, subject to providing a packing with a different-brand name at a cost of ₹2 per unit. However, in this case there will be no selling and distribution expenses. Also, this will not, in any way, affect the company's existing business. What will be the break-even price for this additional offer?

(Nov 2001)

Ans.

i) P/V ratio = $\frac{Contribution}{Sales} X\ 100$

= $\left(\frac{₹15-₹7.50\ \times 100}{₹15}\right) = 50\%$

Let x is the desired sales revenue to earn a target profit of 25% on sales: then the desired contribution would be

Total fixed cost + 25% × x

Since P/V ratio = $\frac{C}{S}$ × 100

= $\frac{Fixed\ cost+Profit}{x}$ × 100

∴ x = $\frac{₹6,00,000+25\%x}{50\%}$ $\times (WN2)$

Orr x × 50% = ₹6,00,000 + 25% x

Or $\left[\frac{x}{2} - \frac{x}{4}\right] = 6,00,000$

Or x = ₹24,00,000

Hence, the desired amount of sales required to earn a target Profit of 25% on sales is ₹24,00,000. On the sale of ₹24,00,000 the desired contribution is 50% of sales i.e. ₹12,00,000 and profit is 25% of sales i.e. ₹6,00,000.

ii) Evaluation of an offer of purchasing 30,000 per annum (subject to providing a packing with a different brand name at a cost of ₹2 per unit) from a large retailer. Determine also the break-even price for this additional offer.

	₹
Present Variable cost per unit	6.50
Less: Variable selling and distribution overheads per unit	0.90
	5.60
Add: Special packing cost per unit	2.00
Revised variable cost per unit	7.60

The break-even price per unit for this additional offer of 30,000 units would be ₹7.60 per unit. In other words, the break-even price for this additional offer here means the price per unit at which 30,000 units offer can be accepted without earning any profit on it.

Note: The existing business will bear the impact of fixed cost.

Fixed costs will not affect this additional offer of 30,000 units.

	₹
New selling price per unit	18.00
Less: Variable cost per unit	6.50
(Refer to working note)	13,80,000
Contribution per unit	11.50
Total contribution	
(1,20,000 units × ₹11.50)	
Less: Present Fixed cost	6,00,000
Less: Additional expenditure on advertising	3,00,000
Profit	4,80,000

Justification: The amount of profit on the sale of 1,00,000 units was ₹2,50,000 (Refer to the statement of the question). On increasing the sale of product units from 1,00,000 to 1,20,000 the profit of the concern increased from ₹2,50,000 to ₹4,80,000 therefore, the expenditure on advertisement is justifiable and the proposal under consideration is viable.

Justification of reduction in selling price to increase capacity utilization to 100%

	₹
Revised selling price per unit	13.00
Less: Variable cost per unit	6.50
(Refer to working note I)	
Contribution per unit	6.50
Total contribution at 100% capacity utilization	9,75,000
(1,50,000 units × ₹6.50)	
Less: Fixed cost	6,00,000
Profit	3,75,000

Working Note:

1)	Contribution / Unit	₹
	SP/Unit: (A)	15.00
	Variable cost/unit:	
	Direct material	3.00
	(₹3,00,000/1,00,000 unit)	
	Direct labour	2.00
	(₹2,00,000/1,00,000 unit)	
	Variable prod. OH	0.60
	(₹60,000/1,00,000 units)	
	Variable S&DOH	0.90
	(₹90,000/10,000 units)	
	Total Variable cost/unit: (B)	6.50
	Contribution per unit [(A) – (B)]	8.50
	(₹15 – ₹6.50)	
2)	**Total fixed cost**	₹
	Production OH	3,00,000
	Admin OH	1,50,000
	S & D OH	1,50,000
	Total fixed cost	6,00,000
	i) Amount of sales required to earn a target profit of 25% on sales after improving the packing.	

Present V. cost/unit (Refer W.N.1)	6.50
Improved packing cost/unit	1.00
Revised variable cost/unit	7.50

51. 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:

	Per Unit (₹)	
	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. **(ICAI SM)**

Ans. **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**

Workings –

Calculation of contribution (per unit)

	X (₹)	**Y (₹)**
Selling price (A)	300	450
Variable cost:		
Direct materials	140	180
Direct wages	60	100
Variable overheads	20	40
Total Variable Cost (B)	220	320
Contribution per unit (A-B)	**80**	**130**
Machine hours (MH)	4	8
Contribution per MH	**20**	**16.25**
Ranking	I	II

52. 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	
- 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
	10,87,300

POR Ltd. has received a special one-time only order for 2500 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.

(ICAI SM)

Ans. In this question, the existing demand for the medals is 7,500 units per monthagainst the 10,000 units capacity. There is an idle capacity for 2,500 medals in a month. Since, the capacity of the plant (supply) is more than the demand, any additional order could increase the existing profit provided the offered price ismore than the marginal cost.

The existing cost and profit structure is as under:

Particulars	**Amount (₹)**	**Amount (₹)**
A. Selling price per unit		150.00
B. Variable Cost per unit:		
- Direct material (₹ 2,62,500 ÷ 7,500 units)	35.00	
- Direct labour (₹ 3,00,000 ÷ 7,500 units)	40.00	
- Overhead (₹ 75,000 ÷ 7,500 units)	10.00	85.00
C. Contribution per unit (A-B)		65.00
D. Total Contribution (₹ 65 × 7,500 units)		4,87,500
E. Fixed Costs:		
- Fixed manufacturing costs	2,75,000	
- Fixed marketing costs	1,75,000	4,50,000
F. Profit (D-E)		37,500

i) The offered price for the additional demand of 2,500 medals is more than the variable cost per unit. Any additional demand will contribute towards fixed costs and profit.

Particulars	**Amount(₹)**	**Amount(₹)**
A. Sales Value {(₹ 150 × 7,500) + (₹ 120 × 2,500)}		14,25,000
B. Variable Cost (₹ 85 × 10,000)		8,50,000
C. Contribution (A-B)		5,75,000
D. Fixed Costs:		
- Fixed manufacturing costs	2,75,000	
- Fixed marketing costs	1,75,000	4,50,000
E. Profit (C-D)		1,25,000

The offer for 2,500 unit be accepted as it increases the profit by ₹ 87,500 (₹ 1,25,000 – ₹ 37,500).

ii) In this instant case, the capacity to produce medals is decreased by 1,000 unit per month and the existing demand for the medals is 7,500. The spare capacity is for 1,500 medals only but the special demand is for 2,500 medals.By accepting the offer, the company has to lose contribution on 1,000 medals from existing customers. The offer will only be acceptable if the gain from the new offer supersedes the loss from the existing customers.

Particulars	**Amount(₹)**	**Amount(₹)**
A. Sales Value {(₹ 150 × 6,500) + (₹ 120 × 2,500)}		12,75,000
B. Variable Cost (₹ 85 × 9,000)		7,65,000
C. Contribution (A-B)		5,10,000
D. Fixed Costs:		
- Fixed manufacturing costs	2,75,000	
- Fixed marketing costs	1,75,000	4,50,000
E. Profit (C-D)		60,000

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.

53. 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 costs 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.

(Old SM)

Ans. **Calculation of relative costs of proposals**

	Proposals

Particulars	Purchase of machine (₹)	Hire Agency-A (₹)	Hire Agency-B (₹)	Hire Agency-C (₹)
Depreciation of machine (Working note1)	2,00,000	-	-	-
Hire charges	-	5,00,000 (₹ 20 × 25,000)	3,00,000 (₹ 12 × 25,000)	2,50,000
Cost of fuel	2,00,000 (₹ 8 × 25,000)	-	-	-
Cost of spare parts	5,000 (₹ 0.2 × 25,000)	-	-	5,000 (₹ 0.2 × 25,000)
Cost of electricity	-	-	-	50,000 (₹ 2 ×25,000)
Repair & maintenance	6,250 (₹ 0.25 × 25,000)	-	-	-
Licensing fees	5,000	-	-	5,000
Insurance cost	25,000	-	25,000	-
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**

iii) Recommendation: Proposal of Hire machine from Agency-C is acceptable as the cost of manufacturing toys is lowest.

Working Note:

1) Depreciation per year:

$$\frac{\text{Cost of machine} - \text{Resale value}}{\text{Life of Machine}} = \frac{₹10,00,000 - ₹2,00,000}{4\ years} = ₹2,00,000$$

54. 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 Rs and in quantity).

ii) Present profit-volume ratio.

iii) Revised break-even sales in Rs and the revised profit-volume ratio, if it reduces its selling price by 10%.

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).

(Dec 2021)

Ans. Variable Cost per Unit=₹16

Fixed Cost per Unit =₹ 4,

Total Fixed Cost= 2,00,000 units × ₹ 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) = $\frac{\text{Fixed cost}}{\text{Contribution margin per unit}} = \frac{₹8,00,000}{₹8}$

Present Break-even Sales (₹) = 1,00,000 units × ₹ 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

Revised P/V Ratio = $\frac{5.60}{21.60} \times 100 = 25.926\%$

Revised Break-even point (₹) = $\frac{\text{Fixed cost}}{\frac{P}{V}\text{ratio}} = \frac{8,00,000}{25.926\%}$ = ₹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

iv) Present profit =₹ 8,00,000

Desired Profit = 120% of ₹ 8,00,000 =₹ 9,60,000

Sales to earn a profit of ₹ 9,60,000

Total contribution required = 8,00,000 + 9,60,000 = ₹ 17,60,000

$\frac{\text{Fixed cost+Desired profit}}{\text{Contribution per unit}} = \frac{8,00,000+9,60,000}{5.60} = 3,14,286$ units

Revised sales (in ₹) = 3,14,286 units × ₹ 21.60 = ₹ 67,88,578

55. At budget activity of 80% of total capacity, a company earns a P/V ratio of 30% and a profit of 15% of total sales. Due to covid pandemic resulting in poor demand, the company has to reduce its selling price by 10%. The company was able to achieve a production and sales volume for the year equivalent to 50% of total capacity. The sales value at this level was ₹ 27,00,000 at a reduced price of ₹ 18 per unit. Due to reduction in production, the actual variable cost went up by 5% of the budget.

You are required to:

i) PREPARE statement of profitability at budget and actual activity.

ii) FIND P/V ratio and BES (in ₹ and unit of the actual sales activity).

(MTP May 2022)

Ans. **i) Statement of profitability at budget and actual activity**

Particulars		Budget (80%)	Actual (50%)
Units		2,40,000	1,50,000
Sales (₹)	(a)	48,00,000	27,00,000
Variable cost (₹)	(b)	33,60,000	22,05,000
Contribution (₹)	(c = a - b)	14,40,000	4,95,000
Fixed cost (₹)	(d)	7,20,000	7,20,000
Profit (₹)	(e = c – d)	7,20,000	(2,25,000)

ii) Calculation of P/V ratio and BES

P/V Ratio $= \frac{\text{Contribution}}{\text{Sales}} \times 100$

$= \frac{4,95,000}{27,00,000} \times 100 = 18.33\%$

Break Even Sales (in ₹) $= \frac{\text{Fixed Cost}}{\text{P/V Ratio}}$

$$= \frac{7,20,000}{18.33\%} = ₹39,27,987$$

Break Even Sale (in Units) $= \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$

$$= \frac{7,20,000}{3.3*} = 2,18,182 \text{ Units}$$

*Contribution per unit $= \frac{4,95,000}{1,50,000 \text{ units}} = 3.3 \text{ per } unit$

Working

Actual Sales	₹27,00,000
Actual Selling Price per unit	18
Actual units (50%) $\left(\frac{(27,00,000)}{18}\right)$	1,50,000
Therefore, budgeted units (80%) $\left(1,50,000 \times \frac{80}{50}\right)$	2,40,000
Budgeted Selling Price $\left(\frac{18}{90\%}\right)$	20

Budgeted Variable cost per unit $= \frac{(2,40,000 \times 20)(1-30)}{2,40,000 \ units} = \frac{33,60,000}{2,40,000 \ units} = ₹14$

56. Company manufactures and sell 3 types of mobile handset. It also manufactures wireless charger for mobile. The company has worked out following estimates for next year.

	Annual Demand (In units)	**Selling Price (₹ per unit)**	**Material cost (₹ per unit)**	**Labour cost (₹ per unit)**
X5	5,000	8,000	2,000	1,000
X6	4,000	9,000	2,500	1,500
X7	3,000	12,000	3,000	2,000
Wireless Charger	15,000	1,500	300	200

To encourage the sale of wireless charger a discount of 10% in its price is being offered if it were to be purchased along with mobile. It is expected that customer buying mobile will also buy the wireless charger. The company factory has an effective capacity of 35,000 labour hours. The labour is paid @ ₹ 500 per hour. Overtime of labour has to be paid at double the normal rate. Other variable cost work out to be 50% of direct labour cost and fixed cost is ₹ 1,00,00,000. There will be no inventory at the end of the year.
PREPARE statement of profitability.

(MTP May 2022)

Ans.

Statement of Profitability

Particulars	**Amount (₹)**	**Amount (₹)**
Sales		
X5 (5,000 × 8,000)	4,00,00,000	
X6 (4,000 × 9,000)	3,60,00,000	
X7 (3,000 × 12,000)	3,60,00,000	
Wireless Charger (12,000 × 1,350) + (3,000 × 1,500)	2,07,00,000	**13,27,00,000**
Less: Variable cost		
Material:		

X5 (5,000 × 2,000)	1,00,00,000	
X6 (4,000 × 2,500)	1,00,00,000	
X7 (3,000 × 3,000)	90,00,000	
Wireless Charger (15,000 × 300)	45,00,000	
	3,35,00,000	
Labour:		
X5 (5,000 × 1,000)	50,00,000	
X6 (4,000 × 1,500)	60,00,000	
X7 (3,000 × 2,000)	60,00,000	
Wireless Charger (15,000 × 200)	30,00,000	
Overtime (5,000 × 1,000)	50,00,000	
	2,50,00,000	
Other variable overheads	**1,25,00,000**	7,10,00,000
Contribution		**6,17,00,000**
Less: Fixed Cost		1,00,00,000
Profit		**5,17,00,000**

Working

Calculation of Labour overtime hours

Total hours required for production

X5	(5,000 × 2 hrs)	10,000
X6	(4,000 × 3 hrs)	12,000
X7	(3,000 × 4 hrs)	12,000
Wireless Charger	(15,000 × 0.40 hrs)	6,000
		40,000
Hours available		(35,000)
Overtime		**5,000**

57. 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?

(Old SM)

Ans.

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.

Working-

The present cost structure is as follows: Variable cost per unit is:

Direct materials cost	₹375
Direct labour cost	₹80
Variable factory overhead	₹16
Total variable cost per unit	**₹471**

The fixed cost of ₹500 lakhs is irrelevant for decision making as it would incur in either case

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.

i) Rental income	₹32,00,000
ii) Additional cost of buying (₹14 × 2,00,000 units)	₹28,00,000
Additional Income {(i)-(ii)}	₹4,00,000

The component should be bought from outside as it would save the company ₹4,00,000 in fixed cost.

58. RPP Manufacturers is approached by an international customer for one-time special order similar to one offered to its domestic customers. Per unit data for sales to regular customers is provided below:

Direct material	₹ 693
Direct labour	₹ 315
Variable manufacturing support	₹ 504
Fixed manufacturing support	₹ 1092
Total manufacturing costs	₹ 2604
Markup (50%)	₹ 1302
Targeted selling price	₹ 3906

It is provided that RPP Manufacturers has excess capacity.

Required:

i) WHAT is the full cost of the product per unit?

ii) WHAT is the contribution margin per unit?

iii) WHICH costs are relevant for making the decision regarding this one-time special order? WHY?

iv) For RPP Manufacturers, WHAT is the minimum acceptable price of this one- time special order only

v) For this one-time-only special order, SHOULD RPP Manufacturers consider a price of ₹2100 per unit? WHY or why not?

(RTP Nov 2022)

Ans.

i) Full cost of the product per unit

Direct material	₹ 693
Direct labour	₹ 315

Variable manufacturing support	₹ 504
Fixed manufacturing support	₹ 1092
Total manufacturing costs	₹ 2604

ii) Contribution margin per unit

Selling price	₹ 3906
Less: Variable costs	
Direct material	₹ 693
Direct labour	₹ 315
Variable manufacturing support	₹ 504
Contribution margin per unit	₹ 2394

iii) Costs for decision making are those costs that differ between alternatives, which in this situation are the incremental costs.

Direct material	₹ 693
Direct labour	₹ 315
Variable manufacturing support	₹ 504
Total incremental costs	₹ 1512

iv) Minimum acceptable price would be the incremental costs in the short term i.e. ₹ 1512

v) Yes, RPP Manufacturers may consider a price of ₹ 2100 per unit because this price is greater than the minimum acceptable price.

59. 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.

(ICAI SM)

Ans.

Item No.	P/V Ratio	Reason
i)	Will not change	Reasoning 2
ii)	Will not change	Reasoning 3
iii)	Will increase	Reasoning 5
iv)	Will decrease	Reasoning 5
v)	Will increase	Reasoning 6
vi)	Will not change	Reasoning 3
vii)	Will not change	Reasoning 1
viii)	Will increase	Reasoning 2
ix)	Will decrease	Reasoning 3
x)	Will increase	Reasoning 4

Reasoning 1. Assumptions: - **a)** Variable cost is less than selling price.

b) Selling price ₹100 variable cost ₹ 90 per unit.

c) P/V ratio = $\frac{100-90}{100} = 10\%$

10% increase in S.P. = ₹ 110

10% increase in variable cost = ₹99

P/V ratio = $\frac{110-99}{10} = 10\%$ i. e. $\frac{P}{V}$ ratiowill not change

Reasoning 2. Increase or decrease in physical sales volume will not change P/V ratio. Hence 10% increase in Selling price per unit will increase P/V ratio.

Reasoning 3. Increase or decrease in fixed cost will not change P/V ratio. Hence 50% increase in the variable cost per unit will decrease P/V ratio.

Reasoning 4. Angle of incidence is the angle at which sales line cuts the total cost line. If it is large, it indicates that the profits are being made at higher rate. Hence increase in the angle of incidence will increase the P/V ratio.

Reasoning 5 = A decrease in variable cost per unit will increase without decrease in selling price per unit twill increase the contribution hence, PV ratio and vice versa

Reasoning 6 = Increase in selling price per unit without increase in variable cost per unit will increase the contribution hence PV ratio.

Assignment
Material Cost

Q. No.	Questions & Solutions
1.	A Company manufactures 5000 units of a product per month. The cost of placing an order is ₹100. The purchase price of the raw material is ₹10 per kg. The re-order period is 4 to 8 weeks. The consumption of raw materials varies from 100 kg to 450 kg per week, the average consumption being 275 kg. The carrying cost of inventory is 20% per annum. **You are required to Calculate: -** **a)** Re-Order Quantity. **b)** Re-Order Level. **c)** Maximum Level. **d)** Minimum Level. **e)** Average Stock Level. **(Nov. 2002, May 2006, Nov 2018, ICAI SM, Modified Nov. 2022, MTP July 2021, MTP May 2023–II)**
Ans.	**a) Re-Order Quantity;** When price discount is not involved re-order quantity should be such a quantity of ordering/order at which the total cost of ordering and carrying inventory p.a. is the least. This is known as EOQ. **Calculate as under: -** **EOQ;** $= \sqrt{\frac{2AO}{C}}$ ✓ A = Annual Requirement – = Avg. Consumption per week × 52 weeks. – = 275 kg. week × 52 weeks – = 14,300 kgs. ✓ O = Ordering Cost/Order – = ₹ 100 per order ✓ P= Price per unit – = ₹ 10 per kg. ✓ C = Stock Holding rate p.a. – = 20 % ✓ C = Carrying Cost/unit p.a. – = ₹ 10 × 20% = ₹ 2 $= \sqrt{\frac{2\times14,300\times100}{2}} = \sqrt{14,30,000}$ = 1,196 kgs (approx.) **b) Re-Order Level;** – = Maximum Usage × Maximum Lead Time = 450 kgs. per week × 8 week = 3,600 kgs. **c) Maximum Level;** – = Reorder Level + Reorder Qty – (Minimum Usage × Minimum Lead Time) = 3,600 kg. + 1,196 kg. - (100 kgs per week × 4 weeks) = 4,796 kgs.—400 kgs. = 4,396 kgs. **d) Minimum Level;** – = Re-order Level—(Average Usage × Average Lead Time) $= 3,600 \text{ kgs - } \left[\left(\frac{100+450}{2}\right) + \left(\frac{4+8}{2}\right)\right]$

$= 3{,}600 - (275 \times 6)$

$= 3{,}600 - 1{,}650$

$= 1{,}950$ kgs.

e) Average Stock Level;

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

$$= \frac{4396 + 1950}{2}$$

$= 3{,}173$ kgs.

Alternatively;

- ✓ Average Stock Level = Minimum Level + $\left(\frac{1}{2} \times \text{Re} - \text{Order Qty.}\right)$
- ✓ $= 1{,}950 \text{ kgs.} + \left(\frac{1196}{2}\text{kg.}\right) = 1{,}950 + 598 \text{ kg.} = 2{,}548$ kgs.

2 From the following data for the year ended 31st March, 20X2, Calculate the inventory turnover ratio of the two items and put forward your comments on them.

Particulars	Material A (₹)	Material B (₹)
✓ Opening Stock 1.04.20X1	10,000	9,000
✓ Purchase during the year	52,000	27,000
✓ Closing Stock 31.3.20X2	6,000	11,000

(ICAI SM, May 2018, RTP Nov-2021, Modified Dec 2021)

[Hint: The number of days for which the average inventory is held]

Ans. **1)** Inventory Turnover ratio; (Consumption ÷ Average inventory)

Cost of Materials Consumed	**Material A (₹)**	**Material B (₹)**
✓ Opening Stock	10,000	9,000
✓ ***Add:*** Purchases	52,000	27,000
	62,000	36,000
✓ ***Less:*** Closing Stock	6,000	11,000
✓ Materials Consumed	56,000	25,000
✓ Average inventory: (Opening Stock + Closing Stock) ÷ 2	8,000	10,000
✓ Inventory Turnover ratio;	7 Times	2.5 times
2) Average no. of days of Inventory holding= (Number of Days in a year/ IT ratio)	**52 days**	**146 days**

Comments;

*Material A is moving faster than Material B.

3. A Company manufactures a product from a raw material, which is purchased at ₹ 80 per kg. The Company incurs a handling cost of ₹ 370 plus freight of ₹ 380 per order.

The incremental carrying cost of inventory of raw materials is ₹ 0.25 per kg per month. In addition, the cost of working capital finance on the investment in inventory of raw material is ₹ 12 per kg per annum. The annual production of the product is 1,00,000 units and 2.5 units are obtained from one kg. of raw material.

Required: -

a) Calculate the economic order quantity of raw materials.

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

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

Assume 360 days in a year.

(May 2014, Modified Nov 2020, Modified MTP May 2020, RTP May 2023)

Ans.

a) Economic Order Quantity;

✓ EOQ = $\sqrt{\frac{2\ AO}{C}}$

✓ = $\sqrt{\frac{2\times 40{,}000\times 750}{15}}$

✓ = 2,000 kg.

A = Annual units required

  ✓ = $\frac{1{,}00{,}000}{2.5}$

  ✓ = 40,000 kg.

  ✓ Ordering Cost = O = 370 + 380 = ₹ 750

  ✓ Carrying Cost = C = 12 + 3= 15

  ✓ (∵ Incremental carrying cost = 0.25 p.m. / per kg.)

b) Computation of days of placing Next Order;

✓ For 40,000 units – 360 days

✓ For 2,000 units – ? days

✓ Days required = $\frac{2{,}000\times 360}{40{,}000}$

✓ = 18 days.

Alternative;
Frequency of placing orders for procurement;

✓ Annual Consumption (A) = 40,000 kg.

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

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

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

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

Particulars	On Quarterly Basis	On E.O.Q. Basis
1) Annual Usage (in kg.)	40,000 kg.	40,000 kg.
2) Size of the order	10,000 kg.	2,000 kg.
3) No. of orders (1÷2)	4	20
4) Cost of placing orders or Ordering cost (No. of orders × Cost per order)	₹ 3000 (4 orders × ₹ 750)	₹ 15,000 (20 orders × ₹ 750)
5) Inventory Carrying Cost (Average inventory × Carrying cost per unit)	₹ 75,000 (10,000 kg × ½ × ₹15)	₹ 15,000 (2,000 kg × ½ × ₹15)
6) Total Cost (4 + 5)	₹ 78,000	₹ 30,000

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

✓ So, discount required = ₹ 48,000

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

✓ Therefore, Percentage of discount to be negotiated

✓ = $\frac{₹\,48{,}000}{₹\,32{,}00{,}000} \times 100 =$ 1.5%.

4. A Company uses four raw materials A, B, C and D for a particular's product for which the following data apply: -

Raw Material	Usage Per Unit Of Product (Kg.)	Re-order Quantity (kg.)	Price Per kg. (₹)	Delivery period (in weeks)			Re-Order Level (kg.)	Minimum Level (kg.)
				Min.	Avg.	Max.		
A	**12**	12,000	12	2	3	4	60,000	?
B	**8**	8,000	22	5	6	7	70,000	?
C	**6**	10,000	18	3	5	7	?	25,500
D	**5**	9,000	20	1	2	3	?	?

Weekly production varies from 550 to 1,250 units, averaging 900 units of the said product. What would be the following quantities:-

a) Minimum Stock of A?
b) Maximum Stock of B?
c) Re-Order level of C?
d) Average Stock level of A?
e) Re-Order Level of D?
f) Minimum Stock Level of D?

(RTP Nov. 2020, ICAI SM, Modified Nov. 2022)

Ans.

1) Minimum Stock of A;

- ✓ Re-Order Level– (Average Consumption × Average Time Required to obtain delivery)
- ✓ = 60,000 kg. – (900 units × 12 kg. × 3 weeks)= 27,600 kg.

2) Maximum Stock of B;

- ✓ Re-Order Level + Re-Order Quantity – (Minimum. Consumption × Minimum Re-Order Period.)
- ✓ = 70,000 kg. + 8,000 kg– (550 Units × 8 kg × 5 weeks).
- ✓ = 78,000–22,000=56,000 kg.

3) Re-Order Level of C;

- ✓ Maximum Re-Order Period × Maximum Usage
- ✓ = 7 weeks × (1,250 Units × 6 Kg.) = 52,500 kg.

OR

- ✓ = Minimum Stock Level of C + (Average Consumption × Average delivery time)
- ✓ = 25,500 kg + [(900 units × 6 kg) × 5 weeks] = 52,500 kg.

4) Average Stock Level of A;

- ✓ $= \frac{\text{Minimum Stock Level + Maximum Stock Level}}{2}$ (Refer to Working Note)
- ✓ $= \frac{27{,}600+58{,}800}{2}$ = 43,200 kg.

<u>Working Notes:-</u>

- ✓ Maximum Stock of A = ROL + ROQ– (Minimum Consumption × Minimum Re-Order Period.)
- ✓ = 60,000 kg + 12,000 kg – [(550 units × 12 kg.) × 2 weeks] = 58,800 kg.

5) Re-Order Level of D;

- ✓ Maximum Re-Order Period × Maximum Usage
- ✓ = 3 weeks × (1,250 units × 5 kg) = 18,750 kg

6) Minimum Stock of D;

- ✓ Re-Order Level—(Average Consumption × Average time required to obtain delivery)
- ✓ = 18,750 kg. – (900 units × 5 kg. × 2 weeks) = 9,750 kg.

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

- ✓ Cost of material 'X' – ₹ 20 per kg.
- ✓ Cost of placing an order – ₹ 1000 per order
- ✓ Carrying Cost – 15% per annum of average inventory

You are required: -

a) Calculate the Economic Order Quantity for Material 'X'.

b) Should the company accept an offer of 2 percent discount by the supplier, if they want to supply the annual requirement of material 'X' in 4 equal quarterly Instalments?

(May 2012, Modified Nov. 2019, Modified MTP Nov 2020)

Ans. **Annual demand of material 'X'**

= 8000 units (per quarter) × 4 (No. of Quarter in a year) × 3 kgs. (for every finished product) = 96,000 kgs.

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

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

b) Analysis of Cost under different options of 'order quantity'.

Particulars	When EOQ is ordered	When discount of 2% is accepted and supply is in 4 equal instalments
Order size	8,000 kgs.	$\frac{96{,}000}{4}$ = 24,000 kgs.
No. of order	$\frac{96{,}000 \text{ kgs}}{8{,}000 \text{ kgs}} = 12$	$\frac{96{,}000 \text{ kgs}}{24{,}000 \text{ kgs}} = 4$
Purchase Cost per kg.	₹ 20	(20– 2% ₹ 20) = ₹ 19.60
Total Purchase Cost (A)	(96,000 kgs.× ₹ 20)	(96,000 kgs.× 19.6)
	= ₹ 19,20,000	= ₹ 18,81,600
Ordering Cost (B)	12 orders × ₹ 1000	4 orders × ₹ 1000
	= ₹ 12,000	= ₹ 4,000
Carrying Cost (C)	$\frac{8{,}000 \text{ kgs}}{2} \times 15\% \times 20$	$\frac{24{,}000 \text{ kgs}}{2} \times 15\% \times 19.6$
	= ₹ 12,000	= ₹ 35,280
Total Cost (A+B+C)	₹ 19,44,000	₹ 19,20,880

Advice: -

The total Cost is lower if Company accept an offer at 2% discount by the supplier, when supply of the annual requirement of material 'X' is made in 4 equal instalments. Hence, the company should accept the offer of 2% discount.

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

The following are the information related to the raw material D;

i) The Re-order quantity is 400 kg. less than the Economic Order Quantity (EOQ.)
ii) Maximum Consumption per day is 40 kg. more than the average consumption per day.
iii) There is an opening stock of 2,000 kg.
iv) Time required to get the raw materials from the suppliers is 4 to 8 days.
v) The purchase price is ₹250 per kg.
vi) There is an opening stock of 1,800 units of the finished product X.
vii) The Carrying cost of inventory is 14% p.a.
viii) To place an order company has to incur ₹1,340 on paper and documentation work.

From the above information. Find Out the followings in relation to raw material D:

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

(RTP May 2021, Modified MTP May 2019, Modified MTP Nov 2022)

Ans.

a) Re-Order Quantity: -

✓ EOQ—400 kg. = 2,328 kg—400 kg. = 1,928 kg.

b) Maximum Stock Level;

✓ = Re order level + Re order Quantity – (Minimum .Consumption per day × Minimum lead time)

✓ = 2,208 kg + 1,928 kg – (196 kg × 4 days) = 4,136 kg – 784 kg = 3,352 kg.

c) Minimum Stock Level: -

✓ = Re order level – (Average Consumption per day × Average lead time)

✓ = 2,208 kg – (236 kg × 6 days) = 792 kg.

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

Particulars	When purchasing the ROQ	When purchasing the EOQ
1) Order Quantity	1,928 kg.	2,328 kg.
2) No. of orders a year	$\frac{70,800 \text{ kg}}{1,928 \text{ kg}} =$ 36.72 or 37 orders	$\frac{70,800 \text{ kg}}{2,328 \text{ kg}} =$ 30.41 or 31 orders
3) Ordering Cost	37 orders × ₹ 1,340 = ₹ 49,580	31 orders × ₹ 1,340 = ₹ 41,540
4) Average Inventory	$\frac{1,928 \text{ kg}}{2} =$ 964 kg.	$\frac{2,328 \text{ kg}}{2} =$ 1,164 kg
5) Carrying Cost	964 kg × ₹ 35 = ₹ 33,740	1,164 kg × ₹ 35 = ₹ 40,740
Total Cost	**₹ 83,320**	**₹ 82,280**

*Extra Cost incurred due to not ordering EOQ = ₹ 83,320 – ₹ 82,280 = ₹ 1,040.

Working Notes: -

i) Computation of Annual Consumption & Annual Demand for raw material 'D';

✓ Sales forecast of the product 'X'	20,000 units
✓ ***Less:*** Opening Stock of 'X'	1,800 units
✓ Fresh Units of 'X' to be produced	18,200 units
✓ Raw material required to produce 18,200 units of 'X' (18,200 units × 4 kg.)	72,800 kg.
✓ ***Less:*** Opening Stock of 'D'	2,000 kg.
✓ Annual demand for raw material 'D'	70,800 kg.

ii) Computation of Economic Order Quantity (EOQ);

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

✓ $=\sqrt{\frac{2\times 70{,}800\text{ kg}\times ₹\,1{,}340}{₹\,250\times 14\%}}=\sqrt{\frac{2\times 70{,}800\text{ kg}\times ₹\,1{,}340}{₹\,35}}=2{,}328\text{ kg.}$

iii) Re-Order level;

✓ $=(\text{Maximum Consumption per day}\times\text{Maximum lead time})$

✓ $=\left\{\left(\frac{\text{Annual Consumption of 'D'}}{300\text{ days}}+40\text{ kg.}\right)\times 8\text{ days}\right\}$

✓ $=\left\{\left(\frac{70{,}800\text{ kg.}}{300\text{ days}}+40\text{ kg.}\right)\times 8\text{ days}\right\}=2{,}208\text{ kg.}$

iv) Minimum Consumption per day of raw material 'D';

- ✓ Average Consumption per day = 236 kg.
- ✓ Hence, Maximum Consumption per day = 236 kg. + 40 kg. = 276 kg.
- ✓ So, Minimum Consumption per day will be
- ✓ Average Consumption $=\frac{\text{Min.Consumption}+\text{Max Consumption}}{2}$
- ✓ Or, 236 kg. $=\frac{\text{Min Consumption}+276\text{ kg.}}{2}$
- ✓ Or, Min. Consumption $=472\text{ kg}-276\text{ kg}=196\text{ kg}$

7. **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?

(ICAI SM, Nov 2004)

Ans. **a)**

Total Annual Requirement (A)	Order Size (Tone) (Q)	No. of Orders A/Q	Cost of Inventory A × Per tonne Cost (₹)	Ordering Cost A/Q × ₹ 1200 (₹)	Carrying Cost p. t. p.a. 1/2 × Q × 20% of Cost p.u. (₹)	Total Cost (4+5+6) (₹)
1	**2**	**3**	**4**	**5**	**6**	**7**
5,000 Ton	400	12.5 (13)*	60,00,000 (5,000×₹1200)	15,600	48,000 (200×₹240)	60,63,600
	500	10	59,00,000 (5,000×₹1180)	12,000	59,000 (250×₹236)	59,71000
	1,000	5	58,00,000 (5,000×₹ 1160)	6,000	1,16,000 (500×₹232)	59,22,000
	2,000	2.5 (3)*	57,00,000 (5,000×₹1140)	3,600	2,28,000 (1,000×₹228)	59,31,600
	3,000	1.666 (2)*	56,00,000 (5,000×₹1120)	2,400	3,36,000 (1,500×₹224)	59,38,400

*Since number of orders cannot be in decimals, thus 12.5 orders are taken as 13 orders, 2.5 are taken as 3 order and 1.66 orders are taken as 2 orders.

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

b) If there are no discounts offered then the purchase quantity should be equal to EOQ. The EOQ is as follows;

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

Where,

- ✓ A = annual inventory requirement,
- ✓ O= Ordering cost per order and
- ✓ C= Carrying Cost per unit per annum.
- ✓ $= \sqrt{\frac{2\times 5{,}000 \text{ units}\times ₹\ 1{,}200}{20\%\times ₹\ 1{,}500}} = 200$ units

8. Imbros India Ltd. is recently incorporated start-up company back in the year 20X0. 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 20X2, company entered into a job agreement of providing 4800 LogMax to NIT, Mandi. Following details w.s.t. issues, receipts, returns of Store Department handling Micro-controller, @ component used in the designated assembling process have been extracted for the month of September, 20X2:

Sep 1	Opening stock of 6,000 units @ ₹285unit.
Sep. 8	issued 4875 units to mechanical division wide material requisition no. Mech 009/20
Sep. 9	Received 17,500 units @₹276 per unit vide purchase order no. 159/20X1

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/ 20X1
Sep. 17	Returned to supplier 700 units out of quantity received vide purchase order no. 160/20X1.
Sep. 20	Issued 9,500 units to technical division vide material requisition no. Tech 165/20

On 25th September, 20X1, 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, 20X1, 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.

(ICAI SM, Modified MTP Nov 2022)

Ans. **Store Ledger of Imbrios India Ltd. (Weighted Average Method)**

Date	Receipts			Issues			Balance of Stock		
Sep.	Qty (kg.)	Rate (₹)	Amount (₹)	Qty (kg.)	Rate (₹)	Amount (₹)	Qty (kg.)	Rate (₹)	Amount (₹)
1	-	-	-	-	-	-	6,000	285.00	17,10,000
8	-	-	-	4,875	285.00	13,89,375	1,125	285.00	3,20,625
9	17,500	276.00	48,30,000	-	-	-	18,625	276.54	51,50,625
10	-	-	-	12,000	276.54	33,18,480	6,625	276.54	18,32,145
12	2,375	276.54	6,56,783	-	-	-	9,000	276.54	24,88,928
15	9,000	288.00	25,92,000	-	-	-	18,000	282.27	50,80,928
17	-	-	-	700	288.00	2,01,600	17,300	282.04	48,79,328
20	-	-	-	9,500	282.04	26,79,380	7,800	282.04	2199948
30	-	-	-	900*	282.04	2,53,836	6,900	282.04	19,46,112
30	-	-	-	300**	-	-	6,600	294.87	19,46,112

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

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

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

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

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

<u>Required: -</u>

a) Compute the economic order quantity.

b) State whether the quantity discount offer can be accepted.

(ICAI SM, MTP May 2023–I)

Ans.

1) Calculation of Economic Order Quantity

$$EOQ - \sqrt{\frac{2\ AO}{C}} = \sqrt{\frac{2 \times 8{,}000 \text{ units} \times ₹\ 200}{₹\ 400 \times \frac{20}{100}}} = \mathbf{200\ units}$$

2) Evaluation of Profitability of Different Options of Order Quantity;

a) When EOQ is ordered

Particulars			(₹)
✓ Purchase Cost	–	(8,000 units × ₹ 400)	32,00,000
✓ Ordering Cost	–	[(8,000 units/200 units) × ₹ 200]	8,000
✓ Carrying Cost	–	(200 units × ₹ 400 × ½ × 20/100)	8,000
Total Cost			**32,16,000**

b) When Quantity Discount is accepted;

Particulars			(₹)
✓ Purchase Cost	–	(8,000 units × ₹ 384 *)	30,72,000
✓ Ordering Cost	–	[(8,000 units/4000 units) × ₹ 200]	400
✓ Carrying Cost	–	(4000 units × ₹ 384 × ½ × 20/100)	1,53,600
Total Cost			**32,26,000**

- ✓ *Unit Cost ₹ 400
- ✓ Less Quantity Discount @ 4% = 16
- ✓ Purchase Cost = 400−16 = ₹ 384

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

10. 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 (kgs.)		Discounts (₹)
Up to 6,000	–	Nil
6,000−8,000	–	400
8,000−16,000	–	2,000
16,000−30,000	–	3,200
30,000−45,000	–	4,000

You are required to: -

a) Calculate the re-order point taking 30 days in a month;

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

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

(May 2002 RTP, Modified MTP Dec 2021)

Ans.

a) Re-Order Level or Point = (Maximum Usage × Maximum Lead Time) + Safety Stock

- ✓ Quarterly (i.e., 3 months) production of finished goods
- ✓ = 20,000 units
- ✓ Raw Material required per unit of finished goods.

✓ = 0.5 kgs. of raw material

✓ ∴ Raw material required for 20,000 units of finished goods

✓ $= 20{,}000 \times 0.5\ kg$

✓ = 10,000 kg of raw material

✓ Daily requirement of raw material

✓ $= \frac{10{,}000 \text{ kg}}{3 \text{ months} \times 30 \text{ days}}$

✓ = 111.11 kg per day.

✓ Re-order Level = 4000 kg (111.11 kg × 36 days) + 1,000 kg = 5,000 kg.

b) Statement of total cost of procurement and storage of raw materials;

i)	No. of Orders to be place (given)	1	2	4	6
ii)	Annual requirement (in kgs.) [(20,000 units of finished goods per quarter × 4 quarter) × 0.5 kg.]	40,000	40,000	40,000	40,0000
iii)	Order size/Reorder Quantity (B/A) units	40,000	20,000	10,000	6,667
iv)	Ordering cost per order	100	100	100	100
v)	Carrying cost per unit p.a.	2	2	2	2
vi)	Total Storage Cost of raw material $\frac{1}{2} \times$ Reorder Quantity $\times$ Carrying $\frac{\text{Cost}}{\text{unit}}$ p. a. $= \frac{1}{2} \times \text{C} \times \text{E}$	40,000	20,000	10,000	6,667
vii)	Total Cost of procurement (Ordering) = No. of orders × Cost of ordering $= \frac{\text{B}}{\text{C}} \times \text{D}$	100	200	400	600
viii)	Discount (₹)	4,000	3,200	2,000	400
ix)	Total Cost of Procurement & Storage after considering discount. [F + G−H]	36,100	17,000	8,400	6,867

c) A = Annual requirement

✓ = 10,.000 units/Qtr. × 4 Qtr.

✓ = 40,000 units.

✓ O = Ordering Cost/order

✓ C = Carrying Cost/unit p.a.

✓ = ₹ 2 unit p.a.

✓ Economic Order Quantity= $\sqrt{\frac{2AO}{\text{C}}}$

✓ $= \sqrt{\frac{2 \times 40{,}000 \times 100}{2}} = 2{,}000$ Units

✓ No. of order when order size is equal to EOQ.

✓ $= \frac{\text{Annual Demand}}{\text{EOQ}}$

✓ $= \frac{40{,}000 \text{ units}}{2{,}000} = 20$ Order p. a.

Total ordering and carrying cost is minimum at the order size, of EOQ which is calculated as under;

✓ Total ordering cost + Total carrying cost

✓ $= \left(\frac{\text{U}}{\text{Q}} \times 0\right) + \left(\frac{\text{Q}}{2} \times \text{P}\right)$

✓ $= \left(\frac{40{,}000}{2{,}000} \times 100\right) + \left(\frac{1}{2} \times 2{,}000 \times 2\right) = 2{,}000 + 2{,}000 =$ ₹ 4,000.

11. SKD Company Ltd., not registered under GST, purchased material P from 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 (Will be given only if payment is made within 30 days.)	@10%
Freight and insurance	₹ 3,400
Toll Tax paid	₹ 1,000
Demurrage	₹ 1,000
Commission and brokerage on purchases	₹ 2,000
Amount deposited for returnable containers	₹6,000
Amount of refund on returning the container	₹4,000
Other Expenses	@ 2% of total cost

20% of material shortage is due to normal reasons.
The payment to the supplier was made within 20 days of the purchases.
You are required to calculate cost per unit of material purchased to SKD Company Ltd.

(Modified MTP May 2022)

Ans. Computation of Total cost of material purchased of SKD Manufacturing Company

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

Note:

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

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

Date	Particulars	Units	Rate per units
15-12-X1	Purchase Order- 008	10,000	9,930
30-12-X1	Purchase Order- 009	10,000	9,780
01-01-X2	Opening Stock	3,500	9,810
05-01- X2	GRN*- 008 (against the Purchase Order-008)	10,000	----
05-01- X2	MRN**-003 (against the Purchase Order-008)	500	----
06-01- X2	Material Requisition-011	3,000	----
07-01- X2	Purchase Order- 010	10,000	9,750
10-01- X2	Material Requisition-012	4,500	----
12-01- X2	GRN-009 (against Purchase Order-009)	10,000	----
12-01- X2	MRN-004 (against the Purchase Order-009)	400	----
15-01- X2	Material Requisition-013	2,200	----
24-01- X2	Material Requisition-014	1,500	----
25-01- X2	GRN-010 (against the Purchase Order- 010)	10,000	----
28-01- X2	Material Requisition- 0.15	4,000	----
30-01- X2	Material Requesiton-016	3,200	----

*GRN-Goods Received Not; ** MRN-Material Required Note

Based on the above data, you are required to Calculate;

a) Re-order level

b) Maximum Stock level

c) Minimum Stock level

d) Prepare Store Ledger for the period January 20X2 and determine the value of Stock as on 31-01-20X2.

e) Value of Components used during the month January, 20X2.

f) Inventory turnover ratio.

(RTP May 2020)

Ans. **Calculation: -**

a) Re-Order Level;

✓ = Maximum Usage × Maximum lead time

✓ = 4,500 units × 21 days = 94,500 units

b) Maximum Stock Level;

✓ = Re − order level + Re − order Quantity − (Min. Usage × Min. lead time)

✓ = 94,500 Units + 10,000 units − (1,500 units × 13 days)

✓ = 1,04,500 units − 19,500 units = 85,000 units.

c) Minimum Stock Level;

✓ = Re − order level − (Average Consumption × Average lead time)

✓ = 94,500 units − (3,000 units × 17days)

✓ = 94,500 units − 52,500 units

✓ = 43,500 units

d) Store Ledger for the month of January 20X2; (Weighted Average Method);

Date	Receipts				Issue				Balance		
	GRN/ MRN	Units	Rate	(₹) ('000')	MRN /MR	Units	Rate	('000')	Units	Rate	(₹) ('000')
01-01-X2	----	----	----	----	----	----	----		3500	9,810	34,335
05-01-X2	008	10,000	9,930	99,300	003	500	9,930	4,965	13,000	9,898	1,28,670
06-01-X2	----	----	----	----	011	3,000	9,898	29,694	10,000	9,898	98,980
10-01-X2	----	----	----	----	012	4,500	9,898	44,541	5,500	9,898	54,439
12-01-X2	009	10,000	9,780	97,800	004	400	9,780	3,912	15,100	9,823	1,48,327
15-01-X2	----	----	----	----	013	2.200	9,823	21,611	12,900	9,823	1,26,716
24-01-X2	----	----	----	----	014	1,500	9,823	14,734	11,400	9,823	1,11,982
25-1- X2	010	10,000	9,750	97,500	----	----		------	21,400	9,789	2,09,482
28-01-X2	----	----	----	----	015	4,000	9,789	39,156	17,400	9,789	1,70,328
30-01-X2	----	----	----	----	016	3,200	9,789	31,325	14,200	9,789	1,39,004

e) Value of components used during the month of January 20X2:

Sum of material requisitions 011 to 016 ('000)

= ₹29,694 + ₹44,541 + ₹21,611 + ₹ 14,734 + ₹ 39,156 + ₹ 31,325

= ₹1,81,061

f) Inventory Turnover Ratio

$$\text{Inventory Turnover Ratio} = \frac{\text{Value of material consumed}}{\text{Average Inventory}}$$

$$\text{Inventory Turnover Ratio} = \frac{1{,}81{,}061}{(1{,}39{,}004 + 34{,}335)/2} = \frac{1{,}81{,}061}{86{,}669.5} = 2.09$$

Workings: -

Consumption is Calculated on the basis of Material Requisitions: -

Maximum component usage = 4,500units (Material requisition on 10 – 01 – X2)

Minimum component usage = 1,500 units (Material requisition on 24 – 01 – X2)

Lead time is calculated from purchase order date to material received date;

Maximum lead time = 21 days (15 – 12 – 20X1 to 05 – 01 – 20X2)

Minimum lead time = 13 days (30 – 12 – 20X1 to 12 – 01 – 20X2)

Re-order quantity (observed) = 10,000 units

Date	Material Requisition number	Units
06-01-20X2	11	3,000
10-01-20 X2	12	4,500 (Maximum)
15-01-20 X2	13	2,200
24-01-20 X2	14	1,500 (Minimum)
28-01-20 X2	15	4,000
30-01-20 X2	16	3,200

13. **From the details given below. Calculate;**

a) Re-Ordering level

b) Maximum level

c) Minimum level

d) Danger level.

Re-Ordering quantity is to be calculated on the basis of following information;

i) Cost of placing a purchase order is ₹ 20

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

iii) Purchase price per unit inclusive of transportation cost is ₹ 50

iv) Annual cost of storage per units is ₹ 5.

v) Details of lead time: - Average –10 days, Maximum – 15 days, Minimum–5 days for emergency purchases–4 days.

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

(ICAI SM)

Ans. **Computations;**

1) (ROL) Re-Ordering level;

- ✓ = Maximum usage per period × Maximum lead time
- ✓ = 20 units per day × 15 days = **300 units.**

2) Maximum level;

- ✓ ROL + ROQ−[Min.rate of consumption × Min. (Refer to working notes 1 and 2) lead time]
- ✓ = 300 units + 200 units −[10 units per day × 5 days]
- ✓ = **450 Units.**

3) Minimum level;

- ✓ = ROL−Average rate of consumption × Average re-order period
- ✓ = 300 units− (15 units per day × 10 days) = **150 Units.**

4) Danger level;

= Average Consumption × Lead time for emergency purchases

= 15 units per day × 4 days = **60 Units.**

<u>Working Notes: -</u>

1) Minimum rate of consumption per day

- ✓ Average rate of consumption $= \frac{\text{Minimum rate of Consumption} + \text{Maximum rate of Consumption}}{2}$
- ✓ 15 units per day $= \frac{\text{X units /day+20 units per day}}{2}$ or X = 10 units per day

2) Re-order Quantity (ROQ) or Economic Order Quantity (EOQ)

$= \sqrt{\frac{2\times 5{,}000 \text{ units}\times ₹20}{5}} = 200$ units

A	(Number of units to be purchased annually)	= 5,000 units
O	(Ordering cost per order)	= ₹ 20
C	(Annual cost of storage per unit)	= ₹ 5
	Purchase price per unit inclusive of transportation cost	= ₹ 50.

14. a) 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

b) Determine the total cost that would result for the items if a new price of ₹12.80 is used.

(ICAI SM)

Ans.

a) Economic Order Quantity $= \sqrt{\frac{2\text{ AO}}{\text{C}}}$

Carrying cost (C)

- ✓ Storage rate = 2%
- ✓ Interest Rate = 12%

- ✓ Obsolescence Rate = 6%

  Total = 20% per annum
- ✓ C = 20% of ₹ 20 = ₹ 4 per unit per annum

$$= \sqrt{\frac{2\times5000\times16}{4}} = \sqrt{40{,}000} = 200 \text{ Units.}$$

Total Cost: -

Particulars	(₹)
✓ Purchase price of 5,000 units @ ₹ 20.00 per unit	= ₹ 1,00,000
✓ Ordering Cost $= \frac{5000}{200} = 25$ orders@ ₹ 16	= ₹ 400
✓ Carrying cost of average inventory $= \frac{200}{2} = 100$ units @ ₹ 4	= ₹ 400
Total Cost	**₹ 1,00,800**

b) If the new price of ₹12.80 used;

C =20% of 12.80 =₹ 2.56 per unit per annum.

Economic Order Quantity $= \sqrt{\frac{2\times5{,}000\times16}{2.56}} = 250$ units

Total Cost;

Particulars	(₹)
✓ Purchase price of 5,000 units @ ₹ 12.80 per unit =	64,000
✓ Ordering Cost $= \frac{5{,}000}{250} = 20$ Orders @ ₹ 16 =	320
✓ Carrying cost (of average inventory) $= \frac{250}{2} = 125$ units @ ₹ 2.56 =	320
Total Cost	**64,640**

15. M/s Tyro tubes trades in four-wheeler tyres and tubes. It stocks sufficient quantity of tyres of almost every vehicle. In year and 202X-X1, the report of sales manager revealed that M/s Tyro tubes experienced stock-out of tyres.

The Stock-out data is as follows: -

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

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

Determine optimum safest stock level.

(ICAI SM)

Ans. **Computation of Stock-out and Inventory Carrying Cost;**

Safety Stock Level (Units) (1)	**Stock Out (Units) (2)**	**Probability (3)**	**Stock Out Cost (₹) (4) = (2) × ₹ 150**	**Expected Stock-out Cost (₹) (5) = (3) × (4)**	**Inventory Carrying Cost (₹) (6) = (1) × ₹ 50**	**Total Cost (₹) (7) = (5) + (6)**
100	0	0.00	0	0	5,000	5,000

80	20	0.02	3,000	60	4,000	4,060
50	50	0.02	7,500	150		
	30	0.05	4,500	225		
			12,000	**375**	**2,500**	**2,875**
20	80	0.02	12,000	240		
	60	0.05	9,000	450		
	30	0.10	4,500	450		
			25,500	**1,140**	**1,000**	**2,140**
10	90	0.02	13,500	270		
	70	0.05	10,500	525		
	40	0.10	6,000	600		
	10	0.20	1,500	300		
			31,500	**1,695**	**500**	**2,195**
0	100	0.02	15,000	300		2,700
	80	0.05	12,000	600		
	50	0.10	7,500	750		
	20	0.20	3,000	600		
	10	0.30	1,500	450		
			39,000	**2,700**	**0**	**2,700**

At Safety Stock level of 20 units, total cost is least i.e., ₹2,140.

Working Notes: -

Computation of Probability of Stock-out;

✓ **Stock-out (units)**	**100**	**80**	**50**	**20**	**10**	**0**	**Total**
✓ **Nos. of times**	2	5	10	20	30	33	**100**
✓ **Probability**	0.02	0.05	0.10	0.20	0.30	0.33	**1.00**

16. **From the following details, Draw a plan of ABC selective control;**

Items	Units	Units Cost (₹)
1	7,000	4.450
2	4,000	19.140
3	1,500	8.90
4	29,000	0.180
5	10,000	8.190
6	40,000	0.450
7	60,000	0.180
8	13,000	0.980
9	10,000	0.205
10	29,000	0.360
11	11,500	6.320
12	4,000	5.220

(ICAI SM)

Ans.

Statement of Total Cost and Ranking;

Item	Units	% of Total Units	Units Cost (₹)	Total Cost (₹)	% of Total Cost	Ranking
1	7,000	3.1963	4.450	31,150	8.7557	4
2	4,000	1.8265	19.140	76,560	21.5195	2
3	1,500	0.6849	8.90	13,350	3.754	7
4	29,000	13.2420	0.180	5,220	1.4672	11

5	10,000	4.5662	8.190	81,900	23.0205	1
6	40,000	18.2648	0.450	18,000	5.0594	6
7	60,000	27.3973	0.180	10,800	3.0357	9
8	13,000	5.9361	0.980	12,740	3.5810	8
9	10,000	4.5662	0.205	2050	0.5762	12
10	29,000	13.2420	0.360	10,440	2.9345	10
11	11,500	5.2511	6.320	72,680	20.4289	3
12	4,000	1.8265	5.220	20,880	5.8690	5
	2,19,000	**100**		**3,55,770**	**100**	

Basis for selective control (Assumed)

- ₹ 50,000 & above ---- 'A' Item
- ₹ 13,000 to 50000 ---- 'B' Item
- Below ₹13,000 ---- 'C' Item

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

Ranking	Item Nos.	% of Total Units	Cost (d)	% of Total Cost	Category
1	5	4.5662	81,900	23.0205	
2	2	1.8265	76,560	21.5195	
3	11	5.2511	72,680	20.4289	
Total	**3**	**11.6438**	**2,31,140**	**64.9689**	**A**
4	1	3.1963	31,150	8.7557	
5	12	1.8265	20,880	5.8690	
6	6	18.2648	18,000	5.0594	
7	3	0.6849	13,350	3.7524	
Total	**4**	**23.9726**	**83,380**	**23.4365**	**B**
8	8	5.9361	12,740	3.5810	
9	7	27.3973	10,800	3.0357	
10	10	13.2420	10,440	2.9345	
11	4	13.2420	5,220	1.4672	
12	9	4.5662	2050	0.5762	
Total	**5**	**64.3836**	**41,250**	**11.5946**	**C**
Grand Total	12	100	3,55,770	100	

1) **Advantages of ABC analysis: -** The advantages of ABC analysis are the following: -
   a) **Continuity in production: -** It ensures that, without there being any danger of interruption of production for want of materials or stores, minimum investment will be made in inventories of stocks of materials or stocks to be carried.

   b) **Lower Cost: -** The Cost of placing orders, receiving goods and maintaining stocks is minimised specially if the system is coupled with the determination of proper economic order quantities.

   c) **Less attention required: -** Management time is saved since attention need to be paid only to some of the items rather than all the items, as would be the case if the ABC system was not in operation.

Systematic working: - With the introduction of the ABC system, much of the work connected with purchases can be systematized on a routine basis, to be handled by subordinate staff.

17. 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 reason.

(ICAI SM)

Ans. **Classification of the items of inventory as per ABC analysis;**

1) **15 number of varieties of inventory items should be classified as 'A' category items because of the following reasons;**
   - **a)** Constitute 0.375% of total number of varieties of inventory handled by stores of factory. Which is minimum as per given classification in the table.
   - **b)** 50% of total use value of inventory holding (average), which is maximum, according to the given table.
   - **c)** Highest in consumption, about 85% of inventory usage (in end-product).
2) **110 number of varieties of inventory items should be classified as 'B' category items because of the following reasons;**
   - **a)** Constitute 2.750% of the total number of varieties of inventory items handled by stores of factory.
   - **b)** Requires moderate investment of about 30% of total use value of inventory holding (average).
   - **c)** Moderate in consumption, about 10% of inventory usage (in end-product)
3) **3,875 number of varieties of inventory items should be classified as 'C' category items because of the following reasons;**
   - **a)** Constitute 96.875% of total varieties of inventory items handled by stores of factory.
   - **b)** Requires about 20% of total use value of inventory holding (average.)
   - **c)** Minimum inventory consumption, i.e., about 5% of inventory usage (in end-product).

18. The following transactions in respect of material Y occurred during the six months ended 30th June, 202X;

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	30	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?

(ICAI SM)

Ans.

a) Total number of units purchase = 2,500

- ✓ Total number of units issued = 2,300
- ✓ The Closing Stock at the end of six months' period i.e., on 30th June, 202X will be 200 units.
- ✓ Up to the end of May 202X, total purchases coincide with the total issues i.e., 1,900 units. It means that at the end of May 202X, there was no closing stock. In the month of June 202X, 600 units were purchased out of which 400 units were issued. Since there was only one purchase and one issue in the month of June, 202X and there was no opening Stock on 1st June 202X, the Closing Stock of 200 units is to be valued at ₹30 per unit.
- ✓ In the view of this, the argument of the Chief Accountant appears to be correct. Where there is only one purchase and one issue in a month with no opening Stock, the method of pricing of material issues becomes irrelevant. Therefore, in the given case one should agree with the argument of the Chief Accountant that the value of closing stock remains the same no matter which method of pricing the issue is used.
- ✓ It may, however, be noted that the argument of Chief Accountant would not stand if one finds the value of the Closing Stock at the end of each month.

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

1) The Cost of the materials issued will be either nearer or will reflect the current market price. Thus, the cost of goods produced will be related to the trend of the market price of materials. Such a trend in price of materials enables the matching of cost of production with current sales revenues.

2) The use of the method during the period of rising prices does not reflect undue high profit in the income statement, as it was under the first-in-first-out or average method. In fact, the profit shown here is relatively lower because the cost of production takes into account the rising trend of material prices.

3) In the case of falling prices. Profit trends to rise due to lower material cost, yet the finished products appear to be more competitive and are at market price.

During the period of inflation, LIFO will tend to show the correct profit and thus, avoid paying undue taxes to some extent.

19. The following information is provided by Sunrise Industries for the fortnight of April, 202X;

Material Exe;

Stock on 1-4-20X1 100 units at ₹5 per unit.

Purchase;

5-4-20X1, 300 units at ₹6
8-4-20 X1, 500 units at ₹7
12-4-20 X1, 600 units at ₹8

Issues;

6-4-20 X1, 250 units
10-4-20 X1, 400 units
14-4-20 X1, 500 units

<u>Required: -</u>

a) Calculate using FIFO and LIFO methods of pricing issues;

- **i)** The value of materials consumed during the period.
- **ii)** The value of stock of materials on 15-04-20X1

b) Explain why the figures in (i) and (ii) in part A of this question are different under the two methods of pricing of materials issues used. You need not draw up the stores Ledgers.

(ICAI SM)

Ans. **a)**

i) Value of Material Exe Consumed during the period;
1-4-20X1 to 15-4-20X1 by using FIFO method.

Date	Description Units	Qty. (Units)	Rate (₹)	(₹)
1-4-20X1	Opening balance	100	5	500
5-4-20X1	Purchase	300	6	1,800
6-4-20X1	Issued	100	5	1,400
		150	6	
8-4-20X1	Purchased	500	7	3,500
10-4-20X1	Issued	150	6	2,650
		250	7	
12-4-20X1	Purchased	600	8	4,800
14-4-20X1	Issued	250	7	3,750
		250	8	
15-4-20X1	Balance	350	8	2,800

Total value of material Exe consumed during the period under FIFO method comes to (₹1,400 + ₹ 2,650 + ₹ 3,750) ₹ 7,800 and balance on 15-4-2020 is of ₹ 2,800.

ii) Value of material Exe Consumed during the period 01-04-20X1 to 15-4-20X1 by using LIFO method;

Date	Description Units	Qty. (Units)	Rate (₹)	(₹)
1-4-20X1	Opening balance	100	5	500
5-4-20X1	Purchase	300	6	1,800
6-4-20X1	Issued	250	6	1,500
8-4-20X1	Purchased	500	7	3,500
10-4-20X1	Issued	400	7	2,800
12-4-20X1	Purchased	600	8	4,800
14-4-20X1	Issued	500	8	4,000
15-4-20X1	Balance	350	----	2,300*

Total value of material Exe issued under LIFO method comes to (₹1,500 + ₹2,800 + ₹4,000) ₹8,300.

*The balance 350 units on 15-4-20X1 of ₹2,300. Relates to opening balance on 1-4-20X1 and purchases made on 5-4-20X1, 8-4-20X1 and 12-4-20X1, (100 units @ ₹5, 50 units @ ₹6,100 units @ ₹7 and 100 units @ ₹8.)

As shown in (a) above, the value of stock of materials on 15-4-20X1;
- ✓ Under FIFO method ₹2,800
- ✓ Under LIFO method ₹2,300

Total value of material Exe issued to production under FIFO and LIFO methods comes to ₹7,800 and ₹8,300 respectively. The value of closing stock of material Exe on 15-4-20X1 under FIFO and LIFO methods comes to ₹2,800 and ₹2,300 respectively.

b) The reasons for the difference of ₹ 500 (₹ 8,300 – ₹ 7,800) as shown by the following table in the value of material Exe, issued to production under FIFO and LIFO as follows;

Date	Quantity Issued (Units)	Value FIFO (₹)	Total (₹)	Value LIFO (₹)	Total (₹)
6-4-20X1	250	1,400		1,500	
10-4-20X1	400	2,650		2,800	
14-4-20X1	500	3,750	7,800	4,000	8,300

1. On 6-4-20X1, 250 units were issued to production. Under FIFO their value comes to 1,400 (100 units × ₹ 5 + 150 units × 6) and under LIFO ₹ 1,500 (250 × ₹ 6). Hence, ₹100 more was charged to production under LIFO.
2. On 10-4-20X1, 400 units were issued to production. Under FIFO their value comes to ₹ 2,650 (150 × 6 + 250× ₹7) and under LIFO ₹2,800 (400 × ₹7). Hence, ₹150 more was charged to production under LIFO.
3. On 14-4-20X1, 500 units were issued to production. Under FIFO their value comes to ₹ 3,750 (250 × ₹7 + 250 × ₹8) and under LIFO ₹4,000 (500 × ₹8.), Hence, ₹250 more was charged to production under LIFO.

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

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

1. In the case of FIFO, all the 350 units of the closing Stock belongs to the purchase of material made on 12-4-20X1, whereas under LIFO these units were from opening balance and purchase made on 5-4-20X1, 8-4-20X1 and 12-4-20X1.
2. Due to different purchase price paid by the concern on difference days of purchase, the value of Closing Stock differed under FIFO and LIFO. Under FIFO 350 units of Closing Stock were Value @ ₹ 8 p.u. Whereas under LIFO first 100 units were valued @ ₹ 5 p.u. next 50 units @ ₹ 6 p.u. next 100 units @ ₹ 7 p.u. and last 100 units @ ₹ 8 p.u.

Thus, under FIFO, the value of Closing Stock increased by ₹ 500.

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

Particulars	(₹)
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.

(ICAI SM)

Ans. **Statement Showing the computation of rate per kg. of each chemical;**

Particulars	Chemical A (₹)	Chemical B (₹)
Purchase price 10,000 @ ₹10 per kg. 8,000 @ ₹ 13 per kg.	1,00,000	1,04,000
Add: Basic Custom Duty @ 10%	10,000	10,400

Add: Railway freight (in the ratio of quantity purchase i.e., 5:4)	2,133	1,707
Total Cost (A)	**1,12,133**	**1,16,107**
Effective Quantity (See Working) (B)	9,310 kg.	7,526.4 kg
Rate per kg. (A ÷ B)	**12.04**	**15.43**

Workings: -

Computation of effective quantity of each chemical available for use;

Particulars	Chemical A (Kg.)	Chemical B (Kg.)
Quantity purchased	10,000	8,000
Less: Shortage due to normal breakages	500	320
	9,500	7,680
Less: Provision for deterioration 2%	190	153.6
Quantity available	**9,310**	**7,526.4**

21. 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?

(ICAI SM)

Ans. **a) Total Annual Cost in Existing Inventory Policy;**

Particulars	(₹)
✓ Ordering Cost (6 orders @ ₹ 25)	150
✓ Carrying Cost of average inventory (36,000 ÷ 6) = 6,000 units per order ✓ Average inventory = 3,000 units ✓ Carrying Cost = 20% of ₹ 1 × 3,000 = 3,000 × 0.20	600
Total Cost	**A 750**

b) Total Annual Cost in Economic Order Quantity;

Economic Order Quantity = $\sqrt{\frac{2\times 36{,}000\times 25}{₹1\times 20\%}}$ = 3,000 units.

Particulars	(₹)
✓ No. of orders = 36,000 ÷ 3,000 units = 12 orders	
Ordering Cost (12 × ₹25) =	300
✓ Carrying Cost of average inventory (3,000 × 0.20) ÷ 2 =	300
Total Cost	**B 600**
✓ **Savings due to E.O.Q ₹ (750−600) (A−B)**	**150**

Note: -

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

22. 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 Glow	**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: -

a) Compute EOQ for Super Grow and Nature's Own.

b) 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?

c) For the EOQ, Compute the number of deliveries per year for Super Grow and Nature's Own.

(ICAI SM)

Ans.

Economic Order Quantity = $\sqrt{\frac{2\,AO}{C}}$

Where,

- A=Annual Demand
- O=Ordering Cost per order
- C=Inventory Carrying Cost per unit per annum

a) Calculation of EOQ;

✓ **Super Grow;**

- EOQ = $\sqrt{\frac{2 \times 2{,}000 \times 1{,}200}{480}} = \sqrt{10{,}000}$ or 100 bags

✓ **Nature's Own;**

- EOQ = $\sqrt{\frac{2 \times 1{,}280 \times 1{,}400}{560}} = \sqrt{6{,}400}$ or 80 bags

b) Total annual relevant cost = Total annual relevant ordering costs + Total annual relevant carrying cost;

Particulars	Super Grow	Nature's Own
✓ Number of Orders = Annual Requirement ÷ EOQ	= 2,000/100 = 20 orders	= 1,280/80 = 16 orders
✓ Ordering Cost	20 × 1200 = ₹ 24000	16 × 1400 = ₹ 22,400
✓ Carrying Cost	½ × 100 × 480 = ₹24,000	½ × 80 × 560 × ₹ 22,400
✓ Total of Ordering and Carrying Cost	= ₹ 24,000 + ₹ 24,000 =₹ 48,000	₹ 22,400 + ₹ 22,400 = ₹ 44,800

c) Number of deliveries for Super Grow and Nature's own fertilizer per year = $\frac{\text{Annual demand for fertilizer bags}}{\text{EOQ}}$

Super Grow	Nature's Own
– = $\frac{2{,}000 \text{ bags}}{100 \text{ bags}}$ = 20 orders	– = $\frac{1{,}280 \text{ bags}}{80 \text{ bags}}$ = 16 Orders.

23. 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 order and the holding cost is 10% p.a.

You are required to Calculate: -

a) Economic order quantity.

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

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

(ICAI SM)

Ans.

a) Economic order quantity: -

✓ A (Annual requirement or Component 'X') = 4,000 units per month × 12 months = 48,000 units

✓ O (Ordering Cost per order) = ₹120

- ✓ C (Holding Cost) = 10% per annum
- ✓ (Purchase Cost per unit) = ₹20
- ✓ Economic Order Quantity = $\sqrt{\frac{2AO}{C}} = \sqrt{\frac{2\times 48{,}000\text{ units}\times ₹\ 120}{10\%\ of\ ₹\ 20}}$ = 2,400 units

b) Extra Cost incurred by the Company: -

i) Total Cost when order size is equal 4,000 units;

- ✓ Total Cost = Total ordering Cost + Total Carrying Cost
- ✓ $= \frac{A}{Q}\times O + \frac{1}{2}Q(C)$
- ✓ $= \left(\frac{48{,}000\text{ units}}{4{,}000\text{ units}}\times ₹120\right) + \left(\frac{1}{2}\times 4{,}000\text{ units}\times 10\%\times ₹20\right)$
- ✓ $= ₹\ 1{,}440 + ₹4{,}000 = ₹\ 5{,}440$

ii) Total Cost when order size is equal EOQ i.e., 2,400 units;

- ✓ Total Cost = $\left(\frac{48{,}000\text{ units}}{2{,}400\text{ units}}\times ₹\ 120\right) + \left(\frac{1}{2}\times 2{,}400\text{ units}\times 10\%\times ₹20\right)$
- ✓ $= ₹\ 2{,}400 + ₹\ 2{,}400 = ₹4{,}800$
- ✓ Extra Cost that the company has to incur = (A) –(B) = ₹ 5,440–₹ 4,800 = ₹ **640**

c) Minimum Carrying Cost: -

Carrying Cost depends upon the size of the order. It will be minimum on the least order size. (In this part of the question the two order sizes are 2,400 units and 4,000 units. Here 2,400 units is the least of the two order sizes. At this order size carrying Cost will be minimum.)

- ✓ The minimum Carrying cost in this case can be computed as under: -
- ✓ Minimum Carrying Cost = $\frac{1}{2}\times 2{,}400\text{ units}\times 10\%\times ₹\ 20 = ₹\ \mathbf{2,400}$.

24. 'AT' Ltd. furnishes the following store transactions for September, 20X1.

1-9-X1	– Opening balance	25 units value ₹ 162.560
4-9-X1	– Issues Req. No. 85	8 Units
6-9-X1	– Receipts from B & Co. GRN No. 26	50 Units @ ₹ 5.75 per unit
7-9-X1	– Issues Req. No. 97	12 Units
10-9-X1	– Return to B & Co.	10 Units
12-9-X1	– Issues Req. No. 108	15 Units
13-9-X1	– Issues Req. No. 110	20 Units
15-9-X1	– Receipts from M & Co. GRN No. 33	25 Units @ ₹ 6.10 per unit
17-9-X1	– Issues Req. No. 121	10 Units
19-9-X1	– Received replacement from B & Co. – GRN No. 38	10 units
20-9-X1	– Returned from department materials of M & Co. MRR No. 4	5 Units
22-9-X1	– Transfer from Job182 to Job 187 in the Dept. MTR 6	5 units
26-9-X1	– Issues Req. No. 146	10 units
29-9-X1	– Transfer from Dept. "A" to Dept "B" MTR 10	
30-9-X1	– 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.

(ICAI SM)

Ans. **Stores Ledger of AT Ltd. for the month of September, 20X1 (FIFO Method)**

Date	Receipt				Issue				Balance		
	GRN No MRR No.	Qty Units	Rate (₹)	(₹)	Requisition No	Qty Units	Rate (₹)	(₹)	Qty. Units	Rate (₹)	(₹)
1	2	3	4	5	6	7	8	9	10	11	12
1-9-X1	----	----	----	----	----	----	----	----	25	6.50	162.50
4-9-X1	----	----	----	----	85	8	6.50	52	17	6.50	110.50
6-9-X1	26	50	5.75	287.50	----	----	----	----	17 50	6.50 5.75	110.5 287.5
7-9-X1	----	----	----	----	97	12	6.50	78	5 50	6.50 5.75	32.5 287.5
10-9-X1	----	----	----	----	Return	10	5.75	57.50	5 40	6.50 5.75	32.5 230
12-9-X1	----	----	----	----	108	5 10	6.50 5.75	32.50 57.50	30	5.75	172.50
13-9-X1	----	----	----	----	110	20	5.75	115	10	5.75	57.50
15-9-X1	33	25	6.10	152.50	----	----	----	----	10 25	5.75 6.10	57.50 152.50
17-9-X1	----	----	----	----	121	10	5.75	57.50	25	6.10	152.50
19-9-X1	38	10	5.75	57.50	----	----	----	----	25 10	6.10 5.75	152.50 57.50
20-9-X1	4	5	5.75	28.75	----	----	----	----	5 25 10	5.75 6.10 5.75	28.75 152.50 57.50
26-9-X1	----	----	----	----	146	5 5	5.75 6.10	28.50 30.50	20 10	6.10 5.75	122 57.50
30-9-X1	----	----	----	----	Shortage	2	6.10	12.20	18 10	6.10 5.75	109.80 163.70

Working Notes: -

1) The Material received as replacement from vendor is treated as fresh supply.

2) In the absence of any information, the price of the material returned from a user department on 20-09-20X1 has been taken at the price of the latest issue made on 17-09-X1. In FIFO method, physical flow of the material is irrelevant, and issue price is based on first in first out.

3) The issue of Material on 26-9-X1 is made out of the material received from a user department on 20-9-X1.

4) The entries for transfer of materials from one job and department to another on 22-9-X1 and 29-9-X1 respectively. Do not affect the store ledger. However, adjustment entries to calculation of Cost of respective jobs and departments are made in Cost Accounts.

5) The Material found short as a result of stock taking has been written off at relevant issue price.

25. **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, W 17, and the Closing Stock under the methods aforesaid and discuss from different points of view which method you would prefer.

(ICAI SM)

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

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

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

Statement of receipts and issues by adopting First-in-First-Out Method

Date	Particulars	Receipts			Issues			Balance		
		Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)
Jan.1	Purchase	100	1	100	----	----	----	100	1	100
Jan.20	Purchase	100	2	200	----	----	----	100 100	1 2	100 200
Jan.22	Issue to Job W 16	----	----	----	60	1	60	40 100	1 2	40 200
Jan.23	Issue to Job W 17	----	----	----	40 20	1 2	40 40	80	2	160

Statement of receipts and issues by adopting Last-In-First-Out Method

Date	Particulars	Receipts			Issues			Balance		
		Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)
Jan.1	Purchase	100	1	100	----	----	----	100	1	100
Jan.20	Purchase	100	2	200	----	----	----	100 100	1 2	100 200
Jan.22	Issue to Job W 16	----	----	----	60	2	120	100 40	1 2	100 80
Jan.23	Issue to Job W 17	----	----	----	40 20	2 1	80 20	80	1	80

Statement of Receipt and Issues by adopting weighted Average method

Date	Particulars	Receipts			Issues			Balance		
		Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)
Jan.1	Purchase	100	1	100	----	----	----	100	1	100
Jan.20	Purchase	100	2	200	----	----	----	200	1.50	300
Jan.22	Issue to Job W 16	----	----	----	60	1.50	90	140	1.50	210
Jan.23	Issue to Job W 17	----	----	----	60	1.50	90	80	1.50	120

Statement of Material Values allocated to Job W 16, Job 17 and Closing Stock, under aforesaid methods;

Particulars	FIFO (₹)	LIFO (₹)	Weighted Average (₹)
✓ Material for Job W 16	60	120	90
✓ Material for Job W 17	80	100	90
✓ Closing Stock	160	80	120
Total	**300**	**300**	**300**

26. **When tenders were invited for a store, quotations were received as under;**

Supplier X;

i) Rate ₹2 each;

ii) Trade discount 10%;'

iii) Cash discount 5% if bills are paid within a fortnight after receipt;

iv) Transport charges ₹1 per 100 units.

Supplier Y;

i) Rate ₹1.80 each (up to 1,000 units), ₹1.60 each (for orders above 1,000 units);

ii) 6% Interest per annum will be added if bills are not paid within a fortnight after receipt of the materials;

iii) Transport charges ₹3 per 100 units.

Assuming that 5,000 units are required every month and that quality and other conditions of supply are the same, offer your comments as to whom purchase order can be issued. The factory pays 50% of its total monthly bills every fortnight.

(RTP)

Ans. **Comparative Statement of Cost of Materials of two quotations;**

Ordering Quantity = 5,000 Units	Supplier X	Supplier Y
✓ 5,000 units @ ₹ 2 per unit	10000	
✓ 5,000 units @ ₹ 1.60 per unit		8000
✓ *Less:* Trade discount @ 10%	1000	
	9000	
✓ Transport Charges @ ₹ 1 per 100 units	50	
✓ Transport Charges @ ₹ 3 per 100 units		150
	9050	**8150**
✓ *Less:* Cash discount @ 5% on half of the amount of ₹ 9,050 paid within 15 days	226.25	
✓ *Add:* Interest @ 6% on half of the amount of ₹ 8,150 not paid within 15 days for the next 15 days of the month $\left(4{,}075 \times \frac{6}{100} \times \frac{1}{24}\right)$		10.2
Total Cost of Materials	**8823.75**	**8160.2**

*The Purchase Order should be issued to Supplier Y because of the lower cost of material.

27. PQR Tubes Ltd. are the manufactures of picture tubes for T.V. The following are the details of their operations during 20X1-20X2;

Ordering Cost – ₹ 100 per order
Inventory Carrying Cost – 20% p.a.
Cost of tubes – ₹ 500 per tube
Normal usage – 100 tubes per week
Minimum usage – 50 tubes per week
Maximum usage – 200 tubes per week
Lead time to supply – 6-8 weeks

Required: -

a) Economic Order Quantity. If the supplier is willing to supply quarterly 1,500 units at a discount of 5%, is it worth accepting?

b) Re-order level

c) Maximum level of stock

d) Minimum level of stock.

(May 2000 RTP)

Ans. **a) Computation of EOQ;**

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

- ✓ Let U = Annual Usage = Normal Usage per week × 52 weeks
  = 100 × 52
  = 5,200 tubes
- ✓ O = Ordering Cost per order = ₹ 100
- ✓ P= Cost per unit = ₹ 500/tube
- ✓ C = Stock holding rate p.a. = ₹ 20% p.a.
- ✓ Q= Re-order Quantity
- ✓ C = Carrying cost per unit p.a. = 500 × 20% = ₹ 100

= $\sqrt{\frac{2\times 5,.200\times 100}{100}}$102 Units (appx)

Evaluation of Price discount offer;

- ✓ The price discount offer can be decided upon only after comparing the total annual inventory cost at EOQ & total annual inventory cost at 1500 units of order size.
- ✓ Total annual inventory cost = Total Purchase Cost + Total ordering cost + Total carrying cost of average inventory.

– $= (U \times C) + \left(\frac{U}{Q} \times O\right) + \frac{1}{2} \times Q \times CS$

– At Q = 102 units (i.e., EOQ) = $(5{,}200\times 500) + \left(\frac{5{,}200}{102} \times 100\right) + \left(\frac{1}{2} \times 102 \times 100\right)$

– = 26,00,000 + 5098 + 5100

– = ₹ 25,10,198 (appro..)

– At quarterly supply = 1,500 Units = $[5200 \times (500 - 5\%)] + \left(\frac{5{,}200}{1{,}500} \times 100\right) + \left[\frac{1}{2} \times 1{,}500 \times (500 - 5\% \times 20\%)\right]$

– = 24,70,000 + 347 + 71,250

– = ₹ 25,41,597 (App.)

*Since, total annual inventory cost is lower, if the re-order quantity is fixed at 1,500 units, so the discount offer should be accepted.

b) Re-Order Level = Maximum Usage × Maximum Lead Time
= 200 tubes per week × 8 weeks
= 1,600 Units.

Since, there is no specification about reorder quantity, it has been assumed to be equal to EOQ units i.e., 102 tubes per order.

c) Maximum Stock Level= Re-order level + Re-order Quantity – (Minimum usage × Minimum Lead Time)

- ✓ = 1,600 (W.N. 1) + 102 (W.N. 2) − (50 tubes per week × 6 weeks)
- ✓ = 1,402 tubes.

d) Minimum Stock Level = Re-Order Level−(Average/Normal usage × Average. Lead time)

- ✓ $= 1{,}600 - \left(100 \times \left(\frac{6+8}{2}\right)\right)$
- ✓ $= 1{,}600 - 700$
- ✓ = 900 Units.

28. **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.

(May 2001)

Ans. **Statement of Cost of procurement of material for a lot size of 1,000 units;**

Particulars	**Source I**	**Source II**
1) Lot Size (Given)	1,000 units	1,000 units
2) Percentage of defective units	2%	2.8%
3) Defective units (1×2)	20 units	28 units
4) Additional price paid per lot	₹ 100	----
5) Cost of rectifying defective unit @ ₹ 5 per unit × (3)	₹ 100	₹ 140
Total Relevant Cost (4 + 5)	₹ 200	₹ 140

On Comparing the total Relevant Cost, we can say it is more economical to procure materials from Source II.

Alternatively (Using Incremental Method);

Saving/(Loss) in procuring materials from source II	**(₹)**
✓ Saving in purchase price per lot of 1,000 units if purchased from Source II	100
✓ ***Less:*** Extra Cost incurred in rectifying defective units as compared to the same cost incurred if supplier procured from Source I = (28 units−20 units) × ₹ 5	40
✓ Net savings if supplies are procured from Source II	
✓ (W.r.t. lot size of 1,000 units) as compared to Source I	**60**

✓ Hence, Source II is more economical than Source I.

29. 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 Re. 0.50 per kg. per month, In addition, the cost of working capital finance on the investment in inventory of raw material is ₹9 per kg. per annum. The annual production of the product is 1,00,000 units and 2.5 units are obtained from one kg. of raw material.

Required: -

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

(Nov. 2001)

Ans. **a) Economic Order Quantity;**

- ✓ A = Annual usage of Raw Material
- ✓ = 1 unit of material gives 2.5 units of Finished Goods
- ✓ For 1,00,000 units of finished goods, material required = $\frac{1,00,000}{2.5}$ = 40,000 kgs.
- ✓ O = Ordering cost per order = Handling Cost + freight per order
  = ₹ 360 + ₹ 390 = ₹ 750
- ✓ P = Cost/kg. of material = ₹ 60 per kg.
- ✓ C= Carrying Cost or Holding Cost of Inventory per unit p.a.
- ✓ = Carrying cost per unit p.a. + Interest cost of investment in inventory per unit p.a.
- ✓ = (₹ 0.50 per unit per month × 12 months) + ₹ 9 per kg. p.a.
- ✓ = ₹ 6 + ₹9 = ₹ 15 per unit p. a.
- ✓ Q = Reorder Quantity.
- ✓ $= \sqrt{\frac{2\ AO}{C}}$
- ✓ $= \sqrt{\frac{2 \times 40,000 \times 750}{15}} = \sqrt{40,00,000} = 2,000$ kgs.

b) Frequency of placing orders/time interval between orders;

- ✓ $= \frac{365 \text{ days or } 12 \text{ months}}{\text{No.or orders}}$
- ✓ $= \text{No. of orders} = \frac{\text{Annual requirement}}{\text{EOQ}}$
- ✓ $= \frac{40,000 \text{ kgs.}}{2,000 \text{ kgs}} = 20$ orders
- ✓ Frequency of placing orders
- ✓ $= \frac{12 \text{ months}}{20 \text{ orders}}$
- ✓ = 0.6 months
- ✓ (Or)
- ✓ $\frac{365 \text{ days}}{20 \text{ orders}}$ = 18 days (approx.)

c) (%) Discount to be negotiated for placing quarterly orders;

- ✓ No. of orders if orders are placed quarterly
- ✓ (i.e., at every three months) = $\frac{12 \text{ months}}{3 \text{ months}}$ = 4 orders
- ✓ Order Size per quarterly order = $\frac{\text{Annual Requirement}}{\text{No.of orders}}$
- ✓ $= \frac{40,000 \text{ kgs.}}{4 \text{ Orders}} = 10,000$ kgs.
- ✓ Total Annual Cost = Total annual Ordering Cost + Total Annual Carrying Cost
- ✓ $= \left(\frac{U}{Q} \times O\right) + \left(\frac{Q}{2} \times PC\right)$
- ✓ At Q = 2,000 kgs. (i.e., at EOQ)
- ✓ $= \left(\frac{40,000}{2,000} \times 750\right) + \left(\frac{2000}{2} \times 15\right)$
- ✓ = 15000 + 15000 = ₹ 30,000
- ✓ At Q= 10,000 kgs. (i.e., at quantity orders)
- ✓ $= \left(\frac{40,000}{10,000} \times 750\right) + \left(\frac{10,000}{2} \times 15\right)$
- ✓ = 3,000 + 75,000 = ₹ 78,000

On analysis of the total annual ordering & carrying cost as above it can be said that if we place quarterly orders of 10,000 kgs. Each then we would incur extra ordering & carrying cost of ₹48,000 (i.e., ₹78,000-30,000).

In Order to avoid or compensate this increase in cost of ₹48,000 we will have to negotiate 3 discount which will, result in a total decrease in purchase cost by atleast ₹48,000.

✓ **Total discount required on annual requirement of;**

– =40,000 kgs. = ₹ 48,000

✓ **Required Discount per kg. of raw material;**

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

✓ **Percentage of Discount to be negotiated;**

$= \frac{\text{Discount/kg.}}{\text{Currect Price/kg}} \times 100 = \frac{1.2}{60} \times 100 = 2\%$

30. A Fire occurred in the factory premises on October 31, 20X1. The accounting records have been destroyed. Certain accounting records were kept in another building. They reveal the following for the period September 1, 20X1 to October 31, 20X1;

	Particulars	**(₹)**
i)	Direct Materials Purchased	2,50,000
ii)	Work-in-process inventory, 1.9.20X1	40,000
iii)	Direct Materials inventory, 1.9.20X1	20,000
iv)	Finished goods inventory, 1.9.20X1	37,750
v)	Indirect manufacturing costs	40% of Conversion Costs
vi)	Sales revenues	7,50,000
vii)	Direct manufacturing costs	2,22,250
viii)	Prime Costs	3,97,750
ix)	Gross margin percentage based on revenues	30%
x)	Cost of Goods available for sale	5,55,775

The loss is fully covered by insurance company. The insurance company wants to know the historical cost of the inventories as a basis for negotiating a settlement, although the settlement is actually to be based on replacement cost, not historical cost.

Required: -

a) Finished goods inventory, 31.10.20X1

b) Work-in-process inventory, 31.10.20X1

c) Direct Materials inventory, 31.10.20X1

(Nov. 2003 RTP)

Ans.

a) Finished Goods Inventory 31.10.20X1;

✓ Sales Revenue	7,50,000
✓ ***Less:*** Gross Margin (30% of Revenue)	2,25,000
✓ Cost of goods sold (a)	5,25,000
✓ Cost of goods available for sale (b)	5,55,775
✓ Finished goods inventory, 31.10.20X1 [(b)– (a)]	**30,775**

b) Work-in-Process Inventory 31.10.20X1;

✓ Prime Cost	3,97,750
✓ ***Add:*** Indirect Manufacturing Cost (Refer to working note (2))	1,48,167
✓ ***Add:*** Opening work-in-process, 1.9.20X1	40,000
✓ Manufacturing cost to account for	5,85,917
✓ ***Less:*** Cost of Goods Manufactured (W.N. (3))	5,18,025
✓ Work-in-Process inventory, 31.10.20X1	**67,892**

c) Direct Material Inventory, 31.10.20X1;

✓ Direct Materials Inventory, 1.9.20X1	20,000
✓ ***Add:*** Direct Material Purchased	2,50,000
	2,70,000

✓ *Less:* Direct Material Inventory (used during) the month (Working note (1))	1,75,500
✓ Direct Material Inventory, 31.10.X1	**94,500**

Working Notes: -

1) **Direct Material Inventory Cost (used during the month) direct material, inventory cost;**
   - ✓ = Prime Cost– Direct Manufacturing labour cost
   - ✓ = ₹ 3,97,750– ₹ 2,22,250
   - ✓ = ₹ 1,75,500
2) **Conversion & Indirect Manufacturing Cost: -**
   - ✓ **Conversion Cost** – = Direct Manufacturing Cost + Indirect Manufacturing Cost
   - ✓ **But Indirect Manufacturing Cost Or Conversion Cost** – = 40% of Conversion Cost
   - – = Direct Manufacturing Cost + 40% of Conversion Cost.
   - ✓ **Or 0.60 Conversion Cost** – = Direct Manufacturing Cost
   - ✓ **Or Conversion Cost** – $= \frac{\text{Direct Manufacturing Cost}}{0.60}$
   - – $= \frac{₹\ 2,22,250}{0.60}$
   - – = ₹ 3,70,417
   - ✓ **Or Indirect Manufacturing Cost** – = 40% × ₹ 3,70,417
   - – = ₹ 1,48,167

3) **Cost of Goods Manufactured: -**

Particulars	(₹)
✓ Cost of goods available for sale	5,55,775
✓ *Less:* Finished goods 1.9.20X1	37,750
✓ Cost of goods manufactured	**5,18,025**

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

The demand for plastic bowl has been forecasted at a fairly steady rate of 40,000 packs every year. The company purchased 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: -

a) Calculate Economic Order Quantity.
b) Calculate Number of Orders needed every year.
c) Calculate the total cost of ordering and storage bowls for the year.
d) 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.

(May 2008, RTP)

Ans.

a) **Economic Order Quantity** $= \sqrt{\frac{2\ AO}{C}}$

- ✓ A = Annual Requirement = 40000
- ✓ B = Buying Cost = 40

- ✓ O = Ordering Cost = ₹ 8
- ✓ C = Carring Cost permit × % Cost of Cost price
- ✓ = ₹ 40 × 10% = ₹ 4
- ✓ Economic Order Quantity = $\sqrt{\frac{2\ \text{AO}}{\text{C}}}$
- ✓ $= \sqrt{\frac{2\times40{,}000\times8}{4}} = 400$
- ✓ Therefore, EOQ = 400 Units

b) No. of Orders needed $= \frac{40{,}000}{400} = 100$ Orders

c) Total Cost of Ordering;

- ✓ At EOQ Level
- ✓ Carrying Cost = Ordering Cost
- ✓ Ordering Cost = 100 × 8 – = 800
- ✓ Carrying Cost (400÷2)×4 – = 800
- ✓ Total Cost – = 1600
- ✓ **Alternatively; Total Cost** – $= \sqrt{2\ \text{AOC}}$
  – $= \sqrt{2 \times 40{,}000 \times 8 \times 4}$
  – = 1,600

d) Timing of next order;

i) Day's requirement served by each order.

- ✓ Number of days requirements $= \frac{\text{No. of working days}}{\text{No. of order in a year}} = \frac{360}{100} = 3.6$
- ✓ Day's Supply.
- ✓ This implies that each order of 400 packs supplies for requirements of 3.6 days only.

ii) Day's requirement covered by inventory;

- ✓ $\frac{\text{Unit in Inventory}}{\text{Economic Order Quantity}} \times (\text{Day's requirement served by an order})$.
- ✓ $\frac{\text{333 Packs}}{\text{400 packs}} \times 3.6$ days = 3 days requirement.

iii) 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.**

32. 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: IGST @ 12%	96.00
	896.00
Add: Packing charges (5 non-returnable boxes)	50.00
	946.00

- ✓ A 2 per cent cash discount will be given if payment is made in 30 days.
- ✓ Documents substantiating payment of IGST are enclosed for claiming Input Credit.

(ICAI SM)

Ans. **Computation of Cost per unit: -**

Particulars	(₹)
✓ Net purchase price	800.00
✓ ***Add:*** Packing charges (5 non-returnable boxes)	50.00
	850.00
✓ No. of units purchased	200 units
Cost per unit	**4.25**

Note: -

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

33. **Following details are related to a manufacturing concern;**

Re-Order Level – 160000 units
Economic Order Quantity – 90000 units
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: -

a) Maximum Consumption per day
b) Minimum Consumption per day

(Nov 2014)

Ans. **1) Maximum Consumption per day;**

- ✓ Re-Order level= Maximum Re-Order period × Maximum Consumption per day.
- ✓ 1,60,000 units = 8 days × Maximum Consumption per day
- ✓ Or, Maximum Consumption per day = $\frac{1,60,000\ units}{8\ \text{days}}$ = 20,000 Units

2) Minimum Consumption per day;

- ✓ Maximum Stock Level = Re-Order Level + Re-Order Quantity – (Minimum Lead time × Minimum Consumption per day.)
- ✓ Or, 1,90,000 units = 1,60,000 units + 90,000 units – (4 days × Minimum Consumption per day.)
- ✓ Or, 4 days × Minimum Consumption per day = 2,50,000 units – 1,90,000 units
- ✓ Or, Minimum Consumption per day = $\frac{60,000\ \text{units}}{4\ \text{days}}$ = 15,000 units

Working Notes:-

- ✓ Difference between Minimum lead time and Maximum lead time = 4 days Maximum lead time − Minimum lead time = 4 days
- ✓ Or, Max lead time = Minimum lead time + 4 days …………………(i)
- ✓ Average lead time is given as 6 days i.e.,
- ✓ $\frac{\text{Maximum Lead time+Minimum Lead time}}{2}$ = 6 days ……………………… (ii)
- ✓ Putting the value of (i) in (ii).
- ✓ $\frac{\text{Minimum Lead time+4 days+Minimum Lead time}}{2}$ = 6 days
- ✓ Or, Minimum Lead time + 4 days + Minimum. Lead time = 12 days
- ✓ Or, 2 Minimum Lead time = 8 days

✓ Or, Minimum Lead time = $\frac{8\text{ days}}{2}$ = 4 days
✓ Putting this Minimum lead time value in (i), we get
✓ Maximum lead time = 4 days + 4 days = 8 days

34. Supreme Limited is a manufacturer of energy saving bulbs, to manufacture the finished product one unit of component 'LED' is required. Annual requirement of component 'LED' is 72,000 units, the cost being ₹300 per unit. Other relevant details for the year 20X1 -20X2 are;

Cost of placing an order – ₹ 2,250
Carrying cost of inventory – 12% per annum
Lead time: -
Maximum – 20 days
Minimum – 8 days
Average – 14 days
Emergency purchase – 5 days
Consumption: -
Maximum – 400 units per day
Minimum – 200 units per day
Average – 300 units per day

You are required to Calculate: -

a) Re-Order Quantity
b) Re-Order Level
c) Minimum Stock Level
d) Maximum Stock Level
e) Danger Level

(Nov. 2016 RTP)

Ans. **a) Calculation of Re-Order Quantity;**

✓ EOQ = $\sqrt{\frac{2\,AO}{C}}$
✓ A = Annual Consumption
✓ O = Ordering cost
✓ C = Carrying cost
✓ $= \sqrt{\frac{2 \times 72{,}000 \times 2{,}250}{300 \times 12\%}}$
✓ $= \sqrt{\frac{32{,}40{,}00{,}000}{36}}$
✓ $= \sqrt{90{,}00{,}000}$
✓ = 3,000 units.

b) Calculation of Re-Ordering Level;

✓ ROL = Maximum Re-Order period × Maximum usage
✓ = 20 days × 400 units per day
✓ = 8,000 units.

c) Calculation of Minimum Stock Level;

✓ Minimum Stock Level = ROL $- \left(\begin{matrix}\text{Average}\\ \text{Consumption}\end{matrix} \times \begin{matrix}\text{Average}\\ \text{Lead time}\end{matrix}\right)$
✓ = 8,000 – (300 × 14)
✓ = 8,000 – 4,200
✓ = 3,800 Units

d) Calculation of Maximum Stock Level;

- ✓ Maximum Stock Level = $\text{ROL} - \left(\begin{matrix}\text{Minimum}\\ \text{Consumption}\end{matrix} \times \begin{matrix}\text{Minimum}\\ \text{Lead time}\end{matrix}\right) + \text{ROQ}$
- ✓ = 8,000− (200 × 8) + 3,000
- ✓ = 8,000− 1,600 + 3,000
- ✓ = 9,400 units.

e) Calculation of Danger Level;

- ✓ Danger Level = Minimum Consumption × Emergency delivery time
- ✓ = 200 units × 5 days
- ✓ = 1,000 units.

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

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

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

✓ Delivery time (days);	6	7	8	9	10
✓ Percentage of Occurrence;	75	10	5	5	5

Required: -

a) Compute the economic order Quantity (EOQ).

b) Assume the Company is willing to assume a 15% risk of being out of stock. What would be the safety stock? The Re-Order Point?

c) Assume the company is willing to assume a 5% risk of being out of stock. What would be the safety stock? The Re-order Point?

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

e) 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 d 720 per year.

- **i)** Compute the new EOQ.
- **ii)** How frequently would the company be placing an order, as compared to the old purchasing policy?

(May 2004)

Ans. **a) Computation of EOQ;**

b)

- ✓ A = Annual Usage = 54,000 Castings
- ✓ P = Cost per Casting = ₹ 800
- ✓ O = Ordering Cost per Order = ₹ 9,000
- ✓ C = Carrying Cost per unit p.a. = ₹ 300
- ✓ EOQ = $\sqrt{\frac{2AO}{C}} = \sqrt{\frac{2\times54,000\times9,000}{300}} = \sqrt{32,40,000}$

= 1,800 Casting

c) Safety Stock;

(Assuming a risk of being out of stock)

- ✓ **Safety Stock for/day** = 54,000/360 days = 150 castings
- ✓ **Re-Order Point** = Minimum Stock Level + (Average lead time × Average Usage)
  = 150 + (6× 150) = 1,050 casting.

d) Safety Stock;

(Assuming a 5% risk of being out of stocks)

- ✓ Safety Stock for 3 days = 150 × 3 days = 450 castings.
- ✓ **Re-Order Point** = 450 Castings + 900 castings (150 × 6) = 1,350 castings.

e) Total Cost of Ordering = (54,000 / 1,800) × ₹ 9,000 = ₹ 2,70,000

Total Cost of Carrying = (450 + 1,800/2) × ₹ 300 = ₹ 4,05,000

f)

i) Computation of new EOQ;

$$\text{EOQ} = \sqrt{\frac{2\times54{,}000\times600}{720}} = 300 \text{ Castings.}$$

ii) Total No. of orders to be placed in a year are 180. Each Order is to be placed after 2 days (as year = 360 days.) Under old purchasing policy each order is placed after 12 days.

36. XYZ Ltd. distributes a wide range of Water Purifier Systems. One of its best-selling items is a Standard Water Purifier. The management of XYZ Ltd. uses the EOQ decision model to determine optimal number of Standard Water Purifiers to order. Management now wants to determine how much safety stock to hold.

XYZ Ltd. estimates the annual demand (360 working days) to be 36,000 Standard Water Purifiers. Using the EOQ decision model the company orders 3,600 Standard Water Purifiers at a time. The lead-time for an order is 6 days. The annual Carrying cost of one Standard Water Purifier is ₹450. Management has also estimated that the additional stock-out costs would be ₹900 for shortage of each Standard Water Purifier.

XYZ Ltd. has analysed the demand during 200 past re-order periods.

The records Indicates the following patterns;

Demand during lead time;	540	560	580	600	620	640	660	**Total**
Number of times quantity was demanded	6	12	16	130	20	10	6	**200**

a) Determine the level of safety stock for Standard Water Purifier that ABC Ltd. should maintain in order to minimize expected stock-out costs and carrying costs. When computing carrying costs, assume that the safety stock is on hand at all times and that there is no over-stocking caused by decrease in expected demand (Consider Safety Stock Levels of 0, 20, 40 and 60 units.)

b) What would be XYZ's new Re-Order Point?

c) What Factors XYZ Ltd. should have considered in estimating stock-out costs?

(RTP)

Ans. **a) Determination of Safety Stock to Minimize expected Stock-Out Costs & Carrying Costs.**

- ✓ **Average daily usage** $= \frac{\text{Annual Demand}}{\text{360 days p.a.}} = \frac{36000}{360}$ **100 Units Per day**
- ✓ **Re-Order Point** = Average Daily Usage × Lead Time = 100 Units per day × 6 days **600 Units**
- ✓ **Possible Safety Stock** = Possible Demand Less Re – Order Point

Probability of demand during lead time is as under;

Demand during lead time;	540	560	580	600	620	640	660	**Total**
Number of times quantity was demanded	6	12	16	130	20	10	6	**200**
Probability (% of Total)	0.03	0.06	0.08	0.65	0.10	0.05	0.03	**1.00**

Cost Analysis: Relevant Costs Under Different Safety Stock Situations are as under;

Safety Stock Level (Units)	**Demand Realizations Resulting in Stakeouts**	**Stock out in Units (3) = (2) – ROL of 600–(1)**	**Probability Of Stock-Out**	**Relevant Stock-Out Costs (5) = (3) × ₹ 900**	**No. of Orders Per Year**	**Expected Stock-out Cost (7) = (4) × (5) × 6**	**Relevant Carrying Cost (8) = (1) × 450**	**Total Relevant Costs (9) = (7) + (8)**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
I 0	620	20	0.10	18,000	10	18,000		
	640	40	0.05	36,000	10	18,000		
	660	60	0.03	54,000	10	16,200		
						52,200	**0**	**52,.200**
II 20	640	20	0.05	18,000	10	9,000		
	660	40	0.03	36,000	10	10,800		
						19,800	**9,000**	**28,800**
III 40	660	20	0.03	18,000	10	**5,400**	**18,000**	**23,400**
IV 60	Nil	Nil				**0**	**27,000**	**27,000**

Decision: - Safety Stock of 40 units would minimize ABC Ltd.'s total expected stock-out and carrying cost.

b) New Re-Order Point = ROL + Safety Stock = 600 units + 40 units = **640 units.**

c) Factory's to Consider in estimating Stock-out Cost;

- ✓ Expediting an order from Supplier (additional Ordering Cost plus any associated Transportation Cost.)
- ✓ Loss of Sales due to stock-out (Opportunity costs in terms of contribution lost on the sales not made due to stock-out, plus any contribution lost on future sales due to that customer, that will be caused by the stock-out.)

37. **Prepare a Store Ledger Account from the following transactions of XY Company Ltd.; April, 20X1**

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 up to 10-4X1 will be priced at LIFO and from 11-4-X1 issues will be priced at FIFO. Shortage will be changed as overhead

(May 2011)

Ans.

Stock Ledger Account

Name: - Maximum Stock Level- Bin No, -

Code No: - Minimum Stock Level – Location Code

Description: - Re-Order Level –

Re-Order Quantity

Date	Receipts			Issues			Balance			Total (₹)
	Qty. (Units)	Rates (₹)	Amt. (₹)	Qty. (Kg.)	Rates (₹)	Amt. (₹)	Qty. (Units)	Rates (₹)	Amt. (₹)	
April 1							200	10	2,000	**2,000**
April 5	250	8	2,000				200 250	10 8	2,000 2,000	**4,000**
April 8	150	8.50	1,275				200 250 150	10 8 8.50	2,000 2,000 1,275	**5,275**
April 10				100	8.50	850	200 250 50	10 8 8.50	2,000 2,000 425	**4,425**
April 15	50	10	500				200 250 50 50	10 8 8.50 10	2,000 2,000 425 500	**4,925**
April 20				10 (shortage)	10	100	190 250 50 50	10 8 8.50 10	1,900 2,000 425 500	**4,825**
April 21	60	9	540				190 250 50 50 60	10 8 8.50 10 9	1,900 2,000 425 500 540	**5,365**
April 22				190 210	10 8	3,580	40 50 50 60	8 8.50 10 9	320 425 500 540	**(Closing Stock) 1,785**

38. **The following are the details of receipt and issue of materials 'CXE' in a manufacturing Co. during the month of April 20X1;**

Date	Particulars	Quantity (Kg.)	Rate per (kg.)
April 4	Purchase	3000	₹ 16
April 8	Issue	1000	
April 15	Purchase	1500	₹ 18
April 20	Issue	1200	
April 25	Return to Supplier out of purchase made on April 15	300	
April 26	Issue	1000	
April 28	Purchase	500	₹ 17

i) Opening Stock as on 01-04-20X1 is 1000 kg @ ₹15 per kg.

ii) On 30th April, 20X1 it was found that 50 kg of material 'CXE' was fraudulently misappropriated by the store assistant and never recovered by the Company.

Required: -

a) Prepare a store ledger account under each of the following method of pricing the issue;
  - **i)** Weighted Average Method
  - **ii)** LIFO

b) What would be the value of material consumed and value of closing stock as on 30-04-20X1 as per these two methods?

(May 2019)

Ans. **a)** **i)**

Stores Ledger A/c
(Weighted Avg. Method)

Date	Receipts			Issues			Balance		
20X1 April	**Qty. (Kg.)**	**Rates (₹)**	**Amt. (₹)**	**Qty. (Kg.)**	**Rates (₹)**	**Amt. (₹)**	**Qty. (Kg.)**	**Amt. (₹)**	**Rate for Further Issue (₹)**
1							1,000	15,000	$\frac{15000}{1000}$ 15
4	3000	16	48,000				4,000	63,000	$\frac{63000}{4000}$ 15.75
8	----	----	----	1,000	15.75	15,750	3,000	47,250	$\frac{47250}{3000}$ 15.75
15	1500	18	27,000	----	----	----	4,500	74,250	$\frac{74250}{4500}$ 16.50
20	----	----	----	1,200	16.50	19,800	3,300	54,450	$\frac{54450}{3300}$ 16.50
25	----	----	----	300	18.00	5,400	3,000	49,050	$\frac{49050}{3000}$ 16.35
26	----	----	----	1,000	16.35	16,350	2,000	32,700	$\frac{32700}{2000}$ 16.35
28	500	17	8,500	----	----	----	2,500	41,200	$\frac{40,376}{2450}$ 16.48
30	----	----	----	50	16.48	824	2,450	40,376	$\frac{40,376}{2450}$ 16.48

ii)

Store Ledger A/c
(LIFO)

Date	Receipts			Issues			Balance		
20X1 April	**Qty. (Kg.)**	**Rates (₹)**	**Amt. (₹)**	**Qty. (Kg.)**	**Rates (₹)**	**Amt. (₹)**	**Qty. (Kg.)**	**Amt. (₹)**	**Rate for Further Issue (₹)**
1	----	----	----	----	----	----	1,000	15,000	$\frac{15000}{1000} = 15$
4	3,000	16	48,000	----	----	----	1,000	15,000	$\frac{15000}{1000} = 15$
----	----	----	----	----	----	----	3,000	48,000	$\frac{48000}{3000} = 16$
8	----	----	----	1,000	16	16,000	1,000	15,000	$\frac{15000}{1000} = 15$
----	----	----	----	----	----	----	2,000	32,000	$\frac{32000}{2000} = 16$
15	1,500	18	27,000	----	----	----	1,000	15,000	$\frac{15000}{1000} = 15$
----	----	----	----	----	----	----	2,000	32,000	$\frac{32000}{2000} = 16$
----	----	----	----	----	----	----	1,500	27,000	$\frac{27000}{1500} = 18$
20	----	----	----	1,200	18	21,600	1,000	15,000	$\frac{15000}{1000} = 15$
----	----	----	----	----	----	----	2,000	32,000	$\frac{32000}{2000} = 16$
----	----	----	----	----	----	----	300	5,400	$\frac{5400}{300} = 18$
25	----	----	----	300	18	5,400	1,000	15,000	$\frac{15000}{1000} = 15$
----	----	----	----	----	----	----	2,000	32,000	$\frac{32000}{2000} = 16$
26	----	----	----	1,000	16	16,000	1,000	15,000	$\frac{15000}{1000} = 15$
----	----	----	----	----	----	----	1,000	16,000	$\frac{16000}{1000} = 16$

28	500	17	8,500	----	----	----	1,000	15,000	$\frac{15000}{1000} = 15$
----	----	----	----	----	----	----	1,000	16,000	$\frac{16000}{1000} = 16$
----	----	----	----	----	----	----	500	8,500	$\frac{8500}{5000} = 17$
30	----	----	----	50	17	850	1,000	15,000	$\frac{15000}{1000} = 15$
----	----	----	----	----	----	----	1,000	16,000	$\frac{16000}{1000} = 16$
----	----	----	----	----	----	----	450	7,650	$\frac{7650}{450} = 17$

b) Value of Material Consumed and value of Closing stock as on 30/04/20X1.

i) Weighted Average Method;

- ✓ **Value of Material Consumed** = (15,750 + 19,800 + 16,350)
- ✓ = ₹ 51,900
- ✓ **Value of Closing Stock as on 30/04/2019** = ₹ 41,200

ii) LIFO Method;

Value of Material Consumed = (16,000+ 21,600 + 16,000)

- ✓ = ₹ 53,600
- ✓ Value of Closing Stock as on 30/04/2019
- ✓ = (15,000 + 16,000 + 7,650) = ₹ 38,650

39. 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.

(RTP Nov. 2019)

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

Particulars	**Material X**	**Material Y**
Purchase Quantity	2,50,000	3,44,085
Rate per kg.	₹140	₹260
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

Number 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

Working Notes:

a) Annual purchase quantity for material X and Y:

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

Particulars	Material X	Material 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	3,44,085

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

ii) Calculation of Economic Order Quantity (ECQ) for Mat-X and Y:

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

Particular	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
ECQ	0	13,632.62 kg.

40. 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.

(July 2021)

Ans. **i) Statement showing the computation of Total inventory cost:**

Item code Number	Units (a)	Unit Cost (₹) (b)	Total cost (a × b)	% of Total cost	Rank
101	25	50	1,250	17	2

102	300	1	300	4	6
103	50	80	4,000	53	1
104	75	8	600	8	4
105	225	2	450	6	5
106	75	12	900	12	3
Total	**750**		7,500	100	

Basis for selective control by MM Ltd.

Cost 15% & above -- 'A' items

Cost more than 6% but less than 15% -- 'B' items

Cost 6% or Less -- 'C' items

ii) On this basis, a plan of A B C selective control is given below which can be adopted by MM Ltd.

Ranking	Item code No.	% of total units	Cost (₹)	% of total cost	Category
1	103	6.6667%	4,000	53%	A
2	101	3.33%	1,250	17%	
Total	2	10%	5,250	70%	
3	106	10%	900	12%	B
4	104	10%	600	8%	
Total	2	20%	1,500	20%	
5	105	30%	450	6%	C
6	102	40%	300	4%	
Total	2	70%	750	10%	
Grand Total	6	100%	7,500	100%	

41. **PQR Ltd. Manufactures a special product, which requires 'ZED'. The following particulars were collected for the year 20X1-X2;**

Monthly demand of Zed	– 7,500 Units
Cost of placing an order	– ₹ 500
Re-Order period	– 5 to 8 weeks
Cost per unit	– ₹ 60
Carrying Cost % p.a.	– 10%
Normal Usage	– 500 Units per week
Minimum Usage	– 250 Units per week
Maximum Usage	– 750 Units per week

Required: -

a) Re-Order Quantity.

b) Re-Order Level.

c) Minimum Stock Level.

d) Maximum Stock Level.

e) Average Stock Level.

(Nov. 2006)

Ans. **a) Re-Order Quantity;**

✓ $= \sqrt{\frac{2\,AO}{C}}$	– A = Annual demand of Input unit for 90,000 (7500 × 12)
✓ $= \sqrt{\frac{2\times 26{,}000\times 500}{6}}$	– $= \sqrt{\frac{2\times 7{,}500\times 12\times 500}{60\times 10\%}}$
✓ = 2082 unit	– $= \sqrt{\frac{9{,}00{,}00{,}000}{6}}$

– $= \sqrt{1,50,00,000}$

– $= 3,872.98$

– $= 3,873.$

b) Re-Order Level;

- ✓ Maximum Re-Order period × Maximum Usage
- ✓ = 8 Weeks × 750 units per weeks
- ✓ = 6000 Units.

c) Minimum Stock Level;

- ✓ = Re-Order Level – (Normal usages × average re-order period)
- ✓ = 6000− (500 × 6.5)
- ✓ = 6000− 3250
- ✓ = 2750 Units.

d) Maximum Stock Level;

- ✓ Re-Order level + Re-Order Quantity – (Minimum Usage × Minimum Re-Order period)
- ✓ = 6000 + 3,873 – (250× 5)
- ✓ = 6000 + 3,873− 1250
- ✓ = 8,623 units

e) Averages Stock Level;

- ✓ $\frac{1}{2}$(Minimum Stock Level + Maximum Stock Level)
- ✓ $= \frac{1}{2}(2750 + 8,623)$
- ✓ = 5,687 Units.

42. M/s SE Traders is a distributor of an electronic items. A periodic inventory of electronic items on hand is taken when books are closed at the end of each quarter. The following information is available for the quarter ended on 30th September, 20X1:

Sales	₹2,19,30,000
Opening Stock	12,500 units @ ₹600 per unit
Administrative Expenses	₹5,62,500
Purchases (including freight inward):	
- July 1, 20X1	25,000 units @ ₹573 per unit
- September 30, 20X1	12,500 units @ ₹630 per unit
Closing stock- September 30, 20X1	16,000 units

You are required to COMPUTE the following by WAM (Weighted Average Method), FIFO method and LIFO method assuming issue/consumption pattern was even throughout the quarter:

i) Value of Inventory on 30th September, 20X1

ii) Profit or loss for the quarter ended 30th September, 20X1.

(MTP May 2022)

Ans. **i) Computation of Value of Inventory as on 30th September 2021:**

Date	Particulars	Units	WAM (₹)	FIFO (₹)	LIFO (₹)
01-07-21	Opening Stock	12,500	75,00,000 (₹600×12,500)	75,00,000 (₹600×12,500)	75,00,000 (₹600×12,500)
01-07-21	Purchases	25,000	1,43,25,000 (₹573×25,000)	1,43,25,000 (₹573×25,000)	1,43,25,000 (₹573×25,000)
30-09-21	Purchases	12,500	78,75,000	78,75,000	78,75,000

			(₹630×12,500)	(₹630×12,500)	(₹630×12,500)
01-07-21 to 30-09-21	Issues/ Consumption (Balancing figure)	34,000	**2,01,96,000***	**1,98,19,500****	**2,01,94,500*****
30-09-21	Closing Stock	16,000	**95,04,000**	**98,80,500**	**95,05,500**

Weighted average rate $= \frac{₹75,00,000+₹1,43,25,000+₹78,75,000}{(12,500+25,000+12,500)\ units} = \mathbf{594}$

* ₹ 594 x 34,000 = ₹2,01,96,000
** ₹600 × 12,500 + ₹573 × 21,500 = ₹1,98,19,500
*** ₹630 × 12,500 + ₹573 × 21,500 = ₹2,01,94,500

ii) Computation of Profit or Loss for the Quarter ended 30th September 2021

Particulars	WAM (₹)	FIFO (₹)	LIFO (₹)
Sales	2,19,30,000	2,19,30,000	2,19,30,000
Less: Consumption	2,01,96,000	1,98,19,500	2,01,94,500
Less: Administrative Exp.	5,62,500	5,62,500	5,62,500
Profit or Loss	11,71,500	15,48,000	11,73,000

43. 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

(ICAI SM)

Ans. Economic Order Quantity $= \sqrt{\frac{2\times A\times o}{C}}$

A = Units Consumed during year = 10,000
O = Ordering Cost per order = 50
C = Inventory Carrying Cost per unit per annum, = 8% of ₹ 2

Economic Order Quantity $= \sqrt{\frac{2\times10,000\times50}{\frac{2\times8}{100}}} = \mathbf{2,500\ kg}$

No. of orders to be placed in a year $= \frac{\text{Total Consumption of Materials per annum}}{\text{EOQ}}$

No. of orders to be placed in a year $= \frac{10,000\ kg.}{2,500\ kg.} =$ **4 Orders per year**

44. 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.

(ICAI SM)

Ans. **a) Re–ordering level:**

Maximum usage per week × Maximum delivery period.

Re–ordering level for component A = 75 units × 6 weeks = **450 units**
Re–ordering level for component B = 75 units × 4 weeks = **300 units**

b) Minimum level:

Re–order level – (Normal usage × Average period)
Minimum level for component A = 450 units – (50 units × 5 weeks) = 200 units
Minimum level for component B = 300 units – (50 units × 3 weeks) = 150 units

c) Maximum level:

Re–order level + Re–order quantity – (Min. usage × Minimum period)
Maximum level for component A = (450 units + 300 units) – (25 units × 4 weeks) = 650 units
Maximum level for component B = (300 units + 500 units) – (25 units × 2 weeks) = 750 units

d) Average stock level:

½ (Minimum + Maximum) stock level
Average stock level for component A = ½ (200 units + 650 units) = 425 units
Average stock level for component B = ½ (150 units + 750 units) = 450 units

Overheads
Assignment

Q. No.	Questions & Answers

1. **The following particulars refers to process used in the treatment of material subsequently, incorporated in a component forming part of an electrical appliance;**

- **i)** The original cost of the machine used (Purchased in June 2008) was ₹10,000. Its estimated life is 10 years, the estimated scrap value at the end of its life is ₹1,000. And the estimated working time per year (50 weeks of 44 hours) is 2200 hours of which machine maintenance etc., is estimated to take up 200 hours.
  No other loss of working time expected, setting up time, estimated at 100 hours, is regarded as productive time. (Holiday to be ignored.)
- **ii)** Electricity used by the machine during production is 16 units per hour at cost of a 9 paisa per unit. No current is taken during maintenance or setting up.
- **iii)** The machine required a chemical solution which is replaced at the end of week at a cost of ₹20 each time.
- **iv)** The estimated cost of maintenance per year is ₹1,200.
- **v)** Two attendants control the operation of machine together with five other identical machines. Their combined weekly wages. Insurance and the employer's contribution to holiday pay amount ₹120.
- **vi)** Department and general works overheads allocated to this machine for the current year amount to ₹2,000.

You are required to Calculate the machine hour rate of operating the machine.

(May 2016, Modified in May 2012, Nov 2013, May 2019, ICAI SM, MTP Dec 2021)

Sol. **Statement Showing the Computation of Machine Hour Rate;**

Particulars	Per hour (₹)
A) Standing Charges;	
– Operator wages	1,000
– Departmental and General Overhead	2,000
– Total	3,000
Standing Charges per hour 3,000 ÷ 2,000	**1.5**
B) Machine Expenses: -	
– Depreciation (10,000– 1,000) ÷ 10 = 900 $\frac{900}{2,000} = 0.45$	0.45
– Electricity (16 unit × 0.09 × 1900 hours) ÷ 2,000	1.37
– Special Chemical Solution (₹ 20 × 50) ÷ 2,000	0.50
– Maintenance (1,200 ÷ 2,000)	0.60
C) Machine hour rate	**4.42**

Working Note: -

1) Calculation of Machine hours: -

✓ Budgeted hours	2,200
✓ ***Less:*** Maintenance hours	200
	2,000

2. Modern Manufactures Ltd. has three Production Departments P_1, P_2, P_3 and two Service Departments S_1 and S_2 details pertaining to which are as under: -

Particulars	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: -

Particulars	**(₹)**
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: -

Particulars	**P_1**	**P_2**	**P_3**	**S_1**	**S_2**
S_1	20%	30%	40%	----	10%
S_2	40%	20%	30%	10%	----

Determine the total cost of product X which is processed for manufacture in Departments P1, P2 and P3 for 4,5, and 3 hours respectively, given that its Direct Material Cost is ₹ 50 and Direct Labour Cost is ₹30.

(ICAI SM, May 2020 RTP, Modified RTP Nov-2021, Nov 2020, MTP May 2022)

Sol. **Statement Showing Distribution of Overheads of Modern Manufactures Ltd.**

Particulars	**Basis**	**Total**	**Production Departments**			**Service Departments**	
		(₹)	**P_1 (₹)**	**P_2 (₹)**	**P_3 (₹)**	**S_1 (₹)**	**S_2 (₹)**
Direct Wages	Actual	1,695	----	----	----	1,500	195
Rent & rates	Area	5,000	1,000	1,250	1,500	1,000	250
General lighting	Light Points	600	100	150	200	100	50
Indirect wages	Direct Wages	1,939	600	400	600	300	39
Power	H.P.	1,500	600	300	500	100	----
Depreciation of machines	Value of machines	10,000	2,400	3,200	4,000	200	200
Sundries	Direct wages	9,695	3,000	2,000	3,000	1,500	195
		30,429	**7,700**	**7,300**	**9,800**	**4,700**	**929**

Redistribution of Service Departments Expenses Over Production Departments:

Particulars	**P_1 (₹)**	**P_2 (₹)**	**P_3 (₹)**	**S_1 (₹)**	**S_2 (₹)**
– Total overhead distributed as above	7,700	7,300	9,800	4,700	929
– Dept. S_1 Overheads apportioned – (20:30:40:–:10)	940	1,410	1,880	-4,700	470
– Dept S_2 Overheads apportioned – (40:20:30:10:–)	559.6	279.8	419.7	139.9	-1,399
– Dept. S_1 Overheads apportioned – (20:30:40:–:10)	28	42	56	-139.9	13.9
– Dept. S_2 Overheads apportioned – (40:20:30:–:10)	6.2	3.1	4.6	----	-13.9
Total	**9,233.8**	**9,034.9**	**12,160.3**		
– Working hours	3070	4475	2419		
– **Rate per hour**	**3.00**	**2.02**	**5.03**		

Determination of total cost of Product 'X'

Particulars	**(₹)**
– Direct Material Cost	50.00
– Direct labour Cost	30.00
– Overhead Cost (See Working note)	37.19
Total	**117.19**

Working Notes: -

Overhead Cost: -

– (₹3 × 4 hours) + (₹2.02 × 5 hours) + (₹5.03 × 3 hours) = ₹12 + ₹10.10 + ₹15.09 = ₹37.19

3. A Machine shop has 8 identical Drilling machines manned by 6 operators. The machine cannot be worked without an operator wholly engaged on it. The original cost of all these machines works out to ₹ 8 lakhs. These particulars are furnished for a 6 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.	₹800
Production bonus estimated	15% on wages
Value of power consumed	₹80,500
Supervision and indirect labour	₹33,000
Lighting and electricity	₹12,000

These particulars are for a year

Repairs and Maintenance including consumables- 3% of value of machines.

- **i)** Insurance- 40,000
- **ii)** Depreciation-10% of original cost.
- **iii)** Other sundry works expenses- ₹ 12,000
- **iv)** General management expenses allocated-₹ 54,530.

You are required to Compute a Comprehensive machine hour rate for the machine shop.

(ICAI SM, Modified Jan 2021, Modified MTP May 2022, Modified MTP May 2019 Modified MTP Nov 2022)

Sol. **Computation of comprehensive machine hour rate of machine shop: -**

Particulars	**(₹)**
– Operator's wages (Refer to working Note 2)	7,38,000
– Production bonus (15% on wages)	1,10,700
– Power consumed	80,500
– Supervision and indirect labour	33,000
– Lighting and electricity	12,000
– Repairs and maintenance (3% × ₹8 lakh × $^1/_2$)	12,000
– Insurance (₹40,000 × $^1/_2$)	20,000
– Depreciation (10% × ₹8 lakhs × $^1/_2$)	40,000
– Sundry works expenses (₹ 12,000 × $^1/_2$)	6,000
– General management expenses (₹54,530 × $^1/_2$)	27,265
	10,79,465

$$\text{Machine hour rate} = \frac{\text{Total overheads of machine shop}}{\text{Hours of machines operation}}$$

$$= \frac{₹\ 10{,}79{,}465}{7{,}200\ \text{hours}}\ (\text{Refer to working note 1}) = ₹\ \mathbf{149.93}$$

Working Notes: -

1) Computation of hours, for which 6 operators are available for 6 months: -

Particulars	**For 6 months and 6 operators**
– Normal available hours (208 × 6 months × 6 operators)	7,488
– *Less:* Absenteeism hours (18 × 6 operators)	(108)
Paid hours	**7,380**
– *Less:* Leave hours (20 × 6 operators)	(120)
– *Less:* Idle time hours (10 × 6 operators)	(60)
Effective working hours	**7,200**

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

2) Computation of operator's wages

Average rate of wages; $\frac{₹\ 800}{8\ \text{hours}}$ = ₹ 100 per hour

Total wages paid to 6 operators for 6 months = 7,380 hours × ₹100 **= ₹ 7,38,000**

4. 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, 20X1;

Item	Total (₹)	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 and Heat	15,000	----	----	----	----	----
Power	1,80,000	----	----	----	----	----
Rent and Rates	1,50,000	----	----	----	----	----
Insurance	18,000	----	----	----	----	----
Meal Charges	60,000	----	----	----	----	----
Depreciation	2,70,000	----	----	----	----	----

The following departmental data are also available: -

Particulars	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: -

Particulars	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.

(Nov.2012, ICAI SM, MTP Modified Dec 2021, MTP July 2021)

Sol.

Primary Distribution of Overheads

Item	Basis	Total (₹)	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
Super Intendent's Salary	Actual	96,000	----	----	96,000	----	----
Fuel and Heat	Radiator Sections (2:4:6:5:3)	15,000	1,500	3,000	4,500	3,750	2,250
Power	Kilowatt hours (7:8:6:3:0)	1,80,000	52,500	60,000	45,000	22,500	----
Rent and 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) × 10]
- B = 90,250 + 0.20 a
- Or, − 0.20a + b = 90,250 -------------(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 × 1,69,668
- B = 1,24,184

Secondary Distribution of Overheads

Particulars	**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**

5. A Manufacturing unit has purchased and installed a new machine of ₹ 12,70,000 to its fleet of 7 existing machines. The new machine has an estimated life of 12 years and is expected to realise ₹ 70,000 as scrap at the end of its working life. Other relevant data are as follows;

i) Budgeted working hours are 2,592 based on 8 hours per day for 324 days. This includes 300 hours for plant maintenance and 92 hours for setting up of plant.

ii) Estimated Cost of maintenance of the machine is ₹ 25,000 (p.a.)

iii) The machine requires a special chemical solution, which is replaced at the end of each week (6 days in a week) at a cost of ₹ 400 each time.

iv) Four operators control operation of 8 machines and the average wages per person amounts to ₹ 420 per week plus 15% fringe benefits.

v) Electricity used by the machine during the production is 16 units per hour at a cost of ₹3 per unit. No current is taken during maintenance and setting up.

vi) Departmental, and general works overhead allocated to the operation during last year was ₹ 50,000. During the current year it is estimated to increase 10% of this amount.

Calculate machine hour rate, if;

a) Setting up time is unproductive;

b) Setting up time is productive. **(May 2005, May 2021 RTP, May-2002 modified)**

Sol. **Computation of Machine hour Rate**

Particulars	**Per year (₹)**	**Per hour (unproductive) (₹)**	**Per hour (productive) (₹)**
✓ Standing Charges			
✓ Operator wages 4 × 420 × 54 weeks **(54 Weeks = 324/6)**	90,720		
✓ ***Add:*** Fringe Benefits 15%	13,608		
	1,04,328		
✓ Departmental and general overhead (50,000 + 5,000)	55,000		
✓ Total Std. Charging for 8 machines	1,59,328		

✓ Cost per machine 1,59,328/8	19,916		
✓ Cost per Machine hour			
✓ 19,916/2,200		9.05	
✓ 19,916/2,292			8.69
✓ Machine Expenses			
✓ Depreciation			
✓ [(12,70,000−70,000)/ (12 × 2,200)]		45.45	
✓ [(12,70,000−70,000)/ (12 × 2,292)]			43.63
✓ Electricity (16 × 3)		48.00	
✓ (16 × 3 × 2,200)/2,292)			46.07
✓ Special chemical solution (400 × 54)/2,200, /2,292		9.82	9.42
✓ Maintenance (25,000/2,200)		11.36	
✓ Maintenance (25,000/2,292)			10.91
Total		**123.68**	**118.72**

Working Notes: -

Computation of Machine hours: -3

1) Setting time (unproductive) = 2,592− 300−92=2,200 hours.

2) Setting time (productive) = 2,592−300=2,292 hours.

6. 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 Forty-eight hours in a week which includes 4 hours set up time. The work is jointly done by operators.

The operators are paid fully for the Forty-eight hours. In additions they are paid a bonus of 10 per cent of productive time. Costs are reported for this Company on the basis of thirteen Four-weekly period.

The Company for the purpose of Computing Machine hour. Rate includes the direct wages of the operator and also recoups the Factory Overheads allocated to the Machines. The following details of factory overheads applicable to the cost centre are available: -

i) Depreciation 10% per annum on original Cost of the Machine. Original Cost of each Machine is ₹ 52,000.

ii) Maintenance and repairs per week per Machine is ₹60.

iii) Consumable Stores per week per Machine are ₹75.

iv) Power: - 20 units per hour per Machine at the rate of 80 paise per unit. No power is used during the set-up hours.

v) 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: -

Calculate the Cost of running one Machine for a four-week period.

(ICAI SM, Nov 2007 & May 2015 modified)

Sol. **Computation of Cost of running one machine for a four-week period**

Particulars	**(₹)**	**(₹)**
A) Standing Charges (Per annum);		
– Rent	5,400	
– Heat and light	9,720	
– Forman' Salary	12,960	
– Other Miscellaneous expenditure	18,000	
– Standing Charges (per annum)	46,080	
– Total expenses for one machine for four-week period		1181.54
– $\left(\frac{₹\ 46,080}{3\text{ Machines}\times 13\text{ four week period}}\right)$		
– Wages (48 hours × 4 weeks × ₹ 20 × 3 operators)		11,520.00
– Bonus {(176 hours × ₹ 20 × 3 operators) × 10%)		1,056.00
Total Standing Charges		**13,757.54**

B) Machine Expenses;		
– Depreciation – $\left(₹\,52{,}000 \times 10\% \times \frac{1}{13 \text{ four week period}}\right)$		400.00
– Repairs and Maintenance (₹ 60 × 4 weeks)		240.00
– Consumable Stores (₹ 75 × 4 weeks)		300.00
– Power (176 × 20 units × ₹ 0.80)		2,816.00
Total machine expenses		**3,756.00**
C) Total expenses (A) + (B);		**17,513.54**

Working Notes:-

1)

Total working hours –unproductive set-up time
{(48 hours × 4 weeks) – {(4 hours × 4 weeks)}
(192 – 16 hours) = 176 hours.

2) Machine hour rate $= \frac{₹\,17{,}513.54}{176 \text{ hours}} = ₹\,\mathbf{99.51}$

7. 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 20X1-20X2, 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 20X1-X2 is as under: -

Production;

Finished goods	20,000 units
Work-in-progress (50% complete in all respects)	8,000 units
Sales	
Finished goods	18,000 units

The Actual Machine hours worked during the period were 48,000. It has been found that one-third of the under absorption of production overheads was due to lack of production planning and the rest was attributable to normal increase in costs.

a) Calculate the amount of under-absorption of production overheads during the year 20X1-X2; and

b) Show the accounting treatment of under-absorption of production overheads.

(ICAI SM, Modified RTP Nov-2019, Modified Dec 2021)

Sol.

a) Amount of under-absorption of production overheads during the year 2019-2020: -

Particulars		**(₹)**
– Total production overheads actually incurred during the year 2019-2020		6,00,000
– ***Less:*** Written off obsolete stores	₹ 45,000	
– Wages paid for strike period	₹ 30,000	75,000
– Net production overheads actually incurred: (A)		5,25,000
– Production overheads absorbed by 48,000 machine		
– Hours @ ₹ 10 per hours: (B)		4,80,000
– Amount of under-absorption of production overheads: [(A)–(B)]		**45,000**

b) Accounting treatment of under absorption of production overheads: -

It is given in the statement of the question that 20,000 units were completely finished and 8,000 units were 50% complete, one third of the under-absorbed overheads were due to lack of production planning and the rest were attributable to normal increase in costs.

Particulars	**(₹)**
1) $33\frac{1}{3}\%\ of$ ₹ 45,000) i.e., ₹15,000 of under-absorbed overheads were due to lack of production planning. This being abnormal, should be debited to the Costing Profit and Loss A/c.	15,000

2) Balance ($66\frac{2}{3}$% of ₹ 45,000) i.e., ₹ 30,000 of under-absorbed overheads should be distributed over work-in-progress, finished goods and cost of sales by using supplementary rate.	30,000
3) Total under-absorbed overheads	**45,000**

Apportionment of unabsorbed overheads of ₹30,000 over, work-in progress, finished goods and cost of sales: -

Particulars	Equivalent Completed Units	(₹)
– Work-in-Progress (4,000 units × ₹ 1.25) (Refer to working note)	4,000	5,000
– Finished goods (2,000 units × ₹ 1.25)	2,000	2,500
– Cost of Sales (18,000 units × ₹ 1.25)	18,000	22,500
Total	**24,000**	**30,000**

Working Notes: -

Supplementary rate per unit $= \frac{₹\ 30,000}{24,000\ units} =$ ₹ 1.25

8. Sanz Ltd. is a Manufacturing Company having three production departments. 'A', 'B' and 'C' and two service departments 'X' and 'Y'. The following is the budget for December 20X1: -

Particulars	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: -

Particulars	A	B	C	X	Y
Service Dept. 'X' (%)	45	15	30	----	10
Service Dept. 'Y' (%)	60	35	----	5	----

Required: -

a) Prepare a Statement Showing distribution of overheads to various departments.

b) Prepare s Statement showing re-distribution of service departments expenses to production departments using Trial and error method.

(ICAI SM, RTP May 2022)

Sol. **a) Overhead Distribution Summary;**

Particulars	Basis	Total (₹)	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Direct Materials	Direct	----	----	----	----	2,00,000	1,00,000
Direct Wages	Direct	----	----	----	----	1,00,000	2,00,000
Factory rent (2:1:2:1:2)	Area	4,00,000	1,00,000	50,000	1,00,000	50,000	1,00,000
Power (10:16:16:3:5)	H.P. × Machine hours	2,50,000	50,000	80,000	80,000	15,000	25,000
Depreciation (2:4:2:1:1)	Capital Value	1,00,000	20,000	40,000	20,000	10,000	10,000

Other Overheads (1:2:4:1:1)	Machine hours	9,00,000	1,00,000	2,00,000	4,00,000	1,00,000	1,00,000
		16,50,000	**2,70,000**	**3,70,000**	**6,00,000**	**4,75,000**	**5,35,000**

- *{(1,000×50): (2,000×40): (4,000×20) : (1,000×15) : (1,000 ×25)}
- (50000 : 80000 : 80000 : 15000 : 25000)

b) Redistribution of Service Department's Expenses: -

Particulars	Service Departments	
	X (₹)	Y (₹)
Overheads as per primary distribution	**4,75,000**	**5,35,000**
1) Apportionment of Dept. -X expenses to Dept.- Y (10% of ₹ 4,75,000)	----	47,500
	----	<u>**5,82,500**</u>
2) Apportionment of Dept.- Y expenses to Dept.- X [5% of (₹ 5,35,000 + ₹ 47,500)]	29,125	----
1) Apportionment of Dept.- X expenses to Dept.- Y (10% of ₹ 29,125)	----	2,913
2) Apportionment of Dept.- Y expenses to Dept. – X (5% of ₹ 2,913)	146	----
Total	**5,04,271**	**5,85,413**

Distribution of Service Departments' Overheads to Production Departments: -

Particulars	Production Departments		
	A (₹)	B (₹)	C (₹)
Overhead as per primary distribution	2,70,000	3,70,000	6,00,000
Dept.- X (90% of *₹ 5,04,300)	2,26,900	75,600	1,51,300
Dept.- Y (95% of *₹ 5,85,400)	3,51,300	2,04,900	----
Total	**8,48,200**	**6,50,500**	**7,51,300**

*Note- Rounded off.

Repeated Distribution Method: -

Under this method, Service Departments' Costs are distributed to other service and production departments on agreed percentages and this process continues to be repeated. Till the figures of service departments are either exhausted or reduced to too small a figure.

9. 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: -

Particulars	Cutting Department	Welding Department	Total
Actual Usage in 20X1-X2 (machine hours)	60,000	40,000	1,00,000
Practical capacity for each department (machine hours)	90,000	60,000	1,50,000

Required: -

a) Allocate the power plants 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.

b) 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.

c) 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.

d) Comment on your results in requirements (i), (ii) and (iii).

(RTP May 2003)

Sol.

a) Statement Showing Power Plants Cost allocation to the cutting and welding deptts. By using single rate method on actual usage of machine hours;

Particulars	Cutting deptt.	Welding deptt.	Total
Power Plants Cost allocation by using actual usage (machine hours.) Refer Working Note 2	6,00,000 {60,000 Hours × ₹ 10}	4,00,000 {40,000 Hours × ₹ 10}	10,00,000

b) Statement showing power plants cost allocation to the cutting and welding deptts. By using actual rate method;

Particulars	Cutting Deptt.	Welding Deptt.	Total
Fixed Cost	5,40,000	3,60,000	9,00,000
(Allocated on practical capacity for each deptt. i.e., 90,000 Hours: 60,000 Hours) = 3:2 $\left(\frac{₹\ 9,00,000 \times 3}{5}\right)$ $\left(\frac{₹\ 9,00,000 \times 2}{5}\right)$			
Variable Cost	2,40,000	1,60,000	4,00,000
(Based on actual usage of machine hour)	60,000 Hours × ₹ 4	40,000 Hours × ₹ 4	
Total Cost	**7,80,000**	**5,20,000**	**13,00,000**

c) Statement Showing Power Plant's Cost allocation to the cutting and welding deptts. Using dual rate method:

Particulars	Cutting Deptt.	Welding Deptt.	Total
Fixed Cost	3,60,000	2,40,000	6,00,000
Allocation of fixed cost on actual usage basis (Refer working Note 1)	60,000 Hours, Hours × ₹ 6	40,000 Hours × ₹ 6	
Variable Cost	2,40,000	1,60,000	4,00,000
Based on actual usage	60,000 Hours × ₹ 4	40,000 Hours × ₹ 4	
Total Cost	**6,00,000**	**4,00,000**	**10,00,000**

d) Comments;

- ✓ Under dual rate method, under (iii) and under single rate method under (i), the allocation of fixed cost of practical capacity of plant over each deptt. Are based on single rate.
- ✓ The major advantage of his approach is that the uses deptts, are allocated fixed capacity cost only for the capacity used. The unused capacity cost of ₹ 3,00,000 (₹9,00,000−₹6,00,000) will not be allocated to the uses deptts. This highlights the cost of unused capacity.
- ✓ Under (ii) fixed cost of capacity are allocated to operating deptts. On the basis of practical capacity, so all fixed costs are allocated and there is no unused capacity identified with the power plant.

<u>Working Notes: -</u>

1) Fixed Practical Capacity cost per Machine Hour;

Practical Capacity (Machine hours)	1,50,000
Practical Capacity fixed cost (₹)	9,00,000
Fixed Practical Capacity cost per machine hour $\left[\frac{₹\ 9,00,000}{1,50,000\ \text{Hours.}}\right]$	₹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.

10. M/s. NOP Limited has its own power plant and generates its own power. Information regarding power requirements and power used are as follows: -

Particulars	**Production 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 20X1	16,000	20,000	12,000	8,000

During the quarter ended September 20X1, Costs for generating power amounted to ₹ 12.60 lakhs out of which ₹ 4.20 lakhs was considered as. Fixed cost.

Service department X renders service 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: -

a) Prepare overheads distribution sheet.

b) Calculate factory overhead per labour hour for the dept. A and dept. B **(Nov. 2018, ICAI SM)**

Sol. **a) Overhead Distribution Sheet;**

Item	**Basis**	**Total Amount (₹)**	**Production Departments**		**Service Departments**	
			A (₹)	**B (₹)**	**X (₹)**	**Y (₹)**
Variable Over-heads (₹ 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 and 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 and B	As per the ratio of 4:1	(1,80,000+ 45,000) = 2,25,000	1,80,000	45,000	----	----
Total Overheads of Production departments			6,75,000	5,85,000		

b) Calculation of the Factory Overheads per labour hour;

Item	**Production Departments**	
	A (₹)	**B (₹)**
Total Overhead	6,75,000	5,85,000
Direct labour hours	67,500	48,750
Factory overhead per hour	**10**	**12**

11. X Ltd. recovers overheads at a pre-determined rate of ₹50 per man-day. The total factory overheads incurred and the man-days actually worked were ₹79 lakhs and 1.5 lakhs days respectively. During the period 30,000 units were sold. At the end of the period 5,000 completed units were held in stock but there was no opening stock of finished goods. Similarly, there was no stock of uncompleted units at the beginning of the period but at the end of the period there were 10,000 uncompleted units which may be treated as 50% completed.

On analyzing the reasons, it was found that 60% of the unabsorbed overheads were due to defective planning and the balance were attributable to increase in overhead cost.

How would unabsorbed overheads be treated in cost accounts?

(Nov 2011, 2 Ques ICAI SM modified)

Sol.

Absorbed Overheads; = Actual Man days × Rate per day
= 1,50,000 × 50
= ₹ 75,00,000

Under absorption of overheads; = Actual overheads – Absorbed overheads
= 79,00,000– 75,00,000
= ₹ 4,00,000

Reasons for under-absorption;

1) Defective Planning	4,00,000 × 60% = ₹ 2,40,000
2) Increase in overhead cost	4,00,000 × 40% = ₹ 1,60,000

Treatment in Cost Accounts;

1) The unabsorbed overheads of ₹ 2,40,000 on account of defective planning to be treated as abnormal and thus be charged to Costing Profit and Loss account.
2) The balance of unabsorbed overheads i.e., ₹1,60,000 be charged as below on the basis of supplementary overhead absorption rate
   - **Supplementary Rate** = ₹1,60,000/ (30,000 + 5,000 + 50% of 10,000)
   - = ₹ 4 per unit

Particulars	(₹)
a) To Cost of Sales Account = 30,000 × 4 =	₹ 1,20,000
b) To Finished Stock Account = 5,000 × 4 =	₹ 20,000
c) To WIP Account = 50% of 10,000 × 4 =	₹ 20,000
	₹ 1,60,000

12.

Deccan Manufacturing Ltd. have three departments which are regarded as production departments. Service Departments' Costs are distributed to these production departments using the 'Step Ladder Method' of distribution. Estimates of factory overhead costs to be incurred by each department in the forthcoming year are as follows. Data required for distribution is also shown against each department.

Department	Factory Overhead (₹)	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 Meters
S	Direct labour hours

You are required to: -

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

b) Calculate the overhead recovery rate per direct labour hour for each of the three production departments.

(ICAI SM, Modified July 2021)

Sol.

a) Deccan Manufacturing Limited: -

Schedule Showing the Distribution of Overhead Costs among Departments: -

Particulars	Production			Service			
	X (₹)	Y (₹)	Z (₹)	P (₹)	Q (₹)	R (₹)	S (₹)
Overhead Cost	**1,93,000**	**64,000**	**83,000**	**45,000**	**75,000**	**1,05,000**	**30,000**
Distribution of Dept. P (100:125:85:- :50:40:50)	10,000	12,500	8,500	-45,000	5,000	4,000	5,000
Distribution of Dept. Q (4:3:4:-:-6:3)	16,000	12,000	16,000	----	-80,000	24,000	12,000
Distribution of Dept. R (6:3:3:-:-:-:-2)	57,000	28,500	28,500	----	----	-1,33,000	19,000
Distribution of Dept.5 (4:3:4:-:-:-:-)	24,000	18,000	24,000	----	----	----	-66,000
Total	**3,00,000**	**1,35,000**	**1,60,000**				

b) Calculation of Overhead recovery rate: -

Particulars	Dept-X	Dept-Y	Dept-Z
– Total apportioned overheads	₹3,00,000	₹ 1,35,000	₹1,60,000
– Direct labour hours	4,000	3,000	4,000
– Overhead recovery rate per labour hour	**₹75**	**₹45**	**₹40**

13. The total overhead expenses of a factory are ₹4,46,380. Taking into account the normal working of the factory, overhead was recovered in production at ₹1.25 per hour. The actual hours worked were 2,93,104. 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.

(Nov.2000, ICAI SM modified)

Sol. **Calculation of Unabsorbed Overheads;**

Particulars	**(₹)**
✓ Actual O/Hs incurred	4,46,380
✓ ***Less:*** O/Hs Absorbed: (O/H Recovery ₹ per hour × Actual Hours worked) = (₹ 1.25 × 2,93, 104 Hours.)	3,66,380
✓ Unabsorbed O/H.	80,000
✓ Unabsorbed O/H on account of increase in cost of indirect materials and labour (80,000 × 50%)	40,000
✓ Unabsorbed O/H on account of factory in efficiency (80,000 × 50%)	40,000
	80,000

Treatment of Unabsorbed O/H and its Implication on Profit;

1) The unabsorbed O/H on account of increase in cost of indirect material and Labour of ₹ 40,000 should be adjusted in the cost books by applying Positive Supplementary Rates.

$$\text{Supplementary Rate} = \frac{\text{Unabsorbed O/H}}{\text{Equivalent completed units of Production}}.$$

Where, Equivalent completed units are as under;

✓ Unit sold	7,000
✓ Units in Closing Stock of Finished Goods	800
✓ (7,800 – 7,000)	
✓ Equivalent WIP units	200
✓ Total Equivalent Completed Units	8,000

$$\text{*Supplementary Rate} = \frac{₹\ 40{,}000}{8{,}000\ \text{units}}$$

= ₹ 5 per equivalent completed units.

The unabsorbed O/H of ₹ 40,000 should be applied by using supplementary Rate of ₹ 5 per equivalent completed unit proportionately on the basis of equivalent completed unit among Cost of Sales A/c. Stock of Finished Goods A/c., and WIP A/c as under;

Particulars	Equivalent Completed units	Rate (₹)	Share of unabsorbed overheads
✓ Cost of Sales A/c	7,000	5	35,000
✓ Stock of Finished Goods A/c	800	5	4,000
✓ WIP A/c	200	5	1,000
			40,000

The above treatment of unabsorbed O/H will reduce the Profit by ₹ 35,000. The amount by which the cost of sales has been increased. Moreover, the value of stock of Finished Goods and WIP will increases by ₹ 4,000 and 1,000 respectively.

The unabsorbed O/H of ₹ 40,000 due to factory inefficiency being in the nature of abnormal loss should be charged to costing P/L A/c and there by the profit would be reduced by ₹ 40,000.

14. You are given the following information of the three machines of a manufacturing department of X Ltd.: -

Particulars	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;

Particulars	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 (Sqft.)	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: -

Calculate predetermined machine hour rates for the above machines after taking into consideration the following factors;

a) An increase of 15% in the price of spare parts.

b) An Increase of 25% in the consumption of spare parts for machine 'B' & 'C' only.

c) 20% general increase in wages rates.

(May 2011, Modified Nov. 2020 RTP)

Sol.

Computation of Machine Hour Rate

Particulars	Basis of Apportionment	Total (₹)	Machines		
			A (₹)	B (₹)	C (₹)
A) Standing Charges;					
Insurance	Depreciation Basis	8,000	3,000	3,000	2,000
Indirect Labour (W.N.3)	Direct Labour Hours	24,000	6,000	9,000	9,000

Building Maintenance expenses	Floor Space	20,000	8,000	8,000	4,000
Rent and Rates	Floor Space	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			84.75	86.29	71.40
B) Machine Expenses:					
Depreciation	Direct	20,000	7,500	7,500	5,000
Spare parts (W.N.2)	Final Estimates	13,225	4,600	5,750	2,875
Power	K.W. rating	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			15.46	13.23	13.03
Total (A + B)		5,53,225	1,95,100	1,93,750	1,64,375
Machine Hour Rate			100.21	99.52	84.43

Working Notes: -

1) Calculation of effective working hours: -

- No. of holidays 52 (Sundays) + 12 (other holidays) = 64
  Saturday (52−2) = 50
- No. of days (Work full time) = 365− 64− 50= 251

Particulars	Hours
Full day's work 251 × 8 = Half day's work 50 × 4 =	2,008 200 2,208

Particulars	Hours
Effective capacity 90% of 2,208	1,987 (Rounded off)
Less: Normal loss of time (Breakdown) 2%	40 (Rounded off)
Effective running hour	1,947

2) Amount of Spare Parts: -

Particulars	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: Increases in Consumption @ 25%	----	1,150	575
Estimated Cost	4,600	5,750	2,875

3) Amount of Indirect Labour is Calculated as under;

Particulars	(₹)
Preliminary estimates	20,000
Add: Increase in wages @ 20%	4,000
	24,000

Interest on Capital outlay is a financial matter and therefore it has been excluded from the cost accounts.

15. A Company has two production departments and two service departments, The data relating to a period are as under;

Particulars	Production Departments		Service Departments	
	PD₁	**PD₂**	**SD₁**	**SD₂**
Direct Materials (₹)	80,000	40,000	10,000	20,000
Direct Wages (₹)	95,000	50,000	20,000	10,000
Overheads (₹)	80,000	50,000	30,000	20,000
Power Requirement (₹)				
At normal capacity operations (kwh)	20,000	35,000	12,500	17,500
Actual Power Consumption during the period (kwh)	13,000	23,000	10,250	10,000

The power requirement of these departments is met by a power generation plant. The said plant incurred an expenditure, which is not included above, of ₹ 1,21,875 out of which a sum of ₹ 84,375 was variable and the rest fixed.

After apportionment of power generation plant costs to the four departments, the service department overheads are to be redistributed on the following bases;

Particulars	PD₁	PD₂	SD₁	SD₂
SD₁	50%	40%	----	10%
SD₂	60%	20%	20%	----

You are required to: -

a) Apportion the power generation plant costs to the four departments.

b) Re-apportion service department cost to production departments.

c) Calculate the overhead rates per direct labour hour of production departments, given that the direct wage rates of PD_1 and PD_2 are ₹ 5 and ₹ 4 per hour respectively.

(ICAI SM, Nov. 1996)

Sol.

a) Statement of Power Generation Plant Cost apportionment to 4 departments:

Particulars	Total (₹)	Basis	Production Departments		Service Departments	
			PD₁	**PD₂**	**SD₁**	**SD₂**
Power generation plant cost		Normal Capacity				
Fixed (1,21,875–84,375)	37,500	(2:3.5:1. 25:1.75)	8,824	15,441	5,515	7,720
Variable	84,375	Actual Power Consumption (13:23:10.25:10)	19,500	34,500	15,375	15,000
Allocated power			28,324	49,941	20,890	22,720
Direct Material	30,000		----	----	10,000	20,000
Direct Wages	30,000				20,000	10,000
Overheads	1,80,000		80,000	50,000	30,000	20,000
Total O/H s	3,61,875		1,08,324	99,941	80,890	72,720

b) Re-apportionment of Service Departments Cost to production departments Under Repeated Distribution Method;

Particulars	Total (₹)	Production departments		Service departments	
		PD₁	**PD₂**	**SD₁**	**SD₂**
Total Overheads	3,61,875	1,08,324	99,941	80,890	72,720
Deptts, SD₁: O/H apportioned to PD₁,,PD₂ and SD₂ in the ratio 50 : 40: 10	80,890	40,445	32,350	(80,890)	8,089
				Nil	80,809
Deptts SD₂: O/H apportioned to PD₁, PD₂ and SD₁ in the ratio 60:20:20	80,890	48,485	16,162	16,162	(80,809)
				16,162	Nil
Deptts. SD₁: O/H apportioned to PD₁ PD₂ and SD₂ in the ratio 50:40:10	16,162	8,081	6,465	(16,162)	1,616
				Nil	1,616

Deptts. SD_2: O/H apportioned to PD_1 PD_2 and SD_1 in the ratio 60:20:20	1,616	970	323	323	(1,616)
				323	Nil
Deptts. SD_1: O/H apportioned to PD_1 PD_2 and SD_2 in the ratio 50:40:10	323	162	129	(323)	32
				Nil	32
Deptts. SD_2: O/H apportioned to PD_1 PD_2 and SD_1 in the ratio 60:20:20	32	19.2	8.4	6.4	(32)
				6.4	Nil
Deptts SD_1: O/H apportioned to PD_1 PD_2 and SD_2 in the ratio 50:40:10	6.4	3.2	2.56	(6.4)	0.64
				Nil	0.64
Deptts. SD_2: O/H apportioned to PD_1 PD_2 only in the ratio 60:20 (due to negligible figure)	0.64	0.48	0.16	----	0.64
Total		2,06,489.88	1,55,385.12	Nil	Nil

Alternatively,

- By Equational approach----
- Let total O/Hs of SD_1 be 'X' and of SD_2 be 'Y'
- Thus,
- $X = 80{,}890 + 20\%$ of y
- $Y = 72{,}720 + 10\%$ of X
- Or, $X = 80{,}890 + 0.2\ y$ ------(i)
- Or, $X - 0.2\ y = 80{,}890$
- Or, $Y = 72{,}720 + 0.1\ X$
- Or, $-0.1X + y = 72{,}720$
- Or $-0.02X + 0.2y = 14{,}544$ (multiplying both the sides by 0.2) (iii)
- Solving the above equation (i) and (ii).
- We get,
- $X - 0.2\ y = 80{,}890$
- $\frac{-0.02\ X + 0.2Y}{0.980\ X} = \frac{14{,}544}{95{,}434}$
- $X = \frac{95{,}434}{0.980} =$ ₹ 97,381
- Now, putting the value of 'X' in equation (i)
- $X - 0.2\ y = 80{,}890$
- $97{,}381 - 0.2\ y = 80{,}890$
- $0.2\ y = 16{,}491$
- $Y =$ ₹ 82,455

Total O/Hs SD_1 and SD_2:	**SD_1**	**SD_2**
Total O/Hs as ascertained being the value of 'X' and 'Y' respectively	97,381	82,455
Less: Proportionate O/Hs transferred to other service deptt.		
SD_1 : (97,381 × 10%)	(9,738)	----
SD_2 : (82,455 × 20%)	----	(16,491)
	87,643	**65,964**

Distribution of Service deptt. O/Hs to Production Departments;

Particulars	**Production**		**Service deptt.**	
	PD_1	**PD_2**	**SD_1**	**SD_2**
✓ Overheads	1,08,324	99,941	87,643	65,964
✓ Deptt. SD_1 : O/H apportioned to PD_1 and PD_2 in ratio 5:4	48,691	38,952	(87,643)	----
✓ Deptt. SD_2: O/H apportioned to PD_1 and PD_2 in ratio 6:2	49,473	16,491	----	(65,964)
Total	**2,06,488**	**1,55,384**	**Nil**	**Nil**

Note: -

In Such type of problems, if the problem is silent about the application of the method of redistribution of service deptt. O/H, then 'Repeated Distribution Method' for distributing service deptt. O/H to other deptts. Should be adopted.

C) Computation of O/H Rates per direct labour hour of Production deptts.;

Particulars	Production Deptts.	
	PD$_1$	**PD$_2$**
✓ Total direct wages: (A)	95,000	50,000
✓ Direct Wages rate per hour (B)	5/-	4/-
✓ Direct labour hours $\frac{A}{B}$ = (C)	19,000	12,500
✓ O/H: (D)	2,06,489.78	1,55,385.09
✓ O/H rate per direct labour hour (D/C)	10.87	12.43

16. The ABC Company has the following account balances and distribution of direct charges on 31st March, 20X1.

Particulars	Total (₹)	Production Depts.		Service Depts.	
		Machine Shop	Packing	General 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				
Total	**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;

Particulars	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 & Maintenance	1,600	60	5	1,50,000	1,000
Total	**4,800**	**225**	**38**	**10,00,000**	**5,000**

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

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

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.

(ICAI SM, MTP May 2023-I)

Sol.

a) Overhead Distribution Statement: -

Particulars	Production Department		Service Department	
	Machine	Packing	General Plant	Stores & Maintenance
Allocated Expenses: -				
– Indirect labour	4,000	3,000	2,000	5,650
– Maintenance Material	1,800	700	1,020	1,500
– Superintendent's Salary	----	----	4,000	----
– Misc. supplies	400	1,000	150	200
– Cost & payroll Salaries	----	----	10,000	----
Total Allocated Overheads	**6,200**	**4,700**	**17,170**	**7,350**
– Apportioned expenses (as per schedule below)	77,720	25,800	2,830	22,650
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 (₹)	General Plant (₹)	Store & Maintenance (₹)
Power (7:1:-:2)	HP hours	8,000	5,600	800	----	1,600
Rent (5:2:1:4)	Floor Space	12,000	5,000	2,000	1,000	4,000
Fuel and heat (3:6:2:4)	Radiator Secs.	6,000	1,200	2,400	800	1,600
Insurance (64:20:1:15)	Investment	1,000	640	200	10	150
Trade license fees (64:20:1:15)	Investment	2,000	1,280	400	20	300
Depreciation (64:20:1:15)	Investment	1,00,000	64,000	20,000	1,000	15,000
Total		**1,29,000**	**77,720**	**25,800**	**2,830**	**22,650**

b) Distribution of Service Department Expenses: -

Particulars	Production Depts.		Service Depts.	
	Machine shop (₹)	Packing (₹)	General Plant (₹)	Stores & Maintenance (₹)
Total Expenses [as per (a)]	**83,920**	**30,500**	**20,000**	**30,000**
– Dist. Of Stores & Maint. (5:2:3)	15,000	6,000	9000	-30,000
– Dist. Of General Plant (4:2:1)	16,571	8,286	-29,000	4,143
– Dist. Of Store & Maint. (5:2:3)	2,072	829	1242	-4,143
– Dist. Of General Plant (4:2:1)	710	355	-1,242	177
– Dist. Of Store & Maint. (5:2:3)	89	35	53	-177
– Dist. Of General plant (4:2:1)	35	18	-53	0
Total	**1,18,397**	**46,023**		

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

Department	Direct Materials (₹)	Direct Wages (₹)	Factory 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: -

a) Compute the overhead absorption rate as per the current policy of the company and determine the selling price of the job No. CW 7083.

b) 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.

c) Determine the Selling price of Job CW 7083 based on the overhead application rates Calculated in (b) above.

d) 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. **(ICAI SM, Nov 1994)**

Sol. **a)** **Computation of overhead absorption rate**
(as per the current policy of the company)

Department	Budgeted factory Overheads (₹)	Budgeted direct wages (₹)
– Machinery	3,60,000	80,000
– Assembly	1,40,000	3,50,000
– Packing	1,25,000	70,000
Total	**6,25,000**	**5,00,000**

– Overhead absorption rate $= \frac{\text{Budgeted factory overheads}}{\text{Budgeted direct wages}} \times 100$

– $= \frac{₹\ 6,25,000}{₹\ 5,00,000} \times 100 = 125\%$ of Direct Wages

Selling Price of the Job No. CW-7083

Particulars	(₹)
– Direct Materials (₹ 1,200 + ₹600 + ₹300)	2,100.00
– Direct Wages (₹ 240 + ₹360 + ₹ 60)	660.00
– Overheads (125% × ₹ 660)	**825.00**
– Total factory cost	**3,585.00**
– ***Add:*** Mark-up (30% × ₹ 3,585)	1,075.50
– Selling price	**4,660.50**

b) Methods available for absorbing factory overheads and their overhead recovery rates in different departments: -

1) Machining Department: -

In the machining department, the use of machine time is the predominant factor of production. Hence machine hour rate should be used to recover overheads in this department. The overhead recovery rate based on machine hours has been calculated as under: -

– Machine hour rate $= \frac{\text{Budgeted factory overheads}}{\text{Budgeted machine hours}}$

– $= \frac{₹\ 3,60,000}{80,000 \text{ hours}} = ₹\ \mathbf{4.50\ per\ hour}$

2) Assembly Department: -

In this department direct labour hours is the main factor of production. Hence direct labour hour rate method should be used to recover overheads in this department. The overheads recovery rate in this case is;

$$\text{Direct labour hour rate} = \frac{\text{Budgeted Factory overheads}}{\text{Budgeted direct labour hours}}$$

$$= \frac{₹\ 1{,}40{,}000}{1{,}00{,}000\ \text{hours}} = ₹\ \mathbf{1.40\ per\ hour}$$

3) Packing Department: -

Labour is the most important factor of production in this department, Hence direct labour hour rate method should be used to recover overheads in this department.

- The overhead recovery rate in this case comes to;
- Budgeted factory overhead
- Direct labour hour rate $= \frac{\text{Budgeted Factory overheads}}{\text{Direct labour hours}}$
- $= \frac{₹\ 1{,}25{,}000}{50{,}000\ \text{hours}} = ₹\ \mathbf{2.50\ per\ hour}$

c) Selling Price of Job CW-7083 [based on the overhead application rates calculated in (ii) above]

Particulars	(₹)
– Direct Materials	2,100.00
– Direct Wages	660.00
– Overheads (Refer to Working note)	1,078.00
– Factory Cost	3,838.00
– ***Add:*** Mark up (30% of ₹ 3,838)	1,151.40
– Selling Price	**4,989.40**

Working Notes: -

Overhead Summary Statement

Dept.	Basis	Hours	Rate (₹)	Overheads (₹)
Machining	Machine hour	180	4.50	810
Assembly	Direct labour hour	120	1.40	168
Packing	Direct labour hour	40	2.50	100
			Total	**1,078**

d) Department-wise Statement of total under or over recovery of overheads: -

a) Under Current Policy

Departments

Particulars	Machining (₹)	Assembly (₹)	Packing (₹)	Total (₹)
– Direct Wages (Actual)	96,000	2,70,000	90,000	
– Overheads recovered @ 125 % of Direct Wage; (A)	1,20,000	3,37,500	1,12,500	5,70,000
– Actual overheads; (B)	3,90,000	84,000	1,35,000	6,09,000
– (Under)/Over recovery of overheads; (A−B)	(2,70,000)	2,53,500	(22,500)	(39,000)

b) As per methods suggested.

Basis of overheads recovery

Particulars	Machine Direct hours	Labour hours	Direct Labour hours	Total (₹)
– Hours worked	96,000	90,000	60,000	
– Rate/hour (₹)	4.50	1.40	2.50	
– Overhead recovered (₹): (A)	4,32,000	1,26,000	1,50,000	7,08,000
– Actual overheads (₹); (B)	3,90,000	84,000	1,35,000	6,09,000
– (Under)/Over recovery: (A−B)	42,000	42,000	15,000	99,000

18. 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: -

1) Cost of Department S_1 to Department P_1 and P_2 equally, and
2) 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: -

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: -

i) Product A 50,000; B 30,000.
ii) Budgeted raw-material cost per unit;
iii) Product A ₹ 120; Product B ₹ 150.
iv) Budgeted time required for production per unit;
v) Department P_1 : - Product A : 1.5 machine hours
Product B : 1.0 machine hour
vi) Department P_2 : - Product A : 2 Direct labour hours
Product B : 2.5 Direct labour hours
vii) Average wage rates budgeted in Department P_2 are;
viii) Product A - ₹ 72 per hour and Product B—₹ 75 hour.
ix) All materials are used in Department P_1 only.

Actual data: (for the month of July, 20X1): -

i) Units actually produced; Product A: 4,000 units
Product B: 3,000 units
ii) Actual direct machine hours worked in Department P_1;
iii) On Product A-6,100 hours, Product B-4,150 hours.
iv) Actual direct labour hours worked in Department P_2;
v) 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: -

a) Compute the pre-determined overhead rate for each production department.
b) Prepare a performance report for July, 20X1 that will reflect the budgeted costs and actual costs.

(ICAI SM, Modified MTP Nov 2020)

Sol. **a) Computation of predetermined overhead rate for each production departments from budgeted data**

Particulars	Production Department		Service Department	
– Budgeted factory overheads for the year in (₹)	25,50,000	21,75,000	6,00,000	4,50,000
– Allocation of service department S_1's Costs to production departments P_1 and P_2 equally in (₹)	3,00,000	3,00,000	(6,00,000)	---

– Allocation of service department S_2's costs to production departments P_1 and P_2 in the ratio of 2:1 in (₹)	3,00,000	1,50,000	---	(4,50,000)
– Total	31,50,000	26,25,000	---	---
– Budgeted machine hours in department P_a (working note 1)	1,05,000	---		
– Budgeted labour hours in department P_2 (working note 1)	----	1,75,000		
– Budgeted machine/ labour hour rate (₹)	30.00	15.00		

b) Performance report for July, 2020

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

Particulars	Budgeted (₹)	Actual (₹)
Raw materials used in Dept. P_1: -		
– A: 4,000 units × ₹ 120	4,80,000	4,89,000
– B: 3,000 units × ₹ 150	4,50,000	4,56,000
Direct labour Cost: - (on the basis of labour hours worked in department P_2)		
– A: 4,000 units × 2 hours × ₹ 72	5,76,000	5,91,900
– B: 3,000 units × 2.5 hours × ₹ 75	5,62,500	5,52,000
Overhead absorbed on machine hour basis in Dept. P_1 : -		
– A : 4,000 units × 1.5 hours × ₹30	1,80,000	1,74,400*
– B : 3,000 units × 1 hours × ₹30	90,000	1,18,649*
Overhead absorbed on labour hour basis in Dept. P_2 : -		
– A : 4,000 units × 2 hours × ₹ 15	1,20,000	1,31,364**
– B : 3,000 units × 2.5 hours × ₹ 15	1,12,500	1,18,548**
	25,71,000	**26,31,861**

*(Refer to working note 4) ** (Refer to working note 5)

Working Notes: -

1)

Particulars	Product A	Product B	Total
– Budgeted output (in units)	50,000	30,000	
– Budgeted machine hours in Dept. P_1	75,000 (50,000 × 1.5 hours)	30,000 (30,000 × 1 hours.)	1,05,000
– Budgeted labour hours in Dept. P_2	1,00,000 (50,000 × 2 hours)	75,000 (30,000 × 2.5 Hours.)	1,75,000

2)

Particulars	Product A	Product B	Total
– Actual output (in units)	4,000	3,000	
– Actual machine hours utilized in Dept. P_1	6,100	4,150	10,250
– Actual labour hours utilized in Dept. P_2	8,200	7,400	15,600

3) Computation of actual overhead rates for each production department from actual data:-

Particulars	Production Department		Service Department	
	P_1	P_2	S_1	S_2
– Actual factory overheads for the month of July, 2020 in (₹)	2,31,000	2,04,000	60,000	48,000
– Allocation of service Dept. S_1's costs to production Dept. P_1 and P_2 equally in (₹)	30,000	30,000	(60,000)	---
– Allocation of service Dept. S_2,s costs to production Dept. P_1 and P_2 in ratio of 2:1 in (₹)	32,000	16,000	---	(48,000)

– **Total**	2,93,000	2,50,000	---	---
– Actual machine hours in Dept. P_1 – (working note 2)	10,250	----		
– Actual labour hours in Dept. P_2 – (working note 2)	----	15,600		
– Actual machine/labour hour rate (₹)	28.59	16.02		

4) Actual overheads absorbed (based on machine hours)

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

5) Actual overheads absorbed (based on labour hours)

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

19. CAS Ltd. has three production departments and four service departments. The expenses for departments as per Primary Distribution Summary are as follows: -

Production Department;	**(₹)**	**(₹)**
A	60,000	
B	52,000	
C	48,000	1,60,000
Service Department;	**(₹)**	**(₹)**
Stores	8,000	
Time-Keeping and Accounts	6,000	
Power	3,200	
Canteen	2,000	19,200

The following information is also available in respect of the production departments;

Particulars	**Dept. A**	**Dept. B**	**Dept. C**
Horse power of Machine	300	300	200
Number of workers	20	15	15
Value of stores requisition in (₹)	2,500	1,500	1,000

Required: -

Apportion the costs of service departments over the production departments.

(ICAI SM, RTP)

Sol.

Statement Showing the Secondary Distribution of Overheads;

Item of Cost	**Basis of Apportionment**	**Total (₹)**	**Production Departments**		
			A (₹)	**B (₹)**	**C (₹)**
Cost as per primary distribution		1,60,000	60,000	52,000	48,000
Summary stores	Values of stores requisition (5 : 3 : 2)	8,000	4,000	2,400	1,600
Time-Keeping and Accounts	No. of workers (4:3:3)	6,000	2,400	1,800	1,800
Power	H.P. of Machine (3:3:2)	3,200	1,200	1,200	800
Canteen	No. of workers (4:3:3)	2,000	800	600	600
		1,79,200	68,400	58,000	52,800

20. A Ltd has calculated a predetermined overhead rate of ₹22 per machine hour for its Quality Check (QC) department. This rate has been calculated for the budgeted level of activity and is considered as appropriate for absorbing overheads. The following overhead expenditures at various activity levels had been estimated.

Total Overheads	Number of Machine hours
₹ 3,38,875	14,500
₹ 3,47,625	15,500
₹ 3,56,375	16,500

You are required to:

i) CALCULATE the variable overhead absorption rate per machine hour.
ii) CALCULATE the estimated total fixed overheads.
iii) CALCULATE the budgeted level of activity in machine hours.
iv) CALCULATE the amount of under/over absorption of overheads if the actual machine hours were 14,970 and actual overheads were ₹3,22,000.
v) ANALYSE the arguments for and against using departmental absorption rates as opposed to a single or blanket factory wide rate.

(MTP May 2019, MTP Nov 2022)

Sol.

i) Variable overhead absorption rate $= \frac{Difference\ in\ Total\ Overheads}{Difference\ levels\ in\ terms\ of\ machine\ hours}$

$$= \frac{₹3{,}47{,}625 - ₹3{,}38{,}875}{15{,}500\ hours - 14{,}500\ hours} = ₹8.75\ per\ machine\ hour.$$

ii) Calculation of Total fixed overheads:

	(₹)
Total overheads at 14,500 hours	3,38,875
Less: Variable overheads (₹ 8.75 × 14,500)	(1,26,875)
Total fixed overheads	2,12,000

iii) Calculation of Budgeted level of activity in machine hours:

Let budgeted level of activity = X

Then, $\frac{(₹8.75\ X + ₹2{,}12{,}000)}{X} = ₹22$

8.75X + ₹2,12,000 = 22X

13.25X = 2,12,000

X =16,000

Thus, budgeted level of activity = 16,000 machine hours.

iv) Calculation of Under / Over absorption of overheads:

	(₹)
Actual overheads	3,22,000
Absorbed overheads (14,970 hours × ₹ 22 per hour)	3,29,340
Over-absorption (3,29,340 – 3,22,000)	7,340

Departmental absorption rates provide costs which are more precise than those provided by the use of blanket absorption rates. Departmental absorption rates facilitate variance analysis and cost control. The application of these rates make the task of stock and work- in-process (WIP) valuation easier and more precise. However, the setting up and monitoring of these rates can be time consuming and expensive.

21. Job No. 198 was commenced on October 10, 20X1 and completed on November 1, 20X1. Materials used were ₹ 6,000 and labour charged directly to the job was ₹ 4,000. Other information is as follows;

Machine No. 215 used for 40 hours, the machine hour rate being ₹35.

Machine No.160 used for 30 hours, the Machine hour rate being ₹ 40. Six welders worked on the job for five days of 8 hours each; the Direct labour hour per welder is ₹ 20.

General expenses related to production not included for calculating either the machine hour or direct labour hour rate totalled ₹20,000. Total direct wages for the period being ₹ 2,00,000. Compute the works costs for job No.198. **(ICAI SM)**

Sol. **Computation for works costs for Job No. 198: -**

Particulars	(₹)
– Materials	6,000
– Direct labour	4,000
	10,000

Factory Overheads: -		
– Machine No. 215: 40 hours @ ₹35	1,400	
– Machine No. 160: 30 hours @ ₹40	1,200	
– *240 hours of welders @ ₹ 20 per hours	4,800	
– ** General expenses 10% of wages	400	7,800
Work Cost		**17,800**

*6 welders × 5 days × 8 hours = 240 hours
** General expenses are calculated as a % of total direct wages-
(20,000/200000*100) = 10%

22. In an engineering company, the factory overheads are recovered on a fixed percentage basis on direct wages and the administrative overheads are absorbed on a fixed percentage basis on factory cost.
The Company has furnished the following data relating to two jobs undertaken by it in a period.

Particulars	**Job 101 (₹)**	**Job 102 (₹)**
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: -

a) Computation of percentage recovery rates of factory overheads and administrative overheads.
b) Calculation of the amount of factory overheads, administrative overheads and profit for each of the two jobs.
c) Using the above recovery rates Determine the selling price of job 103. The additional data being: -

Direct Materials	₹ 24,000
Direct Wages	₹ 20,000
Profit Percentage on Selling Price	12.5 %

(ICAI SM)

Sol. **a) 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 101 = ₹ 54,000 + ₹ 42,000 + ₹ 42,000 F
- For Job 102 = ₹ 37,500 + ₹ 30,000 + ₹ 30,000 F

Total Cost of Jobs;
Factory Cost + Administrative Overhead;
- For Job 101 = (₹ 96,000 + ₹ 42,000 F) + (₹ 96,000 + ₹ 42,000 F) A = ₹ 1,51,500*
- For Job-102 = (₹ 67,500 + ₹ 30,000F) + (₹ 67,500 + ₹ 30,000 F) A = ₹ 1,06,875**
- **The Value of F & A Can be found using following equations**
- 96,000 + 42,000F + 96,000 A + 42,000 AF = 1,51,500 ……..(i)
- 67,500 + 30,000F + 67,500A + 30,000AF = 1,06,875 ……… (ii)
- Multiply equation (i) by 5 and equation (ii) by 7
- 4,80,000 + 2,10,000F + 4,80,000A + 2,10,000AF = 7,57,500…….(iii)
- 4,72,500 + 2,10,000F + 4,72,500A + 2,10,000AF = 7,48,125 ……. (iv)

  \-   \-   \-   \-   \-

  7,500 + 7,500A = 9,325
  7,500 A = 9,325 - 7,500

A = 0.25

- Now put the value of A in equation (i) to find the value of F
- 96,000 + 42,000 F + 24,000 + 10,500 F = 1,51,500
- 52,500F = 1,51,500−1,20,000

F=0.6

- On Solving the above relations; F = 0.60 and A = 0.25
- Hence, percentage recovery rates of;
- Factory Overheads = 60% of Wages and
- Administrative Overheads = 25% of Factory Cost.

b) Statement of Jobs, Showing amount of Factory Overheads, Administrative Overheads and Profit: -

Particulars	Job 101 (₹)	Job 102 (₹)
– Direct Materials	54,000	37,500
– Direct Wages	42,000	30,000
– Prime Cost	96,000	67,500
– Factory Overheads 60% of direct wages	25,200	18,000
– Factory Cost	1,21,200	85,500
– Administrative Overheads (25% of Factory Cost)	30,300	21,375
Total Cost	**1,51,500**	**1,06,875**
– Profit (10% & 20% respectively.)	15,150	21,375
– Selling Price	1,66,650	1,28,250

c) Selling Price of Job 103

Particulars	(₹)
– Direct Materials	24,000
– Direct Wages	20,000
– Prime Cost	44,000
– Factory Overheads (60% of Direct Wages)	12,000
– Factory Cost	56,000
– Administrative Overheads (25% of Factory Cost)	14,000
Total Cost	**70,000**
– Profit Margin (balancing figure)	10,000
– Selling price $\left[\frac{\text{Total Cost}}{87.5\%}\right]$	80,000

Working Notes: -

- Total Cost $= \frac{\text{Selling Price}}{(100\%+\text{Percentage of Profit})}$
- * For Job 101 $= \frac{₹\ 1,66,650}{(100\%+10\%)} = ₹\ 1,51,500$

**For Job 102 $= \frac{₹\ 1,28,250}{(100\%+20\%)} = ₹\ 1,06,875$

23. A light engineering factory fabricates machine parts for customers. The factory commenced fabrication of 12 nos. machine parts as per customers' specifications, the expenditure incurred on the job for the week ending 21st August, 20X1 is as tabulated below;

Particulars		(₹)
Direct Materials (all items)		780.00
Direct labour (manual) 20 hours @ ₹ 15 per hour		300.00
Machine facilities;		
Machine No. 1 : 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 manhours 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 hour worked during the week. During the week ending 21st August, 2020, 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. **(ICAI SM)**

Sol.

- Fabrication of 12 nos. machine parts (job No……)
- Date of commencement; 16 August, 2020
- Date of Completion;

Cost Sheet for the week ending, August 21, 2020: -

Particulars		(₹)
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**
Supplementary Rates: -		
Overheads 20 hours @ ₹ 2 per hour (Refer WN-1)	40.00	
Machine facilities: (Refer WN-2)		
– Machine No. I-4 hours @ ₹ 15	60.00	
– Machine No. II-6 hours @ ₹ 15	90.00	190.00
Cost		**2,000.00**

Working Notes (WN): -

1) Overheads budgeted: 3,000 man—hours × ₹8 = ₹24,000
Actual hours: 2,400 man—hours
Actual rate per hour ₹24,000÷2,400 hours = ₹10
Supplementary charge ₹2 (₹10—₹8) per hour

2) Machine Facilities: -

Particulars	Machine No. I	Machine No. II
– Budgeted	₹ 1,800 (40 × ₹45)	₹ 2,600 (40 × ₹65)
– Actual number of hours	30	32.5
– Actual rate per hour	₹60.00	₹80.00
– Supplementary rate per hour	₹ 15.00 (₹ 60.00—₹45.00)	₹ 15.00 (₹80.00—₹65.00)

24. A Company which sells four products, some of these are unprofitable, Company proposed to discontinue to sale one of these products. The following information is available regarding income, costs and activity for the year ended 31st March, 20X1.

Particulars	Products			
	A	B	C	D
Sales (₹)	30,00,000	50,00,000	25,00,000	45,00,000

Cost of goods sold (₹)	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: -

Particulars	(₹)	Basis of allocation to products
Fixed Costs: -		
Rent & Insurance	3,00,000	Area of storage (Sq. ft.)
Depreciation	1,00,000	No. of Parcels sent
Salesmen's Salaries & expenses	6,00,000	Sales Volume
Administrative wages and salaries	5,00,000	No. of invoices sent
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. **(ICAI SM)**

Sol. **Statement of Profit or Loss on Various Products during the year ended March 31, 2020: -**

Particulars	Total (₹)	Products			
		A (₹)	B (₹)	C (₹)	D (₹)
Sales	**1,50,00,000**	**30,00,000**	**50,00,000**	**25,00,000**	**45,00,000**
Variable Costs;					
– Cost of goods sold	1,08,50,000	20,00,000	45,00,000	21,00,000	22,50,000
– Commissions 4% of Sales	6,00,000	1,20,000	2,00,000	1,00,000	1,80,000
– Packing wages & Materials @ ₹ 2 per parcel	10,00,000	2,00,000	3,00,000	1,50,000	3,50,000
– Stationery @ ₹ 1 per invoice	4,00,000	80,000	1,40,000	60,000	1,20,000
Total Variable Costs	**1,28,50,000**	**24,00,000**	**51,40,000**	**24,10,000**	**29,00,000**
Contribution (Sales−Variable Cost)	21,50,000	6,00,000	(1,40,000)	90,000	16,00,000
Fixed Costs;					
– Rent & Insurance (5:4:8:3)	3,00,000	75,000	60,000	1,20,000	45,000
– Depreciation (4:6:3:7)	1,00,000	20,000	30,000	15,000	35,000
– Salesmen's Salaries & expenses (6:10:5:9)	6,00,000	1,20,000	2,00,000	1,00,000	1,80,000
– Administrative wages & Salaries (4:7:3:6)	5,00,000	1,00,000	1,75,000	75,000	1,50,000
Total Fixed Costs	**15,00,000**	**3,15,000**	**4,65,000**	**3,10,000**	**4,10,000**
– Profit or Loss (Contribution− Fixed Costs)	6,50,000	2,85,000	(6,05,000)	(2,20,000)	11,90,000
– Percentage of Profit or Loss on Sales (%)	4.33	9.50	(12.10)	(8.80)	26.4

25. **Following information is available for the first and second quarter of the year 20X1-X2 of ABC Limited;**

Particulars	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. **(May 2009)**

Sol.

Particulars	Production (Units)	Semi Variable Cost (₹)
Quarter-I	36,000	2,80,000
Quarter-II	42,000	3,10,000
Difference	6,000	30,000

a) Variable Cost per unit= $\frac{\text{Change in Semi Variable Cost}}{\text{Change in Production}}$

$= \frac{₹\ 30,000}{6,000 \text{ units}}$

= ₹ 5 per units

b) Total Fixed Cost= Semi Variable Cost – (Production X Variable Cost per Unit)

Total Fixed Cost in Quarter-I;

$= 2,80,000 - (36,000 \times 5)$

$= 2,80,000 - 1,80,000$

$= 1,00,000$

Total Fixed Cost in Quarter-II;

$= 3,10,000 - (42,000 \times 5)$

$= 3,10,000 - 2,10,000$

$= 1,00,000$

26. M. L. Auto Ltd. is a manufacturer of auto components and the details of its expenses for the year 20X1 are given below;

Particulars	(₹)
Opening Stock of Material	1,50,000
Closing Stock of Material	2,00,000
Purchase of Material	18,50,000
Direct Labour	9,50,000
Factory Overhead	3,80,000
Administrative Overhead	2,50,400

During 20X2, 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: -

a) Calculate the overhead recovery rates based on actual costs for 20X1.

b) Prepare a detailed cost statement for the order received in 20X2 and the price to be quoted if the company wants to earn a profit of 10% on sales.

(Nov.2015)

Sol. **a) Calculation of Overhead Recovery Rate:**

Factory Overhead Recovery Rate = $\frac{\text{Factory Overhead in 20X1} - \text{X2}}{\text{Direct labour cost in 20X1} - \text{X2}} \times 100$

Factory Overhead Recovery Rate = $\frac{3,80,000}{9,50,000} \times 100$ = 40% of direct labour.

Administrative Overhead Recovery Rate = $\frac{\text{Administrative Overhead in 20X1} - \text{X2}}{\text{Factory cost in 20X1} - \text{X2 W.N.}} \times 100$

Administrative Overhead Recovery Rate = $\frac{2,50,400}{31,30,000} \times 100$ = 8% of Factory cost

Working Note:

a) Calculation of Factory cost in 20X1-X2

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	95,000
Prime Cost	27,50,000
Factory Overhead	3,80,000
Factory Cost	31,30,000

b) Job Cost Sheet for the order received in 20X2-X3

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	1,76,582
Sales value (Price to be quoted for the order)	17,65,982

Hence the price to be quoted is ₹ 17,65,982

27. RST Ltd. has two production departments; Machining and Finishing. There are three service departments: Human Resources (HR.), Maintenance and Design. The budgeted costs in these service departments are as follows:

Particulars	HR. (₹)	Maintenance (₹)	Design (₹)
Variable	1,00,000	1,60,000	1,00,000
Fixed	4,00,000	3,00,000	6,00,000
	5,00,000	**4,60,000**	**7,00,000**

The usage of these Service Departments' Output during the year just completed is as follows;
Provision of Service Output (in hours of service)

Particulars	Providers of Service		
Users of Service	**HR.**	**Maintenance**	**Design**
HR	----	----	----
Maintenance	500	----	----
Design	500	500	----
Machining	4,000	3,500	4,500
Finishing	5,000	4,000	1,500
Total	10,000	8,000	6,000

Required: -

a) Use the direct method to re-apportion RST Ltd.'s service department cost to its production departments.

b) Determine the proper sequences to use in re-apportioning the firm's service department cost by step-down method

c) Use the step-down method to reapportion the firm's service department cost.

(Nov. 2006)

Sol. **a) Re-apportion of Service departments cost to its production department by using direct method;**

Particulars			Production Department	
Service Deptt.	**Basis**	**Total**	**Machining**	**Finishing**
H.R.	(4:5)	5,00,000	2,22,222.00	2,77,778.00
Maintenance	(7:8)	4,60,000	2,14,667.00	2,45333.00
Design	(3:1)	7,00,000	5,25,000.00	1,75,000.00
Total			**9,61,889.00**	**6,98,111.00**

b) Sequence of re-apportionment: - As H.R. department serves large number of departments so its cost should be first re-apportioned then overhead of maintenance department should be re-apportioned and lastly overhead of design department should be re-apportioned.

c) Use of Step-down method for re-apportioning overhead of service department;

Particulars	Departments				
	H.R.	Maintenance	Design	Machining	Finishing
Overhead Cost of H.R.	5,00,000	4,60,000	7,00,000	----	----
Dept	(5,00,000)	25,000	25,000	2,00,000	2,50,000
Ratio (1:1:8:10)	----	(4,85,000)	30,313	2,12,187	2,42,500
Ratio (1:7:8)	----	----	(7,55,313)	566,485	1,88,828
Ratio (3:1)					
Total	----	----	----	**9,78,672**	**6,81,328**

28. 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, 20X1:

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 Systems	----	21	1,400

Cost incurred in each of four departments for October, 20X1 are as follows;

Particulars	(₹)
Corporate Sales	₹ 12,97,751
Consumers Sales	₹ 6,36,818
Administrative	₹ 94,510
Information Systems	₹ 3,04,720

The Company uses number of employees as a basis to allocate administrative costs and processing time as a basis to allocate information systems costs.

Required: -

a) Allocate the support department costs to the sales departments using the direct method.

b) 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.

c) How could you have ranked the support departments differently?

d) Allocate the support department costs to two sales departments using the reciprocal allocation method.

(Nov. 2003)

Sol. a) Statement Showing the allocation of support deptt. Cost to the sales deptt: (Using the Direct Deptt.)

Particulars	Basis of allocation	Sales Deptt.		Support Deptt.	
		Corporate Sales	Consumer Sales	Admin.	Information System.
Cost incurred		12,97,751	6,36,818	94,510	3,04,720
Re-allocation of cost of admin. Deptt.	No. of employees (6:4:–:–)	56,706	37,804	(94,510)	----
Reallocation of cost of information system deptt.	Processing Time (6:5:–:–)	1,66,211	1,38,509	----	(3,04,720)
Total		**15,20,668**	**8,13,131**	**---**	**---**

b) Ranking of support deptts. Based on % of their services rendered to other support deptts:

- Administration support deptt. Provides 23.077% $\left(\frac{21 \times 100}{42+28+21}\right)$ of its services to information systems.
  Support thus deptt. 23.077% of ₹ 94,510 = ₹ 21,810/-
- Information system support deptt. Provides 8.33% $\left(\frac{400}{2,400+2,000+400} \times 100\right)$ of its services to Admin. Support deptt.
  Thus 8.33% of ₹ 3,04,720 = ₹ 25,383/-

c) **Statement Showing allocation of support costs**
(By using step down allocation method)

Particulars	Basis of allocation	Service Deptt.		Sales deptt.	
		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 admin. deptt.	No. of employees (6:4:3)	43,620	29,080	(94,510)	21,810
					3,26,530
Reallocation of cost of information system deptt.	Process Time (6:5:—:—:)	1,78,107	1,48,423	----	(3,26,530)
Total		**15,19,478**	**8,14,321**	----	----

d) An alternative ranking is based on the rupee amount of services rendered to other service deptt., using the rupee figures obtained under requirement (ii). This approach would use the following sequence of ranking;

- Allocation of information systems O/H as (i) (₹25,383 provided to administrative.)
- Allocated administrative O/Hs as (ii) (₹ 21,810 provided to information systems.)

Working Notes: -

1) Percentage of services provided by each service deptt. To other service deptt. And Sales deptts: -

Particulars	Sales deptts.		Support deptts.	
	Administrative	Information System	Corporate Sales	Consumer Sales
✓ Administrative	----	23.07%	40.16%	30.77%
✓ Information	8.33%	----	50%	41.67%
✓ System	----	----	----	----

2) Total Cost of the support deptt: (by using simultaneous equation method):

Let A and I be the total costs of support deptts. Administrative and information Systems respectively. These cost can be determined by using the following simultaneous equations:

- A = 94,510 + 0.0833 I
- I = 3,04,720 + 0.2307 A
- Or, A = 94,510 + 0.0833 {3,04,720 + 0.2307 A}
- Or, A = 94,510 + 25,383 + 0.01922 A
- Or 0.98078 A = 1,19,893
- Or A = ₹ 1,22,243/-
- And I = ₹ 3,32,922/-

Statement Showing the allocation of support deptts. Cost to the sales dept. (using Reciprocal allocation method);

Particulars	Sales Deptts.	
	Corporate Sales	Consumer Sales
✓ Cost incurred	12,97,751	6,36,818
✓ Re-allocation of cost of admin. Deptt. (46.16% and 30.77% of 1,22,243)	56,427	37,614
✓ Re-allocation of cost of information system deptt. (50% and 41.67% of 3,32,922)	1,66,461	1,38,729
Total	15,20,639	8,13,161

29. ABS Enterprises produces a product and adopts the policy to recover factory overheads applying blanket rate based on machine hours. The cost records of the concern reveal following information:

Budgeted production overheads	₹ 10,35,000
Budgeted machine hours	90,000
Actual machine hours worked	45,000
Actual production overheads	₹ 8,80,000
Production overheads (actual) include -	
Paid to worker as per court's award	₹ 50,000
Wages paid for strike period	₹ 38,000
Stores written off	₹ 22,000
Expenses of previous year booked in current year	₹ 18,500
Production -	
Finished goods	30000 units
Sale of finished goods	27000 units

The analysis of cost information reveals that 1/3 of the under absorption of overheads was due to defective production planning and the balance was attributable to increase in costs.

You are required: -

a) To Find out the amount of under absorbed production overheads.
b) To give the ways of treating it in Cost Accounts.
c) To apportion the under absorbed overheads over the items.

(Nov. 2019)

Sol. **a) Amount of Under Absorption of Production Overheads during the period;**

Particulars	(₹)	(₹)
✓ Total production overhead actually incurred during the period		8,80,000
✓ *Less:* Amount paid to worker as per court's order	50,000	
✓ Expenses of previous years booked in current year	18,500	
✓ Wages paid for strike period	38,000	
✓ Stores written off	22,000	1,28,500
		7,51,500
✓ *Less:* Production overheads absorbed as per machine hour rate (45,000 hours × ₹ 11.50*)		5,17,500
✓ Amount of under absorbed production overheads		**2,34,000**

*Budgeted Machine hour rate (Blanket rate) = $\frac{₹\ 10,35,000}{90,000}$ = ₹ 11.50 per hour.

b) Accounting treatment of Under Absorbed Production Overheads;

a) As, 1/3 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** = (2,34,000 × 1/3)
  - **Profit and Loss Account** = ₹ 78,000

b) 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** = (₹ 2,34,000 × 2/3) = ₹ 1,56,000
  - **Supplementary rate** = $\frac{₹\ 1,56,000}{30,000\ \text{units}}$ = ₹ 5.20 per unit.

c) Apportionment of Under Absorbed Production Overheads Over Finished goods and Cost of Sales;

Particulars	(₹)
✓ Finished goods (3000 units × ₹ 5.20)	15,600
✓ Cost of Sales (27,000 units × ₹ 5.20)	1,40,400
Total	**1,56,000**

30. 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.

Particulars	**(₹)**
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 stories vary with the running of the Machine.

Required: -

Calculate a two-tier machine hour rate for;

a) set up time and

b) running time.

(May 2002)

Sol. **Comprehensive Two-tier machine Hour Rate;**

a) For Running Hour;

– $= \frac{\text{Fixed Expenses}}{\text{Total Time for recovery of fixed expenses}} + \text{Variable expenses per hour of running time}$

– $= \frac{10{,}500}{200 \text{ hours}} + 100$

– = ₹ 152.50 per hour of Running Time.

b) For Setup Hours;

– $= \frac{\text{Fixed Expenses}}{\text{Total time for recovery of fixed expenses}} + \text{Variable Expenses per hour of Setup time.}$

– $= \frac{10{,}500}{200 \text{ Hours}} + \text{Nil.}$

– = ₹ 52.50 per hour of Setup time.

Working – Calculation of Two-tier Machine Hour Rate; -

1)

Calculation of Fixed Expenses per month;	**(₹)**
✓ Depreciation $\left[\left(\frac{5{,}00{,}000-20{,}000}{10 \text{ Years}}\right) \times \frac{1 \text{ Month}}{12 \text{ Months}}\right]$	4,000
✓ Building Rent $\left(\frac{72{,}000}{6} \times \frac{1 \text{ Month}}{12 \text{ Months}}\right)$	1,000
✓ Supervisor's Salary $\frac{6{,}000}{3 \text{ Machines}}$	2,000
✓ Wage of Operator	2,500
✓ General Lighting	1,000
Total	**10,500**

2) Effective Hour per month of the machine for recovery of fixed expenses = 208 hours, – 8 hours. 200 hours

3) Effective Hours per month of the machine for recovery of valuable expenses = 208 Hours – 8 Hours – 20 Hours, 180 Hours.

4) Variable Expense per Hours;

Particulars	**Running Time (₹)**	**Setup Time (₹)**
✓ Repairs and Maintenance $\left[\frac{60{,}480}{12 \text{ Months}} \times 180 \text{ Hours.}\right]$	28	----
✓ Consumable Stores $\left[\frac{47{,}520}{12 \text{ Months}} \times 180 \text{ hours}\right]$	22	----
✓ Power [25 units per hour × ₹ 2 per unit]	50	----
✓ Total Variable Cost per hours	**100**	**Nil**

31. From the details furnished below you are required to compute a comprehensive machine-hour rate;15

Particulars	**(₹)**
Original purchase price of the machine (subject to depreciation at 10% per annum on original cost)	3,24,000
Normal working hours for the month (The machine works to only 75% of capacity)	200 hours
Wages of Machine man	₹ 125 per day (of 8 hours)
Wages for a Helper (Machine attendant)	₹ 75 per day (of 8 hours)
Power cost for the month for the time worked	₹ 15,000
Supervision charges apportioned for the machine centre for the month	₹ 3,000
Electricity and Lighting or the month	₹ 7,500
Repairs and maintenance (machine) including consumable stores per month	₹ 17,500
Insurance of Plant and Building (apportioned) for the year	₹ 16,250
Other general expenses per annum	₹ 27,500

The workers are paid a fixed dearness allowance of ₹ 1,575 per month. Production bonus payable to workers in terms of an award is equal to 33.33% 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. **(Nov. 2005)**

Sol. **Statement Showing Comprehensive Machine Hour Rate:**

Fixed Cost;

Particulars	**P.M**	**Per hours**
✓ Supervision charges	3,000	
✓ Electricity and Lighting	7,500	
✓ Insurance of Plant and Building (16,250 × 1/12)	1,354.17	
✓ Other general expenses (27,500 × 1/12)	2,291.67	
✓ Depreciation (32,400 × 1/12)	2,700.00	
	16,845.84	**112.31**

Variable cost: -

Particulars	**P.M**	**Per hours**
✓ Repairs and Maintenance	17,500	116.67
✓ Power	15,000	100.00
✓ Wages of machine man (W.N.2)		44.91
✓ Wages of helper (W.N.2)		32.97
✓ Machine hours rate (Comprehensive)		**406.86**

Working Notes: -

1) Effective machine working hours p.m. = 200 hours × 75% = 150 hours.

2) Wages per machine hour

Particulars	**Machine Man (₹)**	**Helper (₹)**
✓ Wages for 200 hours	3,125	
✓ (₹ 125 × 25)		
✓ (₹ 75 × 25)		1,875
✓ D.A.	1,575	1,575
	4,700	3,450
✓ Production bonus (1/3rd of above)	1,567	1,150
	6,267	4,600
✓ Leave Wages (10%)	470	345
	6,737	4,945
✓ Effective wage rate per machine hour W.N.1 (i.e., 150 hours.)	44.91	32.97

32. Sree. Ajeet Ltd. having fifteen different types of automatic machines furnishes information as under for 20X1-20X2.

i) Overhead expenses: Factory rent ₹1,80,000 (Floor area 1,00,000 Sq.ft.). Heat and gas ₹ 60,000 and supervision ₹ 1,50,000.

ii) Wages of the operator are ₹ 200 per day of 8 hours. Operator attends to one machine when it is under set up and two machines while they are under operation.

In respect of machine B (one of the above machines) the following particulars are furnished:

i) Cost of machine ₹1,80,000. Life of machine – 10 years and scrap value at the end of its life ₹10,000

ii) Annual expenses on special equipment attached to the machine are estimated as ₹ 12,000

iii) Estimated operation time of the machine is 3,600 hours while set up time is 400 hours per annum

iv) The machine occupies 5,000 sq. ft. of floor area.

v) Power costs ₹5 per hour while machine is in operation.

Estimate the comprehensive machine hour rate of machine B. Also find out machine costs to be absorbed in respect of use of machine B on the following two work orders.

Particulars	Work Order - I	Work Order - 2
Machine Set up time (Hours)	15	30
Machine operation time (Hours)	100	190

(Nov. 2013 RTP)

Sol.

Shree Ajeet Ltd.

Statement Showing Comprehensive machine hour rate of Machine B

Particulars	(₹)
Standing Charges;	
✓ Factory rent {(₹ 1,80,000/1,00,000 Sq.ft.) × 5,000 Sq. ft)	9,000
✓ Heat and Gas (₹ 60,000/15 Machines)	4,000
✓ Supervision (₹ 1,50,000/15 machines)	10,000
✓ Depreciation [(₹ 1,80,000– ₹ 10,000)/10 years]	17,000
✓ Annual expenses on special equipment	12,000
	52,000
✓ Fixed cost per hour (₹ 52,000/4,000 hours)	13/-

Particulars	Set up rate Per hour (₹)	Operational rate Per hour (₹)
✓ Fixed Cost	13.00	13.00
✓ Power	----	5.00
✓ Wages	25.00	12.50
✓ Comprehensive machine hour rate per hour	38.00	30.50

Statement of 'B' machine costs
To be absorbed on the two work orders

Particulars	Work Order - 1			Work Order - 2		
	Hours (₹)	Rate (₹)	Amount (₹)	Hours (₹)	Rate (₹)	Amount (₹)
✓ Set up time cost	15	38	570	30	38	1,140
✓ Operation time cost	100	30.5	3,050	190	30.5	5,795
Total Cost			**3,620**			**6,935**

33. A Manufacturing Company has an installed capacity of 1,50,000 units per annum. Its cost structure is given below;

Particulars	(₹)
Variable Cost per unit	
Materials	10
Labour (Subject to a minimum of ₹ 1,00,000 per month)	10
Overheads	4
Fixed Overheads per annum	1,92,300

Semi-Variable overheads per annum at 75% capacity (It will increase by ₹ 4,000 per annum for increase of every 5% of the capacity utilization or any part thereof)	60,000

The Capacity utilization for the next year is budgeted at 75% for first three months, 80% for the next six months and 90% for the remaining three months.

Required: -

If the Company is planning to have a profit of 20% on the selling price, Calculate the selling price per unit for the next year.

(Nov. 2006)

Sol. Installed Capacity 1,50,000 units per annum.

Per month capacity 1,50,000 ÷ 12 = 12,500 units.

✓ 75% for 3 months (12,500 × 3 × 75%)	28,125
✓ 80% for 6 months (12,500 × 6 × 80%)	60,000
✓ 90% for 3 months (12,500 × 3 × 90%)	33,750
Total production	**1,21,875**

Labour Cost;

✓ For 3 months (₹ 2,81,250 or ₹ 3,00,000) whichever is higher	3,00,000
✓ For 6 Months	6,00,000
✓ For 3 Months	3,37,500
Labour Cost	**12,37,500**

Semi-Variable Costs;

✓ ₹ 60,000 P.A. 75% Capacity utilisation i.e., ₹ 5,000 P.M. for 1st 3 months	15,000
✓ For next 6 months (5000 × 6 + 2000)	32,000
✓ For next 3 months (5000 × 3 + 3000)	18,000
	65,000

Calculation of Selling price;

✓ Total Production	1,21,875
✓ Material (121875 × 10)	12,18,750.00
✓ Labour	12,37,500.00
✓ Overhead (121875 × 4)	4,87,500.00
✓ Fixed overhead	1,92,300.00
✓ Variable overhead	65,000.00
	32,01,050.00
✓ *Add:* Profit (20% on S.P.)	8,00,262.50
✓ (i.e., 25% on cost price)	40,01,312.50

✓ Selling price/unit = 400131.50/121875

= 32.83% unit.

34. A Company is making a study of the relative profitability of the two products-A and B, In addition to direct costs, indirect selling and distribution costs to be allocated between the two products are as under;

Particulars	(₹)
Insurance Charges for inventory (finished)	78,000
Storage Costs	1,40,000
Packing and forwarding charges	7,20,000
Salesman salaries	8,50,000
Invoicing costs	4,50,000

Other details are: -

Particulars	Product - A	Product - B
Selling price per unit (₹)	500	1,000
Cost per unit (exclusive of indirect selling and distribution costs) (₹)	300	600

Annual Sales in units	10,000	8,000
Average inventory (units)	1,000	800
Number of invoices	2,500	2,000

One unit of product A requires a storage space twice as much as product B. The cost to pack and forward one unit is the same for both the products. Salesman are paid salary plus commission @ 5% on sales and equal amount of efforts are put forth on the sales of each of the products.

Required: -

a) Set up a schedule showing the apportionment of the indirect selling and distribution costs between the two products.

b) Prepare a Statement showing the relative profitability of the two products. **(May 1996)**

Sol. **a) Statement of apportionment of Indirect selling and distribution cost;**

Particulars	**Basis of Apportionment**	**Products**		
		A (₹)	**B (₹)**	**C (₹)**
Insurance Charges of Finished Inventory-Storage Cost	Average. Inventory value (1,000 × ₹ 500): (800 × ₹ 1,000)	30,000	48,000	78,000
Storage Cost	Average Inventory Storage Space: (1,000 × 2): (800 × 1)	1,00,000	40,000	1,40,000
Packing and Forwarding Charges	Actual Sales Units 10,000: 8,000	4,00,000	3,20,000	7,20,000
Salesman Salaries	Efforts of Salesman (1: 1)	4,25,000	4,25,000	8,50,000
Invoicing Cost	No. of invoices (2,500: 2,000)	2,50,000	2,00,000	4,50,000
Salesman Commission (500 × 10,000) + 1000 × 800 × 5%	Annual Sales Value (500 × 10,000): (1,000 × 8,000)	2,50,000	4,00,000	6,50,000
		14,55,000	**14,33,000**	**28,88,000**

b) Statement of Relative Profitability;

Particulars	**Products**	
	A (₹)	**B (₹)**
✓ Annual Sales Value (units sold × price per unit (10,000 units × ₹ 500) : 8,000 units × ₹ 1,000)	50,00,000	80,00,000
✓ ***Less:*** Cost (units sold × Cost/unit: (10,000 × 300) : (8,000 × 600)	30,00,000	48,00,000
Gross Profit	20,00,000	32,00,000
✓ ***Less:*** Indirect Selling and distribution cost	14,55,000	14,33,000
Profit	**5,45,000**	**17,67,000**
✓ Profit as a percentage of sales $\left(\frac{\text{Profit}}{\text{Sales}} \times 100\right)$	10.90%	22.08%

35. 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 is given below:

- ✓ Rent for 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 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 the robot**	**With the aid of the robot**
Vulcanising	500	400
Brushing	1,000	400
Striping	--	1,200

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.

(Nov. 2022)

Sol. **i) Computation of Machine Hour Rate for a Month:**

a) When the robot is used = 22.50 + 12 = ₹34.50 per hour

b) When the robot is not used = ₹12 per hour

ii) Computation of Machine Hour Rate for individual jobs:

Particulars	Vulcanising	Brushing	Striping
Machining cost with the use of robot @34.50 per hour	1,250 (500 × 34.50)	34,500 (1,000 × 34.50)	-
Machining cost without the use of robot @ ₹12 per hour	4,800 (400×12)	4,800 (400×12)	14,400 (1200×12)
Total cost of individual jobs	22,050	39,300	14,400
Total Machine Hours	900	1,400	1,200
Machine hour rate of jobs	24.50	28.7	12.00

Working Notes:

1) Calculation of Total Machine Hours & Robot Hours for a month:

Jobs	Without the aid of the robot	With the aid of the robot
Vulcanising	500	400
Brushing	1000	400
Striping	-	1200
Totals	1,500	2,000

Total Robot Hours = 2,000 and

Total Machine Hours = 1,500 + 2,000 = 3,500

2) Calculation of per hour cost of Robot:

Hire Charges of Robot per month/Monthly hours of Robot

= (2,70,000/6 months)/2,000 hours

= ₹22.50 per hour

3) Calculation of per hour cost of Special Machine:

Particulars	(₹) p.m.
Rent (18,000/3 months)	6,000
Depreciation (19,20,000 × 10%)/12 months	16,000
Other Indirect Expenses (12,00,000 × 20%)/12 months	20,000
Total Overheads per month	42,000
Machine Hour Rate [42,000/3,500 hrs.]	12

36. Gemini Enterprises undertakes three different jobs A, B and C. All of them require the use of a special machine and also the use of a computer. The computer is hired and the hire charges work out to ₹ 4,20,000 per annum. The expenses regarding the machine are estimated as follows;

Particulars	(₹)
Rent for a 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.

Particulars	Job		
	A	B	C
Numbers of hours the machine was used;			
Without the use of the computer	600	900	----
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. **(ICAI SM)**

Sol. **a) Computation of Machine hour rate for the firm as a whole for a month: -**

1) When the Computer was used; $\frac{₹\ 55{,}000}{2{,}000\text{ hours}} = ₹\ 27.50$ per hour

2) When the Computer was not used; $\frac{₹\ 15{,}000}{1{,}500\text{ hours}} = ₹10$ per hour

b) Computation of Machine hour rate for the individual job: -

Particulars	Rate per hour (₹)	Job					
		A		B		C	
		hours	(₹)	hours	(₹)	hours	(₹)
– **Overheads**							
– Without Computer	10.0	600	6,000	900	9,000	---	
– With Computer	27.5	400	11,000	600	16,500	1,000	27,500
Total		**1,000**	**17,000**	**1,500**	**25,500**	**1,000**	**27,500**
– Machine hour rate			17		17		27.5

Working Notes: -

Total machine hours used 3,500
(600 + 900 + 400 + 600 + 1,000)

1) Total machine hours without the use of computers 1,500
(600 + 900)

2) Total machine hours with the use of computer 2,000
(400 + 600 + 1,000)

3)

Total overheads of the machine per month	**(₹)**
1) Rent (₹ 17,500÷3 months)	5,833.33
2) Depreciation (₹ 2,00,000÷12 months)	16,666.67
3) Indirect Charges (₹ 1,50,000÷12 months)	12,500.00
Total	**35,000.00**

4) Computer hire charges for a month = ₹ 35,000
(₹ 4,20,000 ÷ 12 months)

5) Overheads for using machines without computer

$= \frac{₹\ 35{,}000}{3{,}500\text{ hours}} \times 1{,}500\text{ hours} = ₹\ 15{,}000$

6) Overheads for using machines with computer

$= \frac{₹\ 35{,}000}{3{,}500\text{ hours}} \times 2{,}000\text{ hours} + ₹35{,}000 = ₹55{,}000$

37. SE Limited manufactures two products- A and B. The company had budgeted factory overheads amounting to ₹36,72,000 and budgeted direct labour hour of 1,80,000 hours. The company uses pre-determined overhead recovery rate for product costing purposes.

The department-wise break-up of the overheads and direct labour hours were as follows:

Particulars	Budgeted overheads	Budgeted direct labour hours	Rate per direct labour hour
Department Pie	₹ 25,92,000	90,000 hours	₹ 28.80
Department Qui	₹ 10,80,000	90,000 hours	₹ 12.00
Total	₹ 36,72,000	1,80,000 hours	

Additional Information:

Each unit of product A requires 4 hours in department Pie and 1 hour in department Qui. Also, each unit of product B requires 1 hour in department Pie and 4 hours in department Qui.

This was the first year of the company's operation. There was no WIP at the end of the year. However, 1,800 and 5,400 units of Products A and B were on hand at the end of the year.

The budgeted activity has been attained by the company. You are required to:

i) DETERMINE the production and sales quantities of both products 'A' and 'B' for the above year.

ii) ASCERTAIN the effect of using a pre-determined overhead rate instead of department-wise overhead rates on the company's income due to its effect on stock value.

CALCULATE the difference in the selling price due to the use of pre-determined overhead rate instead of using department-wise overhead rates. Assume that the direct costs (material and labour costs) per unit of products A and B were ₹ 25 and ₹ 40 respectively and the selling price is fixed by adding 40% over and above these costs to cover profit and selling and administration overhead.

(RTP-Nov 2022)

Ans. **i) Computation of production and sales quantities:**

The products processing times are as under –

Product	A	B	Total
Department Pie	4 hours	1 hour	90,000 hours
Department Qui	1 hour	4 hours	90,000 hours

Let X and Y be the number of units (production quantities) of the two products. Converting these into equations, we have –

4X + Y = 90,000 & X + 4Y = 90,000

Solving the above, we get X = 18,000; Y = 18,000

Hence, the Production and Sales Quantities are determined as under –

Product	Production Quantity	Closing Stock (Given)	Sales Quantity (Balancing Figure)
A	**18,000 units**	1,800 units	**16,200 units**
B	**18,000 units**	5,400 units	**12,600 units**

ii) Effect of using pre-determined rate of overheads on the company's profit

Product	Closing Stock Quantity	Overhead included using pre- determined rate	Overhead included using department rate	Difference in overhead in closing stock value / Effect on closing stock value
A	1,800 units	1,800 x 5 hours x ₹20.40 = ₹ 1,83,600	Pie = 1,800 units x 4 hours x ₹28.80 = ₹2,07,360 Qui = 1,800 units x 1 hour x ₹ 12 = ₹21,600	**(-) ₹ 45,360**
B	5,400 units	5,400 x 5 hours x ₹20.40 = ₹ 5,50,800	Pie = 5,400 units x 1 hour x ₹28.80 = ₹ 1,55,520	**(+) ₹ 1,36,080**
			Qui = 5,400 units x 4 hours x ₹12 = ₹ 2,59,200	
Total		₹ 7,34,400	₹ 6,43,680	**(+) ₹ 90,720**

Use of pre-determined overhead rate has resulted in over valuation of stock by ₹90,720 due to which the company's income would be affected (increase) by ₹90,720. Profit would be affected only to the extent of Overhead contained in closing finished goods and closing WIP, if any.

iii) Effect of using pre-determined on the products' selling prices

Particulars	Product A	Product B
Selling Price per unit if pre-determined overhead rate is used	₹177.80	₹ 198.80
Selling Price per unit if department wise rate is used	₹ 213.08	₹163.52
Difference	**₹ 35.28** **Under-Priced**	**₹ 35.28** **Over-Priced**

Workings:

1) Pre-determined overhead recovery rate = $\frac{₹\ 36,72,000}{1,80,000\ hours}$ = 20.40 per direct labour hour

2) If pre-determined recovery rate is used

Particulars	Product A in ₹	Product B in ₹
Materials & Labour	25.00	40.00
Add: Production Overhead A = 5 hours × ₹20.40 per hour B = 5 hours × ₹20.40 per hour	102.00	102.00
Cost of production	127.00	142.00
Add: 40% of margin	50.80	56.80
	177.80	**198.50**

3) If department-wise recovery rate is used

Particulars	Product A in ₹	Product B in ₹
Materials & Labour	25.00	40.00
Add: Production Overhead A = Pie = 4 hours x ₹28.80 Qui = 1hour x ₹12 B = Pie = 1hour x ₹28.80 Qui = 4 hours x ₹12	127.20	76.80
Cost of production	152.20	116.80
Add: 40% of margin	60.88	46.72
Selling Price per unit	**213.08**	**163.52**

Process & Operation Costing
Assignment

Q. No. | **Question/Answer**

1

Following details are related to the work done in Process-I by XYZ Company during the month of March, 202X;

Particulars	(₹)
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 average method;

a) Statement of equivalent production.

b) Statement of Cost.

c) Statement of distribution Cost, and

d) Process-I Account, Normal Loss Account and Abnormal Loss Account.

(ICAI SM, Nov. 2015, Modified Jan 2021 & Nov. 2020, Modified MTP May 2019, Modified MTP Nov. 2022)

Sol.

a) **Statement showing the equivalent production of XYZ ltd. during the month of March:**

Input	Particulars	output	Material		Labour		Overhead	
			%	**unit**	**%**	**unit**	**%**	**Unit**
2,000	Opening work in progress	2,000	100	2,000	100	2000	100	2,000
38,000	Input							
	Finished goods	33,000	100	33,000	100	33,000	100	33,000
	Normal loss	2,000	-	-	-	-	-	-
	Abnormal loss	1,000	100	1,000	80	800	80	800
	Closing Work in progress	2,000	100	2,000	80	1,600	80	1600
40,000		40,000		38,000		37,400		37,400

b) Statement of Cost:

Computation of cost per unit

Material cost per unit = $\frac{\text{Total Cost} - \text{Scrap value of Normal loss}}{\text{Input} - \text{Normal loss}}$

Material cost = {80,000 + 14,80,000 – (2,000 × ₹ 20 per unit)} ÷ 38,000 = ₹ 40 per unit

Labour cost = (15,000 + 3,59,000) ÷ 37,400 = ₹ 10 per unit

Overhead = (45,000 + 10,77,000) ÷ 37,400 = ₹ 30 per unit

c) Valuation/ Distribution of cost:

Closing Work in progress

- ✓ Material = 2,000 units × ₹ 40 per unit = ₹ 80,000
- ✓ Labour = 1,600 units × ₹ 10 per unit = ₹ 16,000
- ✓ Overheads = 1,600 units × ₹ 30 per unit = ₹ 48,000

Total cost = ₹ 80,000 + ₹ 16,000 + ₹ 48,000 = ₹ 144,000

Abnormal loss:

- ✓ Material = 1,000 units × ₹ 40 per unit = ₹ 40,000
- ✓ Labour = 800 units × ₹ 10 per unit = ₹ 8,000
- ✓ Overheads = 800 units × ₹ 30 per unit = ₹ 24,000

Total Cost = ₹ 40,000 + ₹ 8,000 + ₹ 24,000 = ₹ 72,000

Finished goods

- ✓ Material = 35,000 units × ₹40 per unit = ₹14,00,000
- ✓ Labour = 35000 units × ₹10 per unit = ₹3,50,000
- ✓ Overheads = 35000 units × ₹30 per unit = ₹10,50,000

d)

Dr. **Process I Account** **Cr.**

Particulars	units	Amount (₹)	Particulars	units	Amount (₹)
To Opening work in progress	2,000	1,40,000	By Normal Loss	2,000	40,000
To Material	38,000	14,80,000	By Abnormal loss	1,000	72,000
To Labour	-	3,59,000	By Process B	35,000	28,00,000
To Overhead		10,77,000	By Closing WIP	2,000	1,44,000
	40,000	30,56,000		40,000	30,56,000

Dr. **Normal Loss Account** **Cr.**

Particulars	Units	Amount (₹)	Particulars	units	Amount (₹)
To Process Account	2,000	40,000	By Cost ledger control account	2,000	40,000
	2,000	40,000		2,000	40,000

Dr. **Abnormal loss Account** **Cr.**

Particulars	Units	Amount (₹)	Particulars	units	Amount (₹)
To Process Account	1,000	72,000	By Cash account	1,000	20,000
			By Costing profit and loss account	-	52,000
	1,000	72,000		1,000	72,000

2. "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 litres of juice.

Following information regarding Process-I has been obtained from the manufacturing department of Healthy Sweets for the month of January. 202X;

Particulars	(₹)
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	80%

Closing work-in-process; 9,000 litres

Degree 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: -

a) Statement of equivalent production.

b) Statement of Cost.

c) Statement of distribution cost, and

d) Process-I Account.

(ICAI SM, May 2013, Nov. 2014, Modified MTP Nov 2020)

Sol. **1) Statement of Equivalent Production;**

Input	Particulars	Output	Material		Labour & O.H.	
			%	unit	%	unit
4,500	Opening work in progress	4500	100	4,500	100	4,500
1,00,000	Input					
	Finished goods	35,000	100	35,000	100	35,000
	Normal loss	55,000	-	-	-	-
	Abnormal loss	1,000	100	1,000	80	800
	Closing Work in progress	9,000	100	9,000	80	7,200
1,04,500		1,04,500		49,500		47,500

***100 kg of Sugarcane Extracts Only 45 Litre of Juice.**
Thus, Normal Loss = 100 – 45 = 55%

2) Statement Showing Cost for each element;

Particulars	Sugarcane (₹)	Labour (₹)	Overheads (₹)	Total (₹)
✓ Cost of Opening work-in-process	50,000	15,000	45,000	1,10,000
✓ Cost incurred during the month	5,00,000	2,00,000	6,00,000	13,00,000
✓ Total Cost; (A)	5,50,000	2,15,000	6,45,000	14,10,000
✓ Equivalent Units: (B)	49,500	47,500	47,500	----
✓ Cost per equivalent unit; (C) = (A ÷ B)	11.111	4.526	13.579	29.216

3) Statement of Distribution of Cost;

Particulars	(₹)	(₹)
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

4)

Dr. **Process-I A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Opening W.I. P			By Normal Loss	55,000	----
– Sugarcane	4,500	50,000	By Abnormal Loss [₹ 25,595 + ₹ 18 (difference due to approximation)]	1,000	25,613
– Labour	----	15,000	By Process-II A/c	39,500	11,54,032
– Overheads	----	45,000	By Closing WIP	9,000	2,30,355
To Sugarcane introduced	100,000	5,00,000			
To Direct Labour	----	2,00,000			
To Overheads	----	6,00,000			
	104,500	**14,10,000**		**104,500**	**14,10,000**

3. Following information is available regarding Process A for the month of October 20X1;

Production Record;	
1) Opening Work-in-Progress (Material: 100% complete, 25% complete for labour & overheads)	40,000 units
2) Units Introduced	1,80,000 units
3) Units Completed	1,50,000 units

4) Units in-process on 31.10.20X1 (Material: 100% complete, 50% Complete for labour & overheads)	70,000 units
Cost Record:	
Opening Work-in-Progress:	
Material Labour Overheads	₹ 1,00,000 ₹ 25,000 ₹ 45,000
Cost incurred during the month:	
Material Labour Overheads	₹ 6,60,000 ₹ 5,55,000 ₹ 9,25,000

Assume that FIFO method is used for W.I.P inventory valuation.

Required: -

a) Statement of Equivalent Production.

b) Statement showing Cost for each element.

c) Statement of apportionment of Cost

d) Process A Account

(Nov. 2010, Modified in ICAI SM and RTP Nov. 2021, MTP Dec. 2021)

Sol.

a) Statement of Equivalent Production
(Under FIFO Method)

Particulars Input (Units)		Output	Units	Equivalent Production			
				Material		Labour & Overheads	
				% Completion	Qty.	% Completion	Qty.
Opening WIP	40,000	Transfer to Process II Opening WIP	40,000	--		75%	30,000
Introduced	1,80,000	completed introduced &	1,10,000	100%	1,10,000	100%	1,10,000
		WIP	70,000	100%	70,000	50%	35,000
	2,20,000		2,20,000		1,80,000		1,75,000

b) Statement Showing Cost for Each Element

Item of Cost	Equivalent Production (A)	Cost Incurred (B)	Cost per Unit (B÷A)
Material	1,80,000	6,60,000	3.66667
Labour & Overheads	1,75,000	14,80,000	8.45714
			12.12381

c) Statement of Evaluation

Transfer to Process II		
Opening WIP Completed		
Cost Incurred already	1,70,000	
Cost Incurred during the Month		
Labour & Overheads	2,53,714	4,23,714
30,000 × 8.45714		
Introduced & Completed 1,10,000 × 12.12381		13,33,619
Transfer to process II		17,57,333

Closing WIP		
Material 70,000 × 3.6667	2,56,667	
Labour and Overheads 35,000 × 8.45714	2,96,000	5,52,667

d) 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	70,000	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

4. MJ 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, 202X are as follows;

Particulars	Process – A	Process – B
40,000 Units introduced at a cost of	₹ 3,60,000	----
Material Consumed	₹ 2,42,000	₹ 2,25,000
Direct Wages	₹ 2,58,000	₹ 1,90,000
Manufacturing Expenses	₹ 1,96,000	₹ 1,23,720
Output in Units	37,000	27,000
Normal Wastage of Input	5%	10%
Scrap Value (per unit)	₹ 15	₹ 20
Selling Price (per unit)	₹ 37	₹ 61

Additional Information: -

i) 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.

ii) Indirect expenses for the year were ₹ 4,48,080.

iii) It is assumed that Process-A and Process-B are not responsibility centre.

Required: -

a) Prepare Process-A and Process-B Account.

b) Prepare Profit & Loss Account showing the net profit/net loss for the year.

(May 2014, Modified in May 2012 & 2008, Modified MTP May 2020)

Sol. **1)**

Dr. **Process-A A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
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**

Calculation of cost per unit:

✓ Cost per unit $= \frac{₹\ 10,56,000 - ₹\ 30,000}{₹\ 40,000\ \text{unit} - 2,000\ \text{units}}$ = ₹ 27 per unit

✓ Normal wastage = 40,000 units × 5% = 2,000 units

✓ Abnormal loss = 40,000 units – (37,000 units + 2,000 units)
= 1,000 units
✓ Transfer to Process- B = 37,000 units × 80% = 29,600 units
✓ Sale = 37,000 units × 20% = 7,400 units

Dr. **Process – B A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
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**

Calculation of cost per unit

✓ Cost per unit $= \frac{₹\ 13,37,920 - ₹\ 59,200}{₹\ 29,600\ \text{units} - 2,960\ \text{units}} =$ ₹ 48 per unit.

✓ Normal wastage = 29,600 units × 10% = 2,960 units

✓ Abnormal gain = (27,000 units + 2,960 units) – 29,600 units
= 360 units

2)

Dr. **Profit & Loss A/c** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Process-A A/c	1,99,800	By Sales;	
To Process-B A/c	12,96,000	– Process-A (7,400 units × ₹ 37)	2,73,800
To Abnormal loss A/c	12,000	– Process-B (*27,000 units × ₹ 61)	16,47,000
To Indirect Expenses	4,48,080	By Abnormal gain	10,080
		By Net loss	25,000
	19,55,880		**19,55,880**

Working Notes: -

Dr. **Normal Wastage (Loss) A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
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**

Dr. **Abnormal Loss A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
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**

Dr. **Abnormal Gain A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
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**

<u>Calculation of abnormal loss and abnormal gain</u>

<u>For Process A</u>

Particulars	Quantity
Input	40,000
Less: Output	37,000
Less: Normal loss 5% of 40,000	2,000
Abnormal Gain/ (Abnormal loss)	(1,000)

<u>For Process B</u>

Particulars	Quantity
Input from process A	29,600
Less: Output	27,000
Less: Normal loss 10% of 29,600	2960
Abnormal Gain/ (Abnormal loss)	360

5. A Company produces a component, which passes through two processes, During the month of April, 202X, materials for 40,000 components were put into Process-I of which 30,000 were completed and transferred to Process-II, those not transferred to Process-II, were 100% complete as to materials cost and 50% complete as to labour and overheads cost. The Process-I Costs incurred were as follows: -

Particulars	(₹)
Direct Materials	15,000
Direct Wages	18,000
Factory Overheads	12,000

Of those transferred to Process-II, 28,000 units were completed and transferred to finished goods stores. There was a normal loss with no salvage value of 200 units in Process-II. There were 1,800 units, remained unfinished in the process with 100% complete as to materials and 25% complete as regard to wages and overheads.

No further process materials costs occur after introduction at the first process until the end of the second process, when protective packing is applied to the completed components. The process and packing costs incurred at the end of the Process-II were;

Particulars	(₹)
Packing Materials	4,000
Direct Wages	3,500
Factory Overheads	4,500

Required: -

a) Prepare Statement of Equivalent Production, Cost per unit and Process-I A/c.

b) Prepare Statement of Equivalent Production, Cost per unit and Process-II A/c.

(ICAI SM, May 2006, Modified RTP May 2021,Modified RTP May 2022)

Sol. a) **Statement showing the equivalent production:**

Input	Particulars	output	Material		Labour		overhead	
			%	Unit	%	unit	%	unit
40,000	Input							
	Finished goods	30,000	100	30,000	100	30,000	100	30,000
	Closing Work in progress	10,000	100	10,000	50	5,000	50	5,000
40,000		40,000		40,000		35,000		35,000

Calculation of cost per unit:

Total material cost = ₹15,000

Material cost per unit = (Material cost – Scrap value of normal loss) ÷ equivalent units

Material cost per unit = (15,000 - 0) ÷ 40,000; = ₹ 0.375 per unit

Direct wages = ₹ 18,000

Labour cost per unit = 18,000 ÷ 35,000 = 0.5142 per unit

Factory overhead = 12,000

Factory overhead cost per unit = ₹ 12,000 ÷ 35,000 = ₹ 0.34285 per unit

Valuation of closing stock:

- Material = 10,000 units × ₹0.375 per unit = ₹3750
- Labour = 5,000 units × ₹0.5142 per unit = 2571.42857
- Overhead = 5,000 units × ₹ 0.34285 per unit = 1714.2857

Total cost = ₹ 3750 + ₹ 2571 + ₹ 1714 = ₹8,035 or 8,040

Total cost per unit = ₹ 0.375 + ₹ 0.5142 + ₹ 0.3428 = ₹ 1.232 per unit

Dr. **Process Account I** **Cr.**

Particulars	units	Amount (₹)	Particulars	units	Amount (₹)
To Material	40,000	15,000	Process II	30,000	36,960
To wages		18,000	Closing WIP	10,000	8,040
To Overhead		12,000			
	40,000	45,000		40,000	45,000

b) **Statement showing the equivalent production:**

Input	Particulars	output	Material		Labour		Overhead	
			%	unit	%	unit	%	Unit
30,000	Input							
	Finished goods	28,000	100	28,000	100	28,000	100	28,000
	Normal loss	200	-	-	-	-	-	-
	Closing Work in progress	1,800	100	1,800	25	450	25	450
30,000		30,000		29,800		28,450		28,450

Calculation of cost per unit:

Material cost = ₹ 36,960 ÷ 29800 = ₹ 1.24026 per unit

Labour cost per unit = ₹ 3,500 ÷ 28,450 = ₹ 0.1230 per unit

Overhead cost per unit = ₹ 4,500 ÷ 28,450 = 0.15817 per unit

Total cost = ₹ 1.24026 + ₹ 0.1230 + ₹ 0.15817 = ₹ 1.52143 per unit

Total cost of finished goods = 28,000 x ₹ 1.52143 + 4,000 = ₹ 46,600

Dr. **Process Account II** **Cr.**

Particulars	units	Amount (₹)	Particulars	units	Amount (₹)
To Process I	30,000	36,960	By Normal Loss	200	-
To packing material		4,000	By Finished goods	28,000	46,600
To wages		3,500	Closing WIP	1,800	2,360
To Overhead		4,500			
	30,000	48,960		30,000	48,960

Calculation of closing stock:

Material = 1800 units × ₹ 1.24026 per unit = ₹ 2232.468

Labour = 450 units × 0.1230 per unit = ₹ 55.35

Overhead = 450 units × 0.15817 per unit = ₹ 71.1765

Total cost = ₹ 2232 + ₹ 55.35 + ₹ 71.1765 = ₹ 2358 or ₹ 2360

6. **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 and Weightage average method, Compute equivalent production and cost per equivalent unit. Also, evaluate the output.

(ICAI SM, Nov. 2018, Modified RTP Nov. 2019)

Sol. **Statement of Equivalent Production Units (Under FIFO Method):**

Input	Particulars	Output	Equivalent Production	
			%	**Unit**
1,000	Opening work in progress	1,000	40	400
10,000	Input	-	-	-
	Finished output	8,000	100	8,000
	Normal Loss	1,100	-	-
	Abnormal loss/gain	100	100	100
	Closing Work in progress	800	75	600
11,000		11,000		9,100

Computation of Abnormal loss:

Abnormal loss = Opening stock + Input – Transferred to next process- Normal loss – Closing stock

Abnormal loss = 1,000 + 10,000 – 9,000 – 1,100 – 800

Abnormal loss = 100 units

Computation of Cost per equivalent production unit: -

Particulars	(₹)
✓ Cost of the Process (for the period)	19,30,000
✓ **Less:** Scrap value of normal loss (₹ 10 × 1,100 units)	11,000
✓ **Total Process Cost**	**19,19,000**

– Cost per equivalent unit = $\frac{\text{₹ 19,19,000}}{\text{9,100 units}}$ = ₹ 210.88

Statement of Evaluation

Particulars	Equivalent Units (EU)	Cost per EU (₹)	Amount (₹)
1) Opening W-I-P Completed during the period	400	210.88	84,352
✓**Add:** Cost of W-I-P at beginning	----	----	1,10,000
✓Complete cost of 1,000 units of opening W-I-P	1,000	194.35	1,94,352
2) Completely processed units	8,000	210.88	16,87,040
3) Abnormal Loss	100	210.88	21,088
4) Closing W-I-P	600	210.88	1,26,528

***(The difference in total amount may arise due to rounding off error.)**

Statement of Equivalent Units (Under Weighted Average Method)

Input	Particulars	Output	Equivalent Production	
			%	**Unit**
1,000	Opening work in progress	1,000	100	1,000
10,000	Input	-	-	-
	Finished output	8,000	100	8,000
	Normal Loss	1,100	-	-
	Abnormal loss/gain	100	100	100
	Closing Work in progress	800	75	600
11,000		11,000		9,700

Computation of Cost per equivalent production Unit: -

Particulars	(₹)
✓ Cost of Opening W-I-P	1,10,000
✓ Cost of the Process (for the period)	19,30,000
✓ **Less:** Scrap value of normal loss (₹ 1 × 1,100 units)	11,000
Total process cost	**20,29,000**

Cost per equivalent unit = $\frac{\text{₹ 20,29,000}}{\text{9,700 units}}$ = ₹ 209.18

Statement of Evaluation:

Particulars	Equivalent Units (EU)	Cost per EU (₹)	Amount (₹)
1) Units Completed and transferred to next process	9,000	209.18	18,82,620
2) Abnormal Loss	100	209.18	20,918
3) Closing W-I-P	600	209.18	1,25,508

(The difference in total amount may arise due to rounding off error.)

7. Pharma Limited produces product 'Glucondin' which passes through two processes before it is completed and transferred to finished stock. The following data relates to March, 202X;

Particulars	Process-I (₹)	Process-II (₹)	Finished Stock (₹)
Opening Stock	1,50,000	1,80,000	4,50,000
Direct Materials	3,00,000	3,15,000	----
Direct Wages	2,24,000	2,25,000	----
Factory overheads	2,10,000	90,000	----
Closing Stock Inter process profit included in	74,000	90,000	2,25,000
Opening Stock	NIL	30,000	1,65,000

Output of process-I is transferred to process-II at 25 percent profit on the transferred price, whereas output of process-II is transferred to finished stock at 20 percent on transfer price. Stock in processes are valued at prime cost. Finished stock is valued at the price at which it is received from process-II. Sales for the month is ₹ 28,00,000.

You are required to prepare Process-I A/c, Process-II A/c, and Finished Stock A/c showing the profit element at each stage.

(May 2010, Modified May 2017, Modified ICAI SM)

Sol

Dr. **Process I A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Opening stock	-	1,50,000	By Process II Account	-	10,80,000
To Material		3,00,000	By Closing stock	-	74,000
To Direct labour		2,24,000			
To Factory overheads		2,10,000			
To profit on transfer		2,70,000			
	0	11,54,000		0	11,54,000

Dr. **Process II A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Opening stock		1,80,000	By Process II Account	-	22,50,000
To Process I Account	-	10,80,000	By Closing stock		90,000
To Material		3,15,000			
To Direct labour		2,25,000			
To Factory overheads		90,000			
To profit on transfer		4,50,000			
	0	23,40,000		0	23,40,000

Dr. **Finished Goods A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To opening stock	-	4,50,000	By Sales	-	28,00,000
To Process II Account		22,50,000	By Closing Stock		2,25,000
To Costing P&L account		3,25,000			
	0	30,25,000		0	30,25,000

Dr. **Costing P&L A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Stock reserve on closing stock			By process I Account		2,70,000
Process II		15,000	By Process II Account		4,50,000
Finished Goods		75,000	By Finished stock account		3,25,000
To Profit		11,50,000	By Stock reserve on opening stock		
			Process II		30,000
			Finished Stock		1,65,000
	0	12,40,000		0	12,40,000

Working Note:

1) Calculation of profit earned under each process:

Process I = 1,50,000 + 3,00,000 + 2,24,000 + 2,10,000 – 74,000 = 8,10,000

$\boxed{\text{Profit} = (8{,}10{,}000 \times 1/3) = 2{,}70{,}000}$

Process II = 1,80,000 + 10,80,000 + 3,15,000 + 2,25,000 + 90,000 – 90,000 = ₹ 18,00,000

$\boxed{\text{Profit} = 18{,}00{,}000 \div 4 = ₹\ 4{,}50{,}000}$

2) Calculation of stock reserve on closing at various levels:

Own cost of process II = 5,40,000 (Calculated on Prime cost given in the question)

Cost of process I = 10,80,000

Ratio between Process cost I and Own cost = 10,80,000 : 5,40,000

$\boxed{\text{Ratio} = 2:1}$

Closing stock at process II = 90,000;

Part of process I cost in closing stock of process II = 90,000 × 2/3 = ₹ 60,000

Profit earned at the process I level = ₹ 60,000 × 25% = ₹ 15,000

Calculation of stock reserve in the finished stock level:

Closing stock of finished stock = ₹ 2,25,000 (all is come from process II on which it earns 20% profit)

Profit = ₹ 2,25,000 × 20% = ₹ 45,000

Cost of such stock for process II = ₹ 2,25,000 - ₹ 45,000 = ₹ 1,80,000

Proportion of process I = 1,80,000 × 2/3 = ₹ 1,20,000

Profit earned by process I = 1,20,000 × 25% = 30,000

Total profit = ₹ 45,000 + ₹ 30,000 = ₹ 75,000

8. 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 202X:

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 ware house. 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% on selling price.

Prepare Process P, Q and R accounts, also Calculate selling price per unit of end product.

(May 2018, Modified Nov. 2002, Modified MTP May 2022)

Sol. **Dr.** **Process-P A/c** **Cr.**

Particulars	Units (Kg.)	(₹)	Particulars	Units (Kg.)	(₹)
To Raw Material (₹ 5 × 10,000 kg)	10,000	50,000	By Normal loss (10% of 10,000) × ₹ 1	1,000	1,000
To Direct Material	----	38,000	By Process-Q A/c (₹ 15.50 × 9,000 kgs)	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 of completed units;

- $= \frac{\text{Total Cost} - \text{Realisable Value from normal loss}}{\text{Input units} - \text{Normal loss units}}$
- $= \frac{₹\ 1{,}40{,}500 - ₹\ 1{,}000}{10000\ \text{kgs} - 1000\ \text{kgs}}$
- $= \frac{₹\ 1{,}39{,}500}{9000\ \text{kg}}$
- = ₹ 15.50 per unit

Dr. **Process -Q A/c** **Cr.**

Particulars	Units (Kg.)	(₹)	Particulars	Units (Kg.)	(₹)
To Process-Q A/c	9,000	1,39,500	By Normal loss (10% of 9,000 kg × ₹ 1)	900	900
To Direct Material	----	42,500	By Process – R A/c (₹ 31 × 8,200 kg.)	8,200	2,54,200
To Direct Labour	----	40,000			
To Production OH (90,000 × 4/12)	----	30,000			
To Abnormal Gain (₹ 31 × 100 kgs)	100	3,100			
	9,100	**2,55,100**		**9,100**	**2,55,100**

Cost Per unit of Completed units and abnormal in;

- $= \frac{\text{Total Cost} - \text{Realisable Value from normal loss}}{\text{Input units} - \text{Normal loss units}}$
- $= \frac{₹\ 2{,}52{,}000 - ₹\ 900}{9000\ \text{kgs} - 900\ \text{kgs}}$
- $= \frac{₹\ 2{,}51{,}100}{8100\ \text{kgs}}$
- = ₹ 31

Dr. **Process – R A/c** **Cr.**

Particulars	Units (Kg.)	(₹)	Particulars	Units (Kg.)	(₹)
To Process Q A/c	8,200	2,54,200	By Normal loss (10% of 8,200 kg) × ₹ 1	820	820
To Direct Material	----	42,880	By Finished Goods (₹ 52 × 7,300 kg)	7,300	3,79,600
To Direct Labour	----	50,000	By Abnormal loss (₹ 52 × 80 kg)	80	4,160
To Production OH (9,000 × 5/12)	----	37,500			
	8,200	**3,84,580**		**8,200**	**3,84,580**

Cost per unit of Completed units and abnormal loss;

$$- \quad = \frac{\text{Total Cost} - \text{Realisable Value from N.L}}{\text{Input units} - \text{Normal loss units}} = \frac{₹\,3{,}84{,}580 - ₹820}{8200\text{ kgs} - 820\text{ kgs}}$$

$$- \quad = ₹\ 52$$

Calculation of Selling Price;

- ✓ Cost of Product = ₹ 3,79,600
- ✓ (52 × 7,300 kg)
- ✓ + Profit = ₹ 1,26,533.33
- ✓ Sales = 5,06,133.33
- ✓ ÷ No. of kg = 7,300 kg
- ✓ Selling Price p.u. = ₹ 69.33

9. From the following information for the month ending October, 202X, prepare Process Cost-accounts for Process-III. Use First-in-First-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 materials added in Process III	₹ 1,97,600
Direct wages	₹ 97,600
Production Overheads	₹ 48,800

Degree of Completion;

Particulars	Opening Stock	Closing Stock	Scrap
Materials	80%	70%	100%
Labour	60%	50%	70%
Overheads	60%	50%	70%

The normal loss in the process was 5% of production and scrap was sold at ₹ 3 per unit.

(Nov. 2005, Modified Nov 2003, RTP)

Sol.

Dr. **Process III Account** **Cr.**

Particulars	Units	Amount (₹)	Particulars	units	Amount (₹)
To Opening stock	2,000	25,750	By Transfer to Process IV	48,000	7,19,750
To Transfer from process II	53,000	4,11,500	By Closing stock	5,000	61,500
To material introduced		1,97,600	By Normal loss	2,500	7,500
To wages		97,600			
To Overheads		48,800			
To Abnormal gain	500	7,500			
	55,500	788,750		55,500	7,88,750

Working Note:

1) Calculation of normal loss and abnormal gain

Normal loss is 5% of production

Closing stock = Opening stock + Purchase - Production

5,000 = 2,000 + 53,000 – Production

Production = 50,000;

Normal loss = 50,000 units x 5% = 2500 units

Actual loss = 2,000 units; Abnormal gain = 2,500 – 2,000 = 500 units

2) Statement showing the equivalent production:

Input	Particulars	Output	Material A		Material B		Labour & overhead	
			%	Unit	%	unit	%	unit
2,000	Opening work in progress	2,000	0	-	20	400	40	800
53,000	Input							
	Finished output	46,000	100	46,000	100	46,000	100	46,000
	Normal Loss	2,500	-	-	-	-	-	-
	Less: Abnormal gain	500	100	500	100	500	100	500
	Closing Work in progress	5,000	100	5,000	70	3,500	50	2,500
55000		55,000		50,500		49,400		48,800

Computation of cost per unit:

Material A Cost

Material cost per unit = $\frac{\text{Total Cost} - \text{Scrap value of Normal loss}}{\text{Input} - \text{Normal loss}}$

Material cost per unit = {(₹ 4,11,500 – 2,500 x ₹ 3 per unit) ÷ 50,500 units} = ₹ 8 per unit

Material B cost

Material cost per unit = ₹1,97,600 ÷ 49,400 units = ₹4 per unit

Labour Cost

Labour cost per unit = ₹97,600 ÷ 48,800 units = ₹2 per unit

Overhead Cost

Labour cost per unit = ₹48,800 ÷ 48,800 units = ₹ 1 per unit

3) **Valuation of Output**

Opening Work in progress

Already incurred = ₹ 25,750

Balance in current period

- Material B = 400 units × ₹4 per unit = ₹ 1,600
- Labour = 800 units × ₹ 2 per unit = ₹ 1,600
- Overhead = 800 units × ₹ 1 per unit = ₹ 800 ₹ 4,000

= 29,750

Inputs of current period

- Material A = 46,000 units × ₹ 8 = ₹ 3,68,000
- Material B = 46,000 units × ₹ 4 = ₹ 1,84,000
- Labour = 46,000 units × ₹ 2 = ₹ 92,000
- Overhead = 46,000 units × ₹ 1 = ₹ 46,000 ₹ 6,90,000

₹ 7,19,750

4) **Calculation of closing stock per unit**:

Material A = 5,000 units × ₹ 8 per unit = ₹ 40,000
Material B = 3,500 units × ₹ 4 per unit = ₹ 14,000
Labour = 2,500 units × ₹ 2 per unit = ₹ 5,000
Overhead = 2500 units × ₹ 1 per unit = ₹ 2,500
Total closing stock = ₹ 40,000 + ₹ 14,000 + ₹ 5000 + ₹ 2,500 = ₹ 61,500

5) **Calculation of abnormal gain**:

Material A = 500 units × ₹ 8 per unit = ₹ 4,000

10. 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 202X-X1, 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.

(ICAI SM, Modified Nov. 2019, Modified Nov. 2022)

Sol.

Dr. **Process-I A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Raw Material used (₹ 60 × 7,500 units)	7,500	4,50,000	By Normal loss (5% of 7,500 units) × ₹ 12.5	375	4,688
To Direct wages	----	1,35,750	By Process-II A/c (₹ 96.7947 × 7,050 units)	7,050	6,82,403
To Direct expenses	----	81,450	By Abnormal loss (₹96.7947 × 75 units)	75	7,259
To Manufacturing Overhead		27,150			
	7,500	**6,94,350**		**7,500**	**6,94,350**

Cost per unit of completed units and abnormal loss;

$$– \; = \frac{\text{Total Cost}-\text{Realisable Value from normal loss}}{\text{Input units}-\text{Normal loss units}}$$

$$– \; = \frac{₹\,6{,}94{,}350 - ₹\,4{,}688}{7{,}500\text{ units} - 375\text{ units}} = \frac{₹\,6{,}89{,}662}{7{,}125\text{ units}} = ₹\,96.7947$$

Dr. **Process-II A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Process-I A/c	7,050	6,82,403	By Normal loss (10% of 7,050 units) × ₹ 37.5	705	26,438
To Direct Wages	----	1,29,250	By Finished Stock A/c (₹ 140.0496 × 6,525 units)	6,525	9,13,824
To Direct expenses	----	84,013			
To Manufacturing Overhead	----	19,387			
To Abnormal gain (₹ 140.0496 × 180 units)	180	25,209			
	7,230	**9,40,262**		**7,230**	**9,40,262**

Cost per unit of completed units and abnormal loss;

$$– \; \frac{\text{Total Cost}-\text{Realisable Value From Normal Loss}}{\text{Input Units}-\text{Normal Loss Units}}$$

$$– \; = \frac{₹\,9{,}15{,}053 - ₹26{,}438}{7{,}050\text{ units} - 705\text{ units}} = \frac{₹8{,}88{,}615}{6{,}345\text{ Units}} = ₹\,140.0496$$

Dr. **Finished Goods Stock A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Process II A/c	6,525	9,13,824	By Cost of Sales (₹ 140.0496 × 6,000 units)	6,000	8,40,298
			By Balance c/d	525	73,526
	6,525	**9,13,824**		**6,525**	**9,13,824**

Income Statement

Particulars	(₹)	Particulars	(₹)
To Cost of Sales (₹ 140.0496 × 6,000 units)	8,40,298	By Abnormal gain (180 units × (₹ 140.0496 – ₹ 37.50)}	18,459
To Abnormal loss (75 units × (₹ 96, 7947–₹ 12.50)}	6,322	By Sales (₹ 8,40,298 × 115%)	9,66,343
To Net Profit	1,38,182		
	9,84,802		**9,84,802**

11. 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

i) 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.

ii) 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.

iii) Cost incurred during May are material used, ₹ 4,79,000, direct labour ₹ 1,82,880, factory overheads ₹ 3,91,160.

Calculate: -

a) Using the FIFO method, the equivalent units of production for material.

b) Cost per equivalent unit for conversion cost.

(ICAI SM, Modified MTP May 2022)

Sol. **a) Calculation of Equivalent Units of Production: -**

Input	Particulars	Output	Material		Conversion cost	
			%	unit	%	unit
16,000	Opening work in progress	16,000	40	6,400	80	12,800
1,00,000	Input	-	-	-	-	-
	Finished output	76,000	100	76,000	100	76,000
	Normal Loss	-	-	-	-	-
	Abnormal loss/gain	-	-	-	-	-
	Closing Work in progress	24,000	90	21,600	40	9,600
1,16,000		1,16,000		1,04,000		98,400

b) Calculation of Cost per equivalent unit for conversion costs;

Particulars	Amount (₹)
✓ Direct Labour	1,82,880
✓ Factory Overheads	3,91,160
	5,74,040
✓ Equivalents Units	98,400
✓ **Cost per equivalent Unit (₹)**	**5.83**

12. M Ltd. produces a product-X, which passes through three processes, I, II and III. In Process-III a by-product arises, which after further processing at a cost of ₹85 per unit, product Z is produced. The information related for the month of August 2020 is as follows:

	Process I	**Process II**	**Process III**
Normal loss	5%	10%	5%
Materials introduced (7,000 units)	1,40,000	-	-
Other materials added	62,000	1,36,000	84,200
Direct wages	42,000	54,000	48,000
Direct expenses	14,000	16,000	14,000

Production overhead for the month is ₹2,88,000, which is absorbed as a percentage of direct wages.

The scrapes are sold at ₹10 per unit

Product-Z can be sold at ₹135 per unit with a selling cost of ₹15 per unit No. of units produced:

Process-I- 6,600; Process-II- 5,200, Process-III- 4,800 and Product-Z- 600 There is not stock at the beginning and end of the month.

You are required to PREPARE accounts for:

i) Process-I, II and III

ii) By-product process.

(RTP Nov. 2020, MTP July 2021)

Sol. **i) Process-I A/c**

Particulars	**Units**	**Amt. (₹)**	**Particulars**	**Units**	**Amt. (₹)**
To Materials	7,000	1,40,000	By Normal loss (5% of 7,000× 10)	350	3,500
To Other materials	-	62,000	By Process-II	6,600	3,35,955
To Direct wages	-	42,000	By Abnormal loss*	50	2,545
To Direct expenses	-	14,000			
To Production OH (**200% of ₹42,000)	-	84,000			
	7,000	**3,42,000**		**7,000**	**3,42,000**

$$\frac{*\text{₹}\,(3{,}42{,}000 - 3{,}500)}{(7{,}000 - 350)\text{units}} = \text{₹}\,50.9022$$

$$**\frac{\text{₹}\,(2{,}88{,}000)}{\text{₹}\,(42{,}000 + 54{,}000 + 48{,}000)} \text{ X } 100 = 200\%$$

Process-II A/c

Particulars	**Units**	**Amt. (₹)**	**Particulars**	**Units**	**Amt. (₹)**
To Process-I A/c	6,600	3,35,955	By Normal loss (10% of 6,600×10)	660	6,600
To Other materials	-	1,36,000	By Process-III**	5,200	5,63,206
To Direct wages	-	54,000	By Abnormal loss**	740	80,149
To Direct expenses	-	16,000			
To Production OH (200% of ₹54,000)	-	1,08,000			
	6,600	**6,49,955**		**6,600**	**6,49,955**

$$\frac{**\text{₹}\,(6{,}49{,}955 - 6{,}600)}{(6{,}600 - 660)\text{ units}} = \text{₹}108.3089$$

Process-III A/c

Particulars	**Units**	**Amt. (₹)**	**Particulars**	**Units**	**Amt. (₹)**
To Process-II A/c	5,200	5,63,206	By Normal loss (5% of 5,200×10)	260	2,600
To Other materials	-	84,200	By Product-X***	4,800	8,64,670
To Direct wages	-	48,000			
To Direct expenses	-	14,000	By Product-Z# (₹35×600)	600	21,000
To Production OH (200% of ₹48,000)	-	96,000			
To Abnormal gain***	460	82,864			
	5,660	**8,88,270**		**5,660**	**8,88,270**

*** $\frac{₹\,(8{,}05{,}406 - 2{,}600 - 21{,}000)}{(5{,}200 - 260 - 600)\text{ units}}$ = ₹180.1396

Realisable value = ₹135 – (85+15) = ₹35

ii) **By-Product Process A/c**

Particulars	**Units**	**Amt. (₹)**	**Particulars**	**Units**	**Amt. (₹)**
To Process-III A/c	600	21,000	By Product-Z	600	81,000
To Processing cost	-	51,000			
To Selling expenses	-	9,000			
	600	**81,000**		**600**	**81,000**

13. Star Ltd. manufactures chemical solutions for the food processing industry. The manufacturing takes place in a number of processes and the company uses FIFO method 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 papers 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 1,600 litres, 70% complete for labour and 60% complete for overheads. Opening work-in-process was valued at ₹ 1,06,560.
- ✓ Closing work-in-process at the end of the month was 320 litres, 30% complete for labour and 20% complete for overheads.
- ✓ Normal loss is 10% of input and total losses during the month were 1,200 litres partly due to the fire damage.
- ✓ Output sent to finished goods warehouse was 8,400 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 ₹78 for the month made up as follows:

	(₹)
Raw material	46
Labour	14
Overhead	18
	78

Required:

i) CALCULATE the quantity (in litres) of raw material inputs during the month.

ii) CALCULATE the quantity (in litres) of normal loss expected from the process and the quantity (in litres) of abnormal loss / gain experienced in the month.

iii) CALCULATE the values of raw material, labour and overheads added to the process during the month.

iv) PREPARE the process account for the month.

(RTP May 2020, Modified MTP dec 2021)

Sol. **i) Calculation of Raw Material inputs during the month:**

Quantities Entering Process	Litres	Quantities Leaving Process	Litres
Opening WIP	1,600	Transfer to Finished Goods	8,400
Raw material input (balancing figure)	8,320	Process Losses	1,200
		Closing WIP	320
	9,920		**9,920**

ii) Calculation of Normal Loss and Abnormal Loss/Gain

	Litres
Total process losses for month	1,200
Normal Loss (10% input)	832
Abnormal Loss (balancing figure)	368

iii) Calculation of values of Raw Material, Labour and Overheads added to the process:

	Material	Labour	Overheads
Cost per equivalent unit	₹46.00	₹14.00	₹18.00
Equivalent units (litre) (refer the working note)	7,488	7,744	7,872
Cost of equivalent units	₹3,44,448	₹1,08,416	₹1,41,696
Add: Scrap value of normal loss (832 units × ₹15)	₹12,480	--	--
Total value added	₹3,56,928	₹1,08,416	₹1,41,696

Workings:

Statement of Equivalent Units (litre):

Input Details	Units	Output details	Units	Equivalent Production					
				Material		Labour		Overheads	
				Units	(%)	Units	(%)	Units	(%)
Opening WIP	1,600	Units completed:							
Units introduced	8,320	- Opening WIP	1,600	--	--	480	30	640	40
		- Fresh inputs	6,800	6,800	100	6,800	100	6,800	100
		Normal loss	832	--	--	--	--	--	--
		Abnormal loss	368	368	100	368	100	368	100
		Closing WIP	320	320	100	96	30	64	20
	9,920		**9,920**	**7,488**		**7,744**		**7,872**	

iv) Process Account for the month

	Litres	Amount (₹)		Litres	Amount (₹)
To Opening WIP	1,600	1,06,560	By Finished goods [8400 × ₹ 78]	8,400	6,55,200
To Raw Materials	8,320	3,56,928	By Normal loss [832 × ₹ 15]	832	12,480
To Wages	--	1,08,416	By Abnormal loss [368 x ₹ 78]	368	28,704
To Overheads	--	1,41,696	By Closing WIP [(320 × ₹ 46) + (320 × .30 × ₹ 14) + (320 × .20 × ₹ 18)]	320	17,216
	9,920	**7,13,600**		**9,920**	**7,13,600**

14. A product passes through Process-I and Process-II.

Particulars pertaining to the Process-I are:

Materials issued to Process-I amounted to ₹80,000, Wages ₹60,000 and manufacturing overheads were ₹52,500. Normal Loss anticipated was 5% of input. 9,650 units of output were produced and transferred out from Process-I to Process II. Input raw materials issued to Process I was 10,000 units.

There were no opening stocks.

Scrap has realisable value of ₹5 per unit.

You are required to prepare:

i) Process-I Account

ii) Abnormal Gain/Loss Account

(Dec. 2021, Modified MTP May 2019)

Ans. **i)** **Process – I Account**

Particulars	**Units**	**(₹)**	**Particulars**	**Units**	**(₹)**
To Materials	10,000	80,000	By Normal loss (5% of 10,000)	500	2,500
To Wages	-	60,000	By Process-II A/c (₹20*×9,650 units)	9,650	1,93,000
To Manufacturing OH		52,500			
To Abnormal Gain A/c (₹20*×150 units)	150	3,000			
	10,150	**1,95,500**		**10,150**	**1,95,500**

$*\frac{(80,000+60,000+52,500)-2500}{10,000-500}$ =₹20

ii) **Abnormal Gain – Account**

Particulars	**Units**	**(₹)**	**Particulars**	**Units**	**(₹)**
To Normal loss A/c	150	750	By Process-I A/c	150	3,000
To Costing P&L A/c	-	2,250			
	150	**3,000**		**150**	**3,000**

15. SM Pvt. Ltd. manufactures their products in three consecutive processes. The details are as below:

	Process A	**Process B**	**Process C**
Transferred to next Process	60%	50%	
Transferred to warehouse for sale	40%	50%	100%

In each process, there is a weight loss of 2% and scrap of 8% of input of each process. The realizable value of scrap of each process is as below:

Process A @ ₹2 per ton Process B @ ₹4 per ton Process C @ ₹6 per ton.

The following particulars relate to April, 2022:

	Process A	Process B	Process C
Materials used (in Tons)	1,000	260	140
Rate per ton	₹ 20	₹ 15	₹ 10
Direct Wages	₹ 4,000	₹ 3,000	₹ 2,000
Direct Expenses	₹ 3,160	₹ 2,356	₹ 1,340

PREPARE Process Accounts- A, B and C & calculate cost per ton at each process.

(RTP Nov 2022, Modified MTP May 2023-I & II)

Ans.

Process A Account

Particulars	Tones	Amount (₹)	Particulars	Tones	Amount (₹)
To Materials	1,000	20,000	By Weight Loss	20	---
To Wages		4,000	By Scrap	80	160
To Direct Expenses		3,160	By Process B	540	16,200
			By Warehouse	360	10,800
Total	**1,000**	**27,160**	**Total**	**1,000**	**27,160**

Cost per Tonne $= \frac{27,160 - 160}{1,000 - 20 - 80}$

$= \frac{27,000}{900}$

= ₹ 30 per ton

Process B Account

Particulars	Tones	Amount (₹)	Particulars	Tones	Amount (₹)
To Process A	540	16,200	By Weight Loss	16	---
To Materials	260	3,900	By Scrap	64	256
To Wages		3,000	By Process C	360	12,600
To Direct Expenses		2,356	By Warehouse	360	12,600
Total	**800**	**25,456**	**Total**	**800**	**25,456**

Cost per Tonne $= \frac{25,456 - 256}{800 - 16 - 64}$

$= \frac{25,200}{720}$

= ₹35 per ton

Process C Account

Particulars	Tones	Amount (₹)	Particulars	Tones	Amount (₹)
To Process B	360	12,600	By Weight Loss	10	---
To Materials	140	1,400	By Scrap	40	240
To Wages		2,000	By Warehouse	450	17,100
To Direct Expenses		1,340			
Total	**500**	**17,340**	**Total**	**500**	**17,340**

Cost per Tonne $= \frac{17,340 - 240}{500 - 10 - 40}$

$= \frac{17,100}{450}$

= ₹ 38 per ton

16. The following information is given in respect of Process No. 3 for the month of January, 202X.

Opening stock----2,000 units made-up of;

Particulars	(₹)
Direct Material – I	12,350
Direct Materials – II	13,200
Direct Labour	17,500
Overheads	11,000

Transferred from Process No. 2: 20,000 units @₹6.00 per unit.

Transferred to Process No. 4: 17,000 units.

Expenditure incurred in Process No. 3;

Particulars	(₹)
Direct Materials	30,000
Direct Labour	60,000
Overheads	60,000

i) Scrap: 1,000 units ---- Direct Materials 100%, Direct Labour 60%, Overheads 40%.

ii) Normal Loss 10% of production.

iii) Scrapped units realised ₹ 4 per unit.

iv) Closing Stock: 4,000 units----Degree of completion: Direct Materials 80%, Direct Labour 60% and overheads 40%.

Prepare Process No. 3 Account using average price method. Along with necessary supporting statements.

(May 2001)

Sol. **Dr.** **Process 3 A/c** **Cr.**

Particulars	Units	(₹)	Particulars	Units	(₹)
To Opening WIP	2,000	54,050	By Normal loss	1,800	7,200
To Process 2	20,000	1,20,000	By Finished goods units	17,000	2,81,822
To Direct Materials II		30,000	By Closing balance	4,000	48,290
To Direct Labour		60,000			
To Overhead		60,000			
To Abnormal Gain	800	13,262			
	22,800	**3,37,312**		**22,800**	**3,37,312**

Working Notes: -

Statement of Equivalent Production

(Average Cost Method)

Input	Particulars	Output	Material I		Material II		Wages		Overheads	
			%	unit	%	units	%	Unit	%	unit
2,000	Opening work in progress	2,000	100	2,000	100	2,000	100	2,000	100	2,000
20,000	Input	-	-	-			-	-	-	-
	Finished output	15,000	100	15,000	100	15,000	100	15,000	100	15,000
	Normal Loss	1,800	-	-	-	-	-	-	-	-

	Abnormal loss/gain	(800)	100	(800)	100	(800)	100	(800)	100	(800)
	Closing Work in progress	4,000	100	4,000	80	3200	60	2,400	40	1,600
22,000		22,000		20,200		19,400		18,600		17,800

Statement of Cost

Particulars	Cost (₹)	Equivalent Units	Rate/Equivalent (unit) (₹)
Material I;			
✓Opening balance 2,000 units ✓Cost of 20,000 units @ ₹ 6/- per unit ✓**Less:** Scrap realized (1,800 units × ₹ 4)	12,350 1,20,000 (7,200)		
	1,25,150	**20,200**	**6.1955**
Material II;			
✓Opening stock ✓In process II	13,200 30,000		
	43,200	**19,400**	**2.2268**
Labour;			
✓Opening labour ✓In Process II	17,500 60,000		
	77,500	**18,600**	**4.1667**
Overhead;			
Opening stock In process II	11,000 60,000		
	71,000	**17,800**	**3.9898**
Total cost per unit			16.5788

Statement of Evaluation;

Particulars	(₹)
✓ Cost of 17,000 finished goods units (17,000 units × ₹ 16.5788)	2,81,839.60 or 2,81,839 (say)
✓ Cost of 800 abnormal units (800 units × ₹ 16.5788)	13,263.04 or 13,263 (say)
✓ Cost of 4,000 closing work-in-progress units	48,289.92 or 48,290 (say)

Particulars		(₹)
✓ Material I	4,000 units × ₹ 6.1955	24,782.00
✓ Material II	3,200 units × ₹ 2.2268	7,125.76
✓ Labour	2,400 units × ₹ 4.1667	10,000.08
✓ Overhead	16,00 units × ₹ 3.988	6,382.08
		48,289.92

Working Notes: -

*Normal loss given is 10% of production. Here production therefore means those units which come upto the state of inspection. In that case, opening stock plus receipts minus closing stock of WIP will represents units of production (2,000 units + 20,000 units – 4,000 units). In such case, the units of production come to 18,000 units and hence 1,800 units as normal loss unit.

17. 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;

Particulars	Kgs.
Material input quantity	2,00,000 kgs
Opening work-in-progress quantity (Material 100% and conversion 50% complete)	40,000 kgs
Work complete quantity	1,60,000 kgs
Closing work-in-progress quantity (Material 100% and conversion two-third complete)	30,000 kgs

Particulars	(₹)
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 realizable 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 kgs of product 'AX' for every kg of Product 'A' of Process I.

Of the 1,60,000 kgs per month of work completed in Process I, 40,000 kgs are sold as Product 'A' and 1,20,000 kgs are passed through Process II for sale as Product 'AX'. Process II has facilities to handle upto 1,60,000 kgs of Product 'A' per month, if required.

The monthly costs incurred in Process II (other than the cost of Product 'A') are;

Particulars	1,20,000 kgs of Product 'A' Input	1,60,000 kgs of Product 'A' Input
Material Cost	₹ 1,32,000	₹ 1,76,000
Processing Costs	₹ 1,20,000	₹ 1,40,000

Required: -

a) Determine, using the weighted average cost method, the cost per kg of Product 'A' in Process I and value of both works completed and closing work-in-progress for the month just ended.

b) Is it processing 1,20,000 kgs of Product A' further?

c) 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.

(Nov. 2006)

Sol. **<u>Statement showing the calculation of abnormal loss</u>**

Particulars	Quantity (kg)
Input	2,00,000
Less: Finished quantity (1,60,000 - 40,000)	1,20,000
Less: Closing Work in progress	30,000
Less: Normal loss 20% of 2,00,000	40,000
Abnormal Gain/ (Abnormal loss)	(10,000)

Statement showing the evaluation of equivalent units using weighted average method:

Input	Particulars	Output	Material		Conversion charges	
			%	Kg	%	Kg
40,000	Opening work in progress	40,000	100	40,000	100	40,000
2,00,000	Input					
	Finished goods	1,20,000	100	1,20,000	100	1,20,000
	Normal loss	40,000	-	-	-	-
	Abnormal loss	10,000	100	10,000	100	10,000
	Closing Work in progress	30,000	100	30,000	2/3	20,000
2,40,000		2,40,000		2,00,000		1,90,000

i) Computation of cost per unit:

Material = (20,000 + 75,000 – 0) ÷ 2,00,000 kg = ₹0.475 per kg

Processing cost = (12,000 + 1,02,000) ÷ 1,90,000 kg = ₹ 0.60 per kg

Computation of value of work completed and closing work in progress:

For work completed:

Material = 1,60,000 kg × ₹0.475 per kg = ₹76,000

Conversion cost = 1,60,000 kg x ₹ 0.60 per kg = ₹ 96,000

For closing work in progress:

Material = 30,000 kg × ₹0.475 per kg = ₹14,250

Conversion charges = (30,000 × 2/3) × ₹ 0.60 per kg = ₹ 12,000

ii) Calculation of checking the feasibility of processing 1,20,000 kg of product A in future:

If we sell the product A after process –I

Sales 1,20,000 kg × ₹ 1.60 per kg = ₹ 1,92,000

Cost of production = 1,20,000 kg × ₹ 1.075 per kg = ₹ 1,29,000

Profit = ₹ 1,92,000 - ₹ 1,29,000 = ₹ 63,000

If we further process the product A

Production of Product AX with the help of product A = 1,20,000 kg × 2 = 2,40,000 kg

Sale value of AX = 2,40,000 kg × ₹ 2 per kg = ₹ 4,80,000

Further processing cost = ₹ 1,20,000 + ₹ 132,000 = 2,52,000

Processing cost incurred at process I = 1,29,000;

Total processing cost = ₹ 3,81,000

Profit = ₹ 4,80,000 – ₹ 3,81,000 = ₹ 99,000

Profit if product sold before further processing = ₹ 63,000

Profit if product sold after further processing = ₹ 99,000

Therefore, company should go for further processing.

Calculation of minimum price that would be charged if potential buyer is found:

Cost of processing remaining 40,000 kg; Expected production of AX = 40,000 x 2 kg = 80,000 kg.

Material (₹ 1,76,000 – ₹ 1,32,000) = ₹44,000

Processing cost = ₹ 1,40,000 – ₹ 1,20,000 = ₹ 20,000

Process cost incurred at process-I = 40,000 kg × ₹ 1.075 per kg = ₹ 43,000

Total cost = ₹ 44,000 + ₹ 20,000 + ₹ 43,000 = ₹ 107,000;

Loss of profit at sale after process –I = (₹ 1.60 – ₹ 1.075) × 40,000 = ₹ 21,000

Total cost incurred for processing = ₹ 1,07,000 + ₹ 21,000 = ₹ 1,28,000

Minimum selling price = ₹ 1,28,000 ÷ 80,000 = ₹ 1.6 per kg.

18. RST Ltd. Manufactures Plastic Moulded Chair. Three models of moulded chairs, all variation of the same design is Standard, Deluxe and Executive. The Company uses an Operation Costing System.

RST Ltd. Has Extrusion, Form, Trim and Finished Operations. Plastic Sheets are produced by the Extrusion Operation. During the Forming Operation, the Plastic Sheets are moulded into Chair Seats and the legs are added. The Standard Model is sold after this operation. During the Trim Operation, the arms are added to the Deluxe and Executive Models, and the chair edges are smoothed. Only the Executive Model enters the Finish Operation, in which padding is added. All of the units produced receive the same steps within each operation. In April, units of production and Direct Materials Cost incurred are as follows;

Model	Units Produced	Extrusion Materials	Form Materials	Trim Materials	Finish Materials
Standard Model	10,500	₹ 1,26,000	₹ 42,000	₹ 0	0
Deluxe Model	5,250	₹ 63,000	₹ 21,000	₹ 15,750	0
Executive Model	3,500	₹ 42,000	₹ 14,000	₹ 10,500	₹ 21,000
Total	**19,250**	**₹ 2,31,000**	**₹ 77,000**	**₹ 26,250**	**₹ 21,000**

The total Conversion Costs for the month of April, are;

Operation	Extrusion Operation	Form Operation	Trim Operation	Finished Operations
Total Conversion Costs	₹ 6,06,375	₹ 2,97,000	₹ 1,55,250	₹ 94,500

Required: -

a) For each product produced by RST Ltd. During April, determine the unit Cost and the Total Cost.

b) Now consider the following information for May. All unit costs in May are identical to the April unit cost Calculated as above in (1). At the end of May. 1,500 units of the Deluxe Model remain in Work-in-Progress. These units are 100% complete as to Materials and 65% complete in the Trim Operation. Determine the cost of the Deluxe Model Work-in-Process inventory at the end of May.

(RTP 2003)

Sol. **a) Computation of Total and Unit Costs for each Model;**

Model	Standard	Deluxe	Executive
Materials;			
Extrusion	₹ 12.00	₹ 12.00	₹ 12.00
Form	₹ 4.00	₹ 4.00	₹ 4.00
Trim	----	₹ 3.00	₹ 3.00
Finish	----	----	₹ 6.00
Sub-Total Material Cost (a)	**₹ 16.00**	**₹ 19.00**	**₹ 25.00**
Conversion;			
Extrusion	₹ 31.50	₹ 31.50	₹ 31.50
Form	₹ 15.43	₹ 15.43	₹ 15.43
Trim	----	₹ 17.74	₹ 17.74
Finish	----	----	₹ 27.00
Sub-Total Conversion Cost (b)	**₹ 46.93**	**₹ 64.67**	**₹ 91.67**

Total Cost per unit **(c)**= (a + b)	₹ 62.93	₹ 83.67	₹ 116.67
Output Quantity in April **(d)**	10,500 units	5,250	3,500 units
Total Cost (c × d)	**₹ 6,60,765.00**	**₹ 4,39,267.50**	**₹ 4,08,345.00**

b) Valuation of WIP Inventory (1,500 units of Deluxe Model);

Particulars	Equivalent Units	Cost per E.U.	Total Cost (₹)
Materials;			
✓ Extrusion	1500	₹ 12.00	18,000.00
✓ Form	1500	₹ 4.00	6,000.00
✓ Trim	1500	₹ 3.00	4,500.00
Conversion;			
✓ Extrusion	1500	₹ 31.50	47,250.00
✓ Form	1500	₹ 15.43	23,145.00
✓ Trim (1,500 units × 65%)	975	₹ 17.74	17,296.50
Cost of 1,500 units of Deluxe Model Chairs WIP			116191.5

Working:

Computation of Cost per Equivalent Unit for each Operation;

Particulars	Extrusion	Form	Trim	Finish
✓ Equivalent Units of Materials required to produce three brands of Plastic Moulded Chairs. **(a)**	19,250 Units	19,250 Units	8,750 Units	3,500 Units
✓ Total Material Costs (given) **(b)**	₹ 2,31,000	₹ 77,000	₹ 26,250	₹ 21,000
✓ Material Cost per Equivalent Unit **(c)= (b ÷ a)**	**₹ 12.00**	**₹ 4.00**	**₹ 3.00**	**₹ 6.00**
✓ Total Conversion Costs (given) **(d)**	₹ 6,06,375	₹ 2,97,000	₹ 1,55,250	₹ 94,500
✓ Conversion Cost per Equivalent Unit **(d ÷ a)**	**₹ 31.50**	**₹ 15.43**	**₹ 17.74**	**₹ 27.00**

19. An English willow company who manufactures cricket bat buys wood as its direct material. The Forming department process 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;

Particulars	(₹)
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: -

a) Equivalent units of production for each cost.
b) The Conversion cost per Equivalent units.
c) Cost of Closing work-in-process (WIP) and finished products. **(ICAI SM)**

Sol.

a) Calculation of equivalent units of production;

Input	Particulars	Output	Material		Conversion cost	
			%	unit	%	unit
Nil	Opening work in progress	-	-	-	-	-
10,000	Input	-	-	-	-	-
	Finished output	8,000	100	8,000	100	8,000
	Normal Loss	-	-	-	-	-
	Abnormal loss/gain	-	-	-	-	-
	Closing Work in progress	2,000	100	2,000	25	500
10,000		10,000		10,000		8,500

b) Calculation of Cost per equivalent unit;

Particulars	Direct Material	Conversion Costs
✓ Total Cost (₹)	33,000	17,000
✓ Equivalent units	10,000	8,500
✓ Cost per equivalent unit (₹)	3.30	2.00

c) The Cost of Closing Work-in-Process (WIP);

Costs	Equivalent Units	Rate (₹)	Total Cost (₹)
✓ Direct Material	2,000	3.30	6,600
✓ Conversion costs	500	2.00	1,000
Total			**7,600**

The Cost of Finished Products;

Costs	Equivalent Units	Rate (₹)	Total Cost (₹)
✓ Direct Materials	8,000	3.30	26,400
✓ Conversion Costs	8,000	2.00	16,000
Total			**42,400**

20. XP Ltd. furnishes you the following information relating to process II.

i) Opening work-in-progress—NIL ii) Units introduced 42,000 units @ ₹ 12 iii) Expenses debited to the process :	₹
Direct material 61,530	
Labour	88,820
Overheads	1,76,400
iv) Normal loss in the process = 2% of input. v) Closing work-in-progress — 1200 units	
Degree of completion = Materials	100%
Labour	50%
Overhead	40%
vi) Finished output — 39500 units vii) Degree of completion of abnormal loss :	
Material	100%
Labour	80%
Overhead	60%
viii) Units scraped as normal loss were sold at ₹ 4.50 per unit. ix) All the units of abnormal loss were sold at ₹ 9 per unit.	

Prepare:

a) Statement of equivalent production.

b) Statement showing the cost of finished goods, abnormal loss and closing work-in-progress.

c) Process II account and abnormal loss account.

(Nov 2009)

Ans. **a)** **Statement of Equivalent Production**

Particulars	Output	Units	Material %	Units	Labour %	Units	Overhead %
Finished Output	39,500	39,500	100%	39,500	100%	39,500	100%
Normal Loss 2% of 42,000 units	00	--	--	--	--	--	--
	840						
Abnormal Loss (42,000 – 39,500 – 840 – 1,200)	460	460	100%	368	80%	276	60%
Closing W.I.P	1,200	1,200	100%	600	50%	480	40%
	42,000	**41,160**		**40,468**		**40,256**	

b) **Statement of Cost**

Particulars	**₹**
Units Introduced 42,000 @ 12	5,04,000
Add: Material	61,530
	5,65,530
Less: Value of Normal Loss	3,780
	5,61,750
Cost per Unit	
Material $\frac{5,61,750}{41,160} =$	₹13.648
Labour $\frac{88,820}{40,468} =$	₹2.195
Overhead $\frac{1,76,400}{40,256} =$	₹4.382
	20.225
Abnormal Loss:	
Material 460 × 13.648	6,278.08
Labour 368 × 2.195	807.76
Overhead 276 × 4.382	1,209.42
	8,295.26
Closing W.I.P.	
Material 1,200 × 13.648	16,377.60
Labour 600 × 2.195	1,317.00
Overhead 480 × 4.382	2,103.36
	19,797.96
Finished Goods	
39,500 × 20.225	₹7,98,887.50

c) **Process II Account**

Particulars	Units	Amount ₹	Particulars	Units	Amount ₹
To Opening WIP	--	Nil	By Normal Loss	840	3,780
To Input	42,000	5,04,000	By Abnormal Loss	460	8,295
To Direct Material	-+-	61,530	By Finished Goods	39,500	7,98,877
To Labour	--	88,820			
To Overhead	--	1,76,400	By Closing WIP	1,200	19,798
	42,000	8,30,750		42,000	8,30,750

Abnormal Loss Account

Particulars	Units	Amount ₹	Particulars	Units	Amount ₹
To Process II	460	8,295	By Cash (Sold @ ₹9)	460	4,140
			By Costing P & L		4,155
	460	8,295		460	8,295

21. ABC Limited manufactures a product 'ZX by using the process namely RT. For the month of May, 2007, the following data are available:

Process RT	
Material introduced (units)	16,000
Transfer to next process (units)	14,400
Work in process:	
At the beginning of the month (units) (4/5 completed)	4,000
At the end of the month (units) (2/3 completed)	3,000

Cost records:	
Work in process at the beginning of the month	
Material	₹30,000
Conversion cost	₹29,200
Cost during the month: materials	₹1,20,000
Conversion cost	₹1,60,800

Normal spoiled units are 10% of goods finished output transferred to next process.

Defects in these units are identified in their finished state. Material for the product is put in the process at the beginning of the cycle of operation, whereas labour and other indirect cost flow evenly over the year. it has no realisable value for spoiled units.

Required:

i) Statement of equivalent production (Average cost method);

ii) Statement of cost and distribution of cost;

iii) Process accounts. **(Nov 2007)**

Ans. i) **Statement of Equivalent Production of Process RT**

Input Units		Output Units	Equivalent Production			
	Particulars		**Material % units**	**%**	**Conversion cost units**	**%**
4,000	Opening WIP					
16,000	Introduced completed and transfer to next	14,400	14,400	100%	14,400	100%
	Normal Spoilage	1,440	1,440	100%	1,440	100%
	Abnormal Spoilage	1,160	1,160	100%	1,160	100%
	Closing WIP	3,000	3,000	100%	2,000	66.67%
20,000		**20,000**	**20,000**		**19,000**	

ii) Statement showing cost of each element

Particulars	Opening (₹)	Cost in Process (₹)	Total (₹)	Equivalent unit	Cost per units
Materials	30,000	1,20,000	1,50,000	20,000	7.50
Conversion cost	29,200	1,60,800	1,90,000	19,000	10.00
Statement of apportionment of cost					
Units completed	Material		14,400	7.50	1,08,000
	Conversion cost		14,400	10.00	1,44,000
					2,52,000
	Normal spoilage (10%)				25,200
Closing stock	Material		3,000	7.50	22,500
	Conversion cost		2,000	10.00	20,000
					42,500
Abnormal stock	Material		1,160	7.5	8,700
	Conversion cost		1,160	10.00	11,600
					20,300

iii) Process Account

Particulars	₹	Particulars	₹
To Opening WIP	59,200	By Profit and Loss Account (Abnormal)	20,300
To Material	1,20,000	By Transfer to next process	2,77,200
To Conversion cost	1,60,800	By Closing WIP	42,500
	3,40,000		**3,40,000**

22. 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**	
	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.

(May 2019)

Ans. **Process A A/c**

Particulars	Total (₹)	Cost (₹)	Profit (₹)	Particulars	Total (₹)	Cost (₹)	Profit (₹)
To Opening Stock	5,000	5,000	-	By Process B A/c	28,800	21,600	7,200
To Direct Materials	9,000	9,000	-				

To 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 (1/3 of the 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 (₹)**
To Opening Stock	5,500	4,500	1,000	By Finished Stock A/c	61,675	41,550	20,125
To Process A	28,800	21,600	7,200				
To Direct Materials	9,500	9,500	-				
To 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	2030	-				
Process Cost	49,340	41,550	7,790				
Profit (25% on total cost)	**12,335**	-	**12,335**				
	61,675	**41,550**	**20,125**		**61,675**	**41,550**	**20,125**

* Cost of Closing Stock $=\frac{41,600}{49,800}\times 2,490 = ₹2,080$

Finished Stock Account

Particulars	**Total (₹)**	**Cost (₹)**	**Profit (₹)**	**Particulars**	**Total (₹)**	**Cost (₹)**	**Profit (₹)**
To Opening Stock	10,000	6,000	4,000	By Costing P&L A/c	75,000	44,182	30,818
To Process A	61,675	41,550	20,125				
	71,675	47,550	24,125				
Less: Closing Stock*	(5,000)	(3,368)	(1,632)				
To Finished Stock	66,675	44,182	22,493				
To Profit	8,325	-	8,325				
	75,000	**44,182**	**30,818**		**75,000**	**44,182**	**30,818**

*Cost of Closing Stock $=\frac{₹41,550}{₹61,675}\times ₹5,000 = ₹3,368$

Working Notes:

Let the transfer price be 100 then profit is 25; i.e. cost price is ₹75.

1) If cost is ₹75 then profit is

   If cost is ₹21,600 then profit is $\frac{25}{75}\times 21,600 = ₹7,200$

2) If cost is ₹80 then profit is ₹20

If cost is ₹49,340 then profit is $\frac{20}{80}\times 49,340 = ₹12,335$

23. 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.

Particulars	Process I (₹)	Process II (₹)	Process III (₹)
Materials Issued	40,000	20,000	10,000
Labour	6,000	4,000	1,000
Manufacturing Overheads	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.

(ICAI SM)

Sol.

Process-I Account

Dr. **Cr.**

Particulars	Units	Total (₹)	Particulars	Units	Total (₹)
To Material	10,000	40,000	By Normal Loss A/c (2% of 10,000 units)	200	----
To Labour	----	6,000	By Abnormal Loss A/c (₹ 5.7142 × 50 units)	50	286
To Manufacturing OH	----	10,000	By Process-II A/c (₹ 5.7142 × 9,750 units)	9,750	55,714
	10,000	**56,000**		**10,000**	**56,000**

Cost per unit of completed units and abnormal loss;

$$- \frac{\text{Total Cost}}{\text{Input} - \text{Normal Loss}} = \frac{₹\ 56{,}000}{10{,}000 \text{ units} - 200 \text{ units}} = ₹\ 5.7142$$

Process-II Account

Dr. **Cr.**

Particulars	Units	Total (₹)	Particulars	Units	Total (₹)
To Process-I A/c	9,750	55,714	By Normal Loss A/c (5% of 9,750 units)	488	----
To Material	----	20,000	By Process-III A/c (₹ 9.6862 × 9,400 units)	9,400	91,051
To Labour	----	4,000			
To Manufacturing OH	----	10,000			
To Abnormal Gains A/c (₹ 9.6862 × 138 units)	138	1,337			
	9,888	**91,051**		**9,888**	**91,051**

Cost per unit of completed units and abnormal gain;

$$-\quad \frac{\text{Total Cost}}{\text{Inputs} - \text{Normal Loss}} = \frac{₹\ 89{,}714}{9{,}750 \text{ units} - 488 \text{ units}} = ₹\ 9.6862$$

Process-III Account

Dr. **Cr.**

Particulars	Units	Total (₹)	Particulars	Units	Total (₹)
To Process-II A/c	9,400	91,051	By Normal Loss A/c (10% of 9,400 units)	940	----
To Material	----	10,000	By Abnormal Loss A/c (₹ 13.8358 × 460 units)	460	6,364
To Labour	----	1,000	By Finished Stock A/c (₹ 13.8358 × 8,000 units)	8,000	1,10,687
To Manufacturing OH	----	15,000			
	9,400	**1,17,051**		**9,400**	**1,17,051**

Cost per unit of completed units and abnormal loss;

$$\frac{\text{Total Cost}}{\text{Inputs} - \text{Normal loss}} = \frac{₹\ 1{,}17{,}051}{9{,}400 \text{ units} - 940 \text{ units}} = ₹\ 13.8358$$

24. A Product passes from Process I and Process II, Materials issued to Process-I amounted to ₹40,000, Labour ₹30,000 and manufacturing overheads were ₹27,000. Normal loss was 3% of input as estimated. But 500 more units of output of Process-I were lost due to the carelessness of workers. Only 4,350 units of output were transferred to Process-II.

There were no opening stocks. Input raw materials issued to Process-I were 5,000 units. You are required to show Process-I account.

(Nov. 2008)

Sol. **Dr.** **Process I A/c** **Cr.**

Particulars	Qty.	(₹)	Particulars	Qty.	(₹)
To Material	5,000	40,000	By Normal loss (5000 × 3%)	150	----
To Labour		30,000	By Abnormal loss (@ ₹ 20 p.u.)	500	10,000
To Manufacturing overheads		27,000	By Transfer to Process-II A/c (@ ₹ 20 per units)	4,350	87,000
	5,000	**97,000**		**5,000**	**97,000**

Working Notes: -

Calculate of cost per unit;

$$\text{Cost per unit} = \frac{\text{Cost of Material + Labour +Overheads}}{\text{Input units} - \text{Normal loss}}$$

$$\text{Cost per unit} = \frac{40{,}000+30{,}000+27{,}000}{5{,}000 - 150}$$

$$\text{Cost per unit} = \frac{97{,}000}{4{,}850}$$

Cost per unit = ₹ 20 per unit

Note: *In the absence of any information, it is assumed that normal loss is not sold as scrap.

Service Costing
Assignment

Q. No. **Questions**

1. **The following information relates to a bus operator;**

Particulars	(₹)
Cost of the bus	18,00,000
Insurance charges (18,00,000 × 3%)	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 kms.)	2,500
Diesel and oil (for 10 kms.)	52
Commission to driver and conductor (shared equally)	10% of collections
Route distance	20 km long

The bus will make 3 round trips for carrying on 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.

(Nov. 2013, 2 times ICAI SM modified, May 2010, Modified May 2015 & Nov 2016, Modified MTP May 2022 & Nov 2022)

Ans. **Statement of Operating Costs & Revenues per month**

Particulars	Computation	(₹)	(₹)
Standing Charge;			
Depreciation	$\frac{18,00,000-1,20,000}{15\text{ years}} \times \frac{1}{12}$	9333.33	
Insurance	$18,00,000 \times 3\% \times \frac{1}{12}$	4,500	
Manager cum Accountants Salary	Given	8,000	
Annual tax	$50,000 \times \frac{1}{12}$	4166.67	
Garage rent	Given	2,500	
Total standing Charge			**28,500**
Repairs & Maintenance	$\frac{1,50,000}{12}$	12,500	**12,500**
Running Cost			
Drivers' salary	Given	15,000	
Conductors' salary	Given	12,000	
Stationery	Given	500	
Engine oil, lubricants	$\frac{3,000\text{ Km}}{1,200\text{ Km}} \times ₹\ 2,500$	6,250	
Diesel oil	$\frac{3,000\text{ km}}{10\text{ km}} \times ₹\ 52$	15,600	
Total running cost			**49,350**

Total operating cost	**(Excluding commission) (85% – 10% =75%)**		**90,350**
Add: commission	(10% on collection)		12,047
Total cost			1,02,397
Add: Profit	15%		18,070
Total takings	100%		1,20,467

Computation of fare per passenger km:

No. of passengers = 40 (given)
No. of km. per month = 1 Bus × 3 Trips × 2 ways × 20 km. × 25 days
= 3,000 km. pm.
Passenger km. p.m. = 40 × 3,000 = 1,20,000.
It is given that profit = 15% of takings &
Commission = 10% of takings.

Hence,

Total Operating Costs	= 100% – 15% – 10% = 75% of total taking.
Total Takings	= $\frac{90,350}{75\%}$ = 1,20,467

*Now, Commission & Profits are taken at 10% & 15% respectively on total takings.

Fare per Passenger Km. = $\frac{1,20,467}{1,20,000}$ = ₹ 1.00389

2. Sanziet Lifecare Ltd. operates in life insurance business, Last year it launched a new term insurance policy for practicing professionals Protection Plus'. The Company has incurred the following expenditures during the last year for the policy.

Particulars	(₹)
Policy development cost	11,25,000
Cost of marketing of the policy	45,20,000
Sales support expenses	11,45,000
Policy issuance Cost	10,05,900
Policy servicing cost	35,20,700
Claims management cost	1,25,600
IT Cost	74,32,000
Postage and logistics	10,25,000
Facilities Cost	15,24,000
Employees Cost	5,60,000
Office administration Cost	16,20,400

Number of policies sold – 528
Total insured value of policies - ₹ 1,320 Crore

Required: -

a) Calculate total cost for Professionals Protection Plus policy segregating the costs into four main activities namely.
  i) Marketing and Sales support.
  ii) Operations
  iii) IT and
  iv) Support functions.
b) Calculate Cost per policy.
c) Calculate Cost per rupee of insured value.

(ICAI SM, May 2021 RTP, Modified July 2021, Modified MTP May 2023-I)

Ans.

1) Calculation of total Cost for 'Professionals Protection Plus's policy;

Particulars	(₹)	(₹)
i) 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
ii) Operations;		
✓ Policy issuance Cost	10,05,900	
✓ Policy servicing cost	35,20,700	
✓ Claims management cost	1,25,600	46,52,200
iii) IT Cost		74,32,000
iv) 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**

2) Calculation of Cost per policy $= \frac{\textbf{Total Cost}}{\textbf{No.of policies}} = \frac{\textbf{₹ 2,36,03,600}}{\textbf{528}} = ₹\ 44{,}703.79$

3) Cost per rupee of insured Value $= \frac{\textbf{Total Cost}}{\textbf{Total Insured Value}} = \frac{\textbf{₹ 2,36,03,600 Crore}}{\textbf{₹ 1,32,00,00.0000}} = ₹\ 0.0018$

3. A transport company has a fleet of three trucks of 10 tons, capacity each plying in different directions for transport of customers' 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 tons
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	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;

Particulars		(₹)
Diesel	:	₹ 10 per liter, Each liter gives 4 km, per liter of diesel on an average
Drivers' salary	:	₹ 2,000 per month.
License and taxes	:	₹ 5,000 per annum per truck
Insurance	:	₹ 5,000 per annum for all the three vehicles.
Purchase price per truck	:	₹ 3,00,000, Life 10 years. **Scrap** value 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: -

a) Prepare an Annual Cost Statement covering the fleet of three vehicles.

b) Calculate the cost per km. run.

c) Determine the freight rate per tonne km. to yield a profit of 10% on freight.

(Nov. 2001, RTP Nov 2019, Modified MTP July 2021, Modified MTP May 2019)

Ans. **a) Annual Cost Statement of 3 vehicles;**

Particulars	Amount
Fixed Cost	
Driver Salary (2,000 × 12 Months) × 3 trucks	72,000
License & Taxes (5,000 × 3 trucks)	15,000
Insurance	5,000
Depreciation $\left(\frac{3,00,000-10,000}{10}\right) \times$ 3 trucks	87,000
General Overheads	11,084
Maintenance cost (W.N, -2)	6,000
Sub-Total	**1,96,084**

Variable Cost;

✓ Diesel $\left(\frac{₹\,10}{4\text{ Km}} \times 1,34,784\text{ Km.}\right)$(W.N-1)	3,36,960	
✓ Oil & Sundries $\left(\frac{₹\,25}{100\text{ Km}} \times 1,34,784\text{ Km.}\right)$(W.N-1)	33,696	
✓ Maintenance (0.25 × 1,34,784 Km.) (W.N-2)	33,696	
Sub-Total		4,04,352
Total Annual Cost		**6,00,436**

b) Calculation of cost/Km. Run;

- Cost/Km run = $\frac{\text{Total annual cost of 3 Trucks}}{\text{Capital effective tonnes K.m p.a.(W.N)}}$
- = $\frac{₹\,6,00,436}{5,25,312\text{ Km.tonne}}$
- = ₹ 1.14

c) Freight rate per tonne km:

- *Cost/KM = 1.14*
- *Add:* Profit $\left(\frac{₹\,1.14}{90} \times 10\right)$ = ₹ 0.13
- Freight/tonne km. = ₹1.27

Working Notes: -

1) Total km travelled and effective tons km of load carried generated by 3 trucks annually;

Truck	One way distance (Km) (A)	No. of trip /day (B)	Total distance covered/day (Km) (C) = A × 2 × B	Load carried per trip/day (tonne) (D)	Total Effective Tons Km/day (E) = A × B × D
1	16	4	128	6	384
2	40	2	160	9	720
3	30	3	180	8	720
			468		**1,824**

- Total Kms. Travelled by 3 trucks annually;
- 468 Km. × 24 days × 12 months = 1,34,784 Kms.
- Total effective tonne km of load carried by 3 trucks annually.
- 1,824 tons Km. × 24 days × 12 months = 5,25,312 tonnes Kms.

2) Segregation of fixed & Variable component of maintenance cost = Variable Maintenance cost;

- Per Km/ = $\frac{\text{Difference in Maintenance Cost}}{\text{Difference in distance travelled}}$
- $= \frac{₹\ 46{,}050 - ₹\ 45{,}175}{1{,}60{,}200\ \text{Kms} - 1{,}56{,}700\ \text{Kms.}}$
- $= \frac{₹\ 875}{3{,}500\ \text{Km.}}$
- = ₹ 0.25

Fixed Maintenance Cost;

- = Total Maintenance cost – Variable Maintenance Cost
- = ₹ 46,050 – (1,60,200 Km. × 0.25)
- = ₹ 6,000/-

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 afternoon the first trip takes the junior students and an hour later the second trip takes the senior students' home.

The distance travelled by each bus one way is 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

i) Each bus gives an average mileage of 4 km. per litre of diesel.
ii) Seating Capacity of each bus is 50 Students.
iii) 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: -

a) Prepare a Statement Showing the expenses of operating a Single bus and the fleet of five buses for a year.

b) Work Out the average Cost per Student per month in respect of-

- **i)** Students Coming from a distance of up to 4 km. from the school and
- **ii)** Students coming from a distance beyond 4 km. from the school.

(ICAI SM, May 2004, Modified December 2021, RTP Nov 2022)

Ans.

1) Statement of Expenses of Operating bus/ buses for a year;

Particulars	**Rate (₹)**	**Per Bus per annum (₹)**	**Fleet of 5 buses p.a. (₹)**
i) Standing Charges;			
✓ Driver's Salary	4,500 p.m.	54,000	2,70,000
✓ Cleaner's Salary	3,500 p.m.	8,400	42,000
✓ License fee, taxes etc.	8,600 p.a.	8,600	43,000
✓ Insurance	10,000 p.a.	10,000	50,000
✓ Depreciation (15,00,000−3,00,000) ÷ 12 years	1,00,000 p.a.	1,00,000	5,00,000
ii) Maintenance Charges;			
✓ Repairs & Maintenance	35,000 p.a.	35,000	1,75,000
iii) Operating Charges;			
✓ Diesel (Working Note 1)		1,62,000	8,10,000
✓ Total Cost [(i) + (ii) + (iii)]		3,78,000	18,90,000
✓ Cost per month		31,500	1,57,500
✓ Total no. of equivalent Students		150	750
✓ Total Cost per half fare equivalent Student		**₹ 210**	**₹ 210**

2) Average Cost per Student per Month;

a) Average Coming from distance of up to 4 km. from School

$$- = \frac{\text{Total Cost per Month}}{\text{Total no.of equivalent Students}} = \frac{₹\ 31{,}500}{150\ \text{Students}} = ₹\ 210$$

b) Students Coming from a distance beyond 4 km. from School;

– = Cost of per half fare Student × 2 = ₹ 210 × 2 = ₹420

Alternatively,

1) Let X fare to be charged per month per student covering 8km distance.

2) Let $\frac{X}{2}$ fare to be charged per month per student covering 4km distance.

3) Total fare collected per month= (50 students × X × 2trips) × 50% + (50 students × $\frac{X}{2}$ × 2 trips) × 50%.

50X + 25X = ₹31,500 ($\frac{\text{Total cost}}{12}$)
75X = ₹31500
*X = ₹420

* Fare to be charged per month per student covering 8km distance = ₹420
Fare to be charged per month per student covering 4km distance = ₹210

Working Notes: -

1) Calculation of Diesel Cost per bus:

- ✓ Distance travelled in a year;
- ✓ (8 round trip × 8 km. × 25 days × 9 months).
- ✓ Distance travelled p.a.: 14,400 km.
- ✓ Cost of diesel (per bus p.a.): $\frac{14{,}400 \text{ km}}{4 \text{ km}} \times ₹\ 45 = ₹\ 1{,}62{,}000$

2) Calculation of equivalent number of students per bus;

Seating Capacity of a bus	50 Students
Half fare Students (50% of 50 Students)	25 Students
Full Fare Students (50% of 50 Students)	25 Students
Total number of students equivalent to half fare students	
Full fare Students (25 Students × 2)	50 Students
Add: Half Fare Students	25 Students
Total Equivalent number of students in a trip	75 Students
Total number of equivalent students in two trips (Senior + Junior)	150 Students

5. Prepare the cost statement of Ignus Thermal Power Station Showing the Cost of electricity generated per kwh., from the data provided below pertaining to the year 2019-2020.

Total Units generated 20,00,000 Kwh

Particulars	(₹)
Operating labour	30,00,000
Repairs & Maintenance	10,00,000
Lubricants, spares and stores	8,00,000
Plant supervision	6,00,000
Administration Overheads	40,00,000

5 Kwh. Of electricity generated per kg. of coal consumed @ ₹ 4.25 per kg. Depreciation Charges @ 5% on Capital Cost of ₹ 5,00,00,000.

(ICAI SM, Modified SM, RTP May 2023)

Ans. **Cost Statement of Ignus Thermal Power Station**

Total units generated 20,00,000 kwh.

Particulars	Per annum (₹)	Per kwh (₹)
Fixed Costs;		
✓ Plant Supervision	6,00,000	
✓ Administration Overheads	40,00,000	
✓ Depreciation (5% of ₹ 5,00,00,000 p.a.)	25,00,000	
✓ Total fixed Cost; (A)	**71,00,000**	3.55
Variable Costs;		
✓ Operating labour	30,00,000	
✓ Lubricants, spares and stores	8,00,000	
✓ Repairs & maintenance	10,00,000	
✓ Coal Cost (Refer to working note)	17,00,000	
✓ Total Variable Cost: (B)	**65,00,000**	3.25
Total Cost [(A) + (B)]	**1,36,00,000**	**6.80**

Working Notes: -

Computation of coal cost:

Coat Cost (20,00,000 kwh, ÷ 5 kwh) × ₹ 4.25 per kg. = ₹ 17,00,000.

6. SLS Infrastructure built and operates 110 km. highway on the basis of Built-Operate-Transfer (BOT) for a period of 25 years. A traffic assessment carried out to estimate the traffic flow per day shows the following figures.

Types of Vehicles	Daily traffic Volume
Two Wheelers	44,500
Car and SUVs	3,450
Bus and LCV	1,800
Heavy Commercial Vehicles	816

The following is the estimated cost of the project.

Activities	(₹) in lakhs
Site Clearance	170.70
Land development and filling work	9,080.35
Sub base and base courses	10,260.70
Bituminous work	35,070.80
Bridge, flyovers, underpasses, Pedestrian, Subway, footbridge, etc.	29,055.60
Drainage and protection work	9,040.50
Traffic sign, marking and road appurtenance	8,405.00
Maintenance, repairing and rehabilitation	12,429.60
Environmental management	982.00
Total Project Cost	**114,495.25**

An Average Cost of ₹1,120 lakh has to be incurred on administration and toll plaza operation. On the basis of the vehicle specifications. (i.e., weight, size, time saving etc.)

The following weights has been assigned to the passing vehicles.

Type of Vehicles	(%)
Two wheelers	5%
Car and SUVs	20%
Bus and LCV	30%
Heavy Commercial Vehicles	45%

Required: -

a) Calculate the total project cost per day of concession period.

b) 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.

(ICAI SM, Modified MTP Dec 2021, MTP Nov 2019)

Ans. **1) Calculation of total project cost per day of concession period;**

Activities	(₹) In Lakhs
Site Clearance	170.70
Land development and filling work	9,080.35
Sub base and base courses	10,260.70
Bituminous work	35,070.80

Bride, flyovers, underpasses, Pedestrian subway, Footbridge etc.	29,055.60
Drainage and protection work	9,040.50
Traffic sign, marking and road appurtenance	8,405.50
Maintenance, repairing and rehabilitation	12,429.60
Environmental management	982.00
Total Project Cost	114,495.25
Administration and toll plaza operation cost	1,120.00
Total Cost	115,615.25
Concession period in days (25 years × 365 days)	9,125
Cost per day of concession period (₹ in lakh)	12.67

2) Computation of toll fee: -

- Cost to be recovered per day = Cost per day of concession period + 15% profit on cost
- = ₹ 12,67,000 + ₹ 1,90,050 = ₹ 14,57,050
- Cost per equivalent vehicle = $\frac{\text{₹ 14,57.050}}{\text{76,444 units (Refer working note)}}$
- = ₹ 19.06 per equivalent vehicle

Vehicle type-wise toll fee: -

Type of Vehicle	Equivalent Cost (A)	Weight [B]	Toll fee per vehicle [A × B]
Two wheelers	₹ 19.06	1	19.06
Car and SUVs	₹ 19.06	4	76.24
Bus and LCV	₹ 19.06	6	114.36
Heavy commercial vehicles	₹ 19.06	9	171.54

Working Notes: -

Computation of equivalent vehicles:

The Cost per day has to be recovered from the daily traffic. Each type of vehicle is to be converted into equivalent unit. Let's Convert all vehicle types equivalent to Two-wheelers.

Type of Vehicle	Daily Traffic Volume [A]	Weight	Ration [B]	Equivalent Two-Wheeler [A × B]
Two Wheelers	44,500	0.05	1	44,500
Car and SUVs	3,450	0.20	4	13,800
Bus and LCV	1,800	0.30	6	10,800
Heavy Commercial Vehicles	816	0.45	9	7,344
Total				**76,444**

7. GTC has a lorry of 6-ton carrying capacity. It operates lorry service from city A to city B. It Charges ₹ 2,400 per ton from city 'A' to city 'B' and ₹ 2,200 per ton for the return journey from city 'B' to city. 'A' Goods are also delivered to an intermediate city 'C' but no concession or reduction in rates is given. Distance between the city 'A' to 'B' is 300 km and distance from city 'A' to 'C' is 140 km.

In January 202X, the truck made 12 outward journeys for city 'B'. The details of journeys are as follows:

Outward Journey	No. of Journeys	Load (in ton)
'A' to 'B'	10	6
'A' to 'C'	2	6
'C' to 'B'	2	4

Return Journey	No. of Journeys	Load (in ton)
'B' to 'A'	5	8
'B' to 'A'	6	6
'B' to 'C'	1	6
'C' to 'A'	1	0

Annual fixed Costs and maintenance charges are ₹ 6,00,000 and ₹ 1,20,000 respectively. Running Charges Spent during January 202X are ₹ 2,94,400 (includes ₹ 12,400 paid as penalty for overloading).

You are required to: -

a) Calculate the Cost as per;
  - **i)** Commercial ton-kilometer.
  - **ii)** Absolute ton-kilometer.

b) Calculate Net Profit/loss for the month January, 202X.

(ICAI SM, Nov 2018 Modified))

Ans. **1) Calculation of total monthly cost for running truck;**

Particulars	Amount per annum (₹)	Amount per month (₹)
i) **Standing Charges;**		
✓ Annual Fixed Costs	6,00,000	50,000
ii) **Maintenance Charges;**	1,20,000	10,000
iii) **Running Cost;**		
✓ Running Charges 2,94,400		
✓ ***Less:*** Penalty paid for overloading (12,400)		2,82,000
Total Monthly Cost		**3,42,000**

a) Cost per commercial ton-km. $= \frac{₹\ 3{,}42{,}000}{44{,}856\ \text{ton}-\text{km.}} = ₹\ 7.62$

(Refer to working note-1)

b) Cost per absolute ton-km. $= \frac{₹\ 3{,}42{,}000}{44{,}720\ \text{ton}-\text{km}} = ₹\ 7.65$

(Refer to working note-2)

2) Calculation of Net Profit/Loss for the month of January 202X;

Particulars	(₹)	(₹)
Truck hire charges received during the month:		
From Outward Journey (12 trips × 6 ton × ₹ 2,400)	1,72,800	
From return Journey {(5 trips × 8 ton × ₹ 2,200) + (7 trips × 6 ton × ₹ 2,200)}	1,80,400	3,53,200
Less: Monthly running cost (as per (i) above}		(3,42,000)
Operating Profit		11,200
Less: Penalty paid for overloading		(12,400)
Net Loss for the month		(1,200)

Working Notes: -

1) Calculation of Commercial Ton-Km;

Particulars		Ton-km.
A) Total Distance Travelled		
✓ To and from (300 km × 2 × 12 trips) (in km)		7,200
B) Average Weight Carried:		
✓ Outward (12 Journeys × 6 ton + 2 Journeys × 4 ton)	80	
✓ Return (5 journeys × 8 ton + 6 Journeys × 6 ton + 1 Journey × 6 ton)	82	
Total weight	**162**	
✓ No. of journeys	26	
✓ **Average weight** (in ton) (162 ÷ 26)	**6.23**	
✓ Total Commercial Ton-km (A × B)		**44,856**

2) Calculation of Absolute Ton-km;

Particulars	Ton-km.	Ton-km.
Outward Journeys;		
✓From city A to city B (10 Journey × 300 km. × 6 ton)	18,000	
✓From city A to city C (2 journeys × 140 km. × 6 ton)	1,680	
✓From city C to city B (2 journeys × 160 km. × 4 ton)	1,280	20,960
Return Journeys;		
✓From city B to city A (5 Journeys × 300 km. × 8 ton) + (6 Journeys × 300 km. × 6 ton)	22,800	
✓From city B to city C (1 journey × 160 km. × 6 ton)	960	23,760
Total Absolute Ton-km		**44,720**

Note: -

While Calculating absolute/Commercial ton-km., Actual load carried are considered irrespective of the fact it attracts fines or penalty.

Penalty paid for overloading is an abnormal expenditure and is not included in the operating cost of the Lorry. This amount will be debited to Costing Profit and Loss A/c and hence deducted from operating profit to arrive at net profit/loss.

8. Mr. X owns a bus which runs according to the following schedule;

1) 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%
2) 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%
3) Delhi to Jaipur and back, the same day.	
Distance covered	270 km. one way
Number of days run each month:	6
Seating Capacity Occupied	100%
4) 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;

a) Delhi to Chandigarh
b) Delhi to Agra and
c) Delhi to Jaipur

(ICAI SM, RTP Nov-2021 modified)

Ans. **Monthly Operating Cost Statement;**

Kindly check the calculation and its effects-Done

Particulars	**(₹)**	**(₹)**
1) Running Costs		
✓ Diesel {(11,440 km ÷ 4 km) × ₹ 56}	1,60,160	
✓ Lubricant Oil {(11,440 km ÷ 100) × ₹ 10}	1,144	
		1,61,304
2) Maintenance Costs		
✓ Repairs & Maintenance		1000
3) Standing Charges		
✓ Salary to driver	24,000	
✓ Salary to Conductor	21,000	
✓ Salary of part-time accountant	5,000	
✓ Insurance (₹ 4,800 ÷ 12)	400	
✓ Road tax (15,915 ÷ 12)	1326.25	
✓ Permit Fee	315	
✓ Depreciation {(₹ 12,00,000 × 20%) ÷ 12}	20,000	
✓ Total Costs per month before Passenger Tax (i) + (ii) + (iii)		72,041.25
		2,34,345.25
✓ Passenger Tax*		93,738.10
✓ Total Cost		3,28,083.35
✓ ***Add:*** Profit*		1,40,607.15
✓ Total takings per month		**4,68,690.50**

***Let, total takings be X then**

- ✓ X= Total Costs per month before passenger tax + 0.2 X (Passenger tax) + 0.3 X (Profit)
- ✓ X = ₹ 2,34,345.25 + 0.2 X + 0.3 X
- ✓ 0.5 X = ₹ 2,34,345.25 or, X = ₹ 4,68,690.50
- ✓ Passenger Tax = 20% of ₹ 4,68,690.50 = ₹ 93,738.10
- ✓ Profit = 30% of ₹ 4,68,690.50 = ₹ 1,40,607.15

Calculation of Rate per passenger km. and fares to be charged for different routes;

$$\text{Rate per Passenger-Km.} = \frac{\text{Total takings per month}}{\text{Total Passenger} - \text{km per month}}$$

$$= \frac{₹\ 4{,}68{,}690.50}{5{,}20{,}500\ \text{Passenger} - \text{km.}} = ₹\ 0.90$$

Bus fare to be charged per passenger;

Delhi to Chandigarh	= ₹ 0.90 × 250 Km	= ₹ 225.00
Delhi to Agra	= ₹ 0.90 × 210 Km	= ₹ 189.00
Delhi to Jaipur	= ₹ 0.90 × 270 Km	= ₹ 243.00

<u>Working Notes: -</u>

Computation of total Distance (in km.) covered per month;

Bus route	Km. per trip	Trips per day	Days per month	Km. per month
Delhi to Chandigarh	250	2	8	4,000
Delhi to Agra	210	2	10	4,200
Delhi to Jaipur	270	2	6	3,240
				11,440

Computation of Passenger-km. per month;

Particulars	Total Seats Available Per Month (at 100% Capacity)	Capacity Utilized		Km. Per trip	Passenger- Km. per Month
		(%)	Seats		
Delhi to Chandigarh & Back	800 (50 Seats × 2 Trips × 8 days)	90	720	250	1,80,000 (720 Seats × 250 Km.)
Delhi to Agra & Back	1,000 (50 Seats × 2 Trips × 10 days)	85	850	210	1,78,500 (850 Seats × 210 Km.)
Delhi to Jaipur & Back	600 (50 Seats × 2 Trips × 6 days)	100	600	270	1,62,000 (600 Seats × 270 Km.)
Total					**5,20,500**

9. AD Higher Secondary School (AHSS) Offers Courses for 11th & 12th Standard in three streams i.e., Arts, Commerce and Science. AHSS runs higher secondary classed along with primary and secondary classes. But for accounting purpose it treats higher secondary as a separate responsibility center. The Managing committee of the school wants to revise its fee structure for higher secondary students. The accountant of the school has provided the following details for a year.

Particulars	(₹)
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
Examination's expenditure	10,80,000

Office & Administration Cost	15,20,000
Annual day expenses	4,50,000
Sports expenses	1,20,000

Other Information: -

i)

Particulars	Standard 11 & 12			Primary & Secondary
	Arts	Commerce	Science	
No. of Students	120	360	180	840
Lab Classes in a year	0	0	144	156
No. of examinations in a year	2	2	2	2
Time spent at library per student per year	180 hours	120 hours	240 hours	60 hours
Time spent by principal for administration	208 hours	312 hours	480 hours	1,400 hours
Teachers for 11 & 12 standard	4	5	6	10

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) Al 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.

(ICAI SM, RTP May 2020)

Ans. **Calculation of Cost per annum;**

Particulars	Arts (₹)	Commerce (₹)	Science (₹)	Total (₹)
Teachers Salary (W-N-1)	16,80,000	21,00,000	25,20,000	63,00,000
Re-apportionment of Economics & Mathematics teacher's salary (W-N-2)	(84,000)	1,45,091	(61,091)	----
Principal's Salary (W-N-3)	1,24,800	1,87,200	2,88,000	6,00,000
Lab assistants Salary (W-N-4)	---	----	1,72,800	1,72,800
Salary to library staff (W-N-5)	43,200	28,800	57,600	1,29,600

Salary to peons (W-N-6)	31,636	94,909	47,455	1,74,000
Salary to other staffs (W-N-7)	38,400	1,15,200	57,600	2,11,200
Examination expenses (W-N-8)	86,400	2,59,200	1,29,600	4,75,200
Office & Administration expenses (W-N-7)	1,21,600	3,64,800	1,82,400	6,68,800
Annual Day expenses (*W-N-7)	36,000	1,08,000	54,000	1,98,000
Sports expenses (W-N-7)	9,600	28,800	14,400	52,800
Total Cost per annum	**20,87,636**	**34,32,000**	**34,62,764**	**89,82,400**

a) Calculation of Cost per Student per annum;

Particulars	Arts (₹)	Commerce (₹)	Science (₹)	Total (₹)
Total Cost per annum	20,87,636	34,32,000	34,62,764	89,82,400
No. of Students	120	360	180	660
Cost per student per annum	17,397	9,533	19,238	13,610

Calculation of Profitability;

Particulars	Arts (₹)	Commerce (₹)	Science (₹)	Total (₹)
Total Fess per annum	12,000	12,000	12,000	
Cost per student per annum	17,397	9,533	19,238	
Profit/(Loss) per student per annum	(5,397)	2,467	(7,238)	
No. of students	120	360	180	
Total Profit/ (Loss)	**(6,47,640)**	**8,88,120**	**(13,02,840)**	**(10,62,360)**

b) Computation of fees to be charged to earn a 10% profit on cost;

Particulars	Arts (₹)	Commerce (₹)	Science (₹)
Cost per Student per annum	17,397	9,533	19,238
Add: Profit @ 10%	1,740	953	1,924
Fees per annum (A)	19,137	10,486	21,162
Fees per month = (A)/12	1,595	874	1,764

Working Notes: -

1) Teachers' Salary;

Particulars	Arts (₹)	Commerce (₹)	Science (₹)
No. of teachers	4	5	6
Salary per annum (₹) (₹ 35,000 × 12)	4,20,000	4,20,000	4,20,000
Total Salary	**16,80,000**	**21,00,000**	**25,20,000**

2) Re-apportionment of Economics and Mathematics teachers' Salary to commerce stream-
This is not clear

Particulars	Economics		Mathematics	
	Arts	Commerce	Science	Commerce
No. of Classes	832	208	940	160
Salary re-apportionment (₹)	(84,000)	84,000	(61,091)	61,091
	$\left(\frac{₹\,4{,}20{,}000}{1{,}040}\times 208\right)$		$\left(\frac{₹\,4{,}20{,}000}{1{,}100}\times 160\right)$	

3) Principal's Salary has been apportioned on the basis of time spent by him for administration of Classes.

4) Lab attendants' Salary has been apportioned on the basis of lab Classes attended by the students.

5) Salary of library staffs are apportioned on the basis of time spent by the students in library.

6) Salary of Peons are apportioned on the basis of number of students. The peons' Salary allocable to higher secondary classes is calculated as below;

Particulars	(₹)
✓ Peon dedicated for higher secondary (1 peon × ₹ 10,000 × 12 months)	1,20,000
✓ ***Add:*** 15% of other peons' salary (15% of (3 peons × ₹ 10,000 × 12 months)}	54,000
Total	**1,74,000**

7) Salary to Other Staffs, Office & administration Cost, Annual day expenses and sports expenses are apportioned on the basis of number of students.

Examination expenditure has been apportioned taking number of students into account (It may also be apportioned on the basis of number of examinations).

10. Navya LMV Pvt. Ltd, operates cab/ car rental service in Delhi/NCR. It provides its service to the offices of Noida, Gurugram and Faridabad. At present it operates CNG fuelled cars but it is also considering to upgrade these into Electric vehicle (EV). The details related with the owning of CNG & EV propelled cars are as tabulated below:

Particulars	**CNG Car**	**EV Car**
Car purchase price (₹)	9,20,000	15,20,000
Govt. subsidy on purchase of car (₹)	--	1,50,000
Life of the car	15 years	10 years
Residual value (₹)	95,000	1,70,000
Mileage	20 km/kg	240 km per charge
Electricity consumption per full charge	--	30 Kwh
CNG cost per Kg (₹)	60	--
Power cost per Kwh (₹)	--	7.60
Annual Maintenance cost (₹)	8,000	5,200
Annual insurance cost (₹)	7,600	14,600
Tyre replacement cost in every 5 -year (₹)	16,000	16,000
Battery replacement cost in every 8- year (₹)	12,000	5,40,000

Apart from the above, the following are the additional information:

Particulars	
Average distance covered by a car in a month	1,500 km
Driver's salary (₹)	20,000 p.m
Garage rent per car (₹)	4,500 p.m
Share of Office & Administration cost per car (₹)	1,500 p.m

Required:
CALCULATE the operating cost of vehicle per month per car for both CNG & EV options.

(RTP May 2022, Modified MTP May 2023)

Ans. **Calculation of Operating cost per month:**

	Particulars	CNG Car (₹)	EV Car (₹)
A	**Running cost:**		
	Fuel cost/ Power consumption cost [Refer WN-2]	4,500	1,425
B	**Maintenance cost:**		
	Annual Maintenance cost [Annual cost ÷12]	666.67	433.33
	Annual Insurance cost [Annual cost ÷12]	633.33	1,216.67
	Amortised cost of Tyre replacement [Refer WN-3]	177.78	133.33
	Amortised cost of Battery replacement [Refer WN-4]	66.67	4,500
		1,544.45	6,283.33
C	**Fixed cost:**		
	Depreciation [Refer WN-1]	4,583.33	10,000
	Driver's salary	20,000	20,000
	Garage rent	4,500	4,500
	Share of Office & Administration cost	1,500	1,500
		30,583.33	36,000
D	**Operating cost per month [A+B+C]**	**36,627.78**	**43,708.33**

Working Notes:

1) Calculation of Depreciation per month:

	Particulars	CNG Car	EV Car
A	Car purchase price (₹)	9,20,000	15,20,000
B	Less: Govt. subsidy (₹)	--	(1,50,000)
C	Less: Residual value (₹)	(95,000)	(1,70,000)
D	Depreciable value of car (₹) [A-B-C]	8,25,000	12,00,000
E	Life of the car	15 years	10 years
F	Annual depreciation (₹) [D÷E]	55,000	1,20,000
G	**Depreciation per month (₹) [F÷12]**	**4,583.33**	**10,000**

2) Fuel/ Electricity consumption cost per month:

	Particulars	CNG Car	EV Car
A	Average distance covered in a month (KM)	1,500	1,500
B	Mileage (KM)	20	240
C	Qty. of CNG/ Full charge required [A÷B]	75 kg.	6.25
D	Electricity Consumption [C×30kwh]	-	187.5
E	Cost of CNG per kg (₹)	60	-
F	Power cost per Kwh (₹)	-	7.60
G	**CNG Cost per month (₹) [C×E]**	**4,500**	**-**
H	**Power cost per month (₹) [D×F]**	**-**	**1,425**

3) Amortised cost of Tyre replacement:

	Particulars	CNG Car	EV Car
A	Life of vehicle	15 years	10 years
B	Replacement interval	5 years	5 years
C	No. of time replacement required	2 times	1 time
D	Cost of tyres for each replacement (₹)	16,000	16,000
E	Total replacement cost (₹) [C×D]	32,000	16,000
F	Amortised cost per year (₹) [E÷A]	2,133.33	1,600
E	Cost per month (₹) [F÷12]	177.78	133.33

4) Amortised cost of Battery replacement:

	Particulars	CNG Car	EV Car
A	Life of vehicle	15 years	10 years
B	Replacement interval	8 years	8 years
C	No. of time replacement required	1 time	1 time
D	Cost of battery for each replacement (₹)	12,000	5,40,000
E	Total replacement cost (₹) [C×D]	12,000	5,40,000
F	Amortised cost per year (₹) [E÷A]	800	54,000
E	**Cost per month (₹) [F÷12]**	**66.67**	**4,500**

11. 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 suits for its customers. Viz., single room, double rooms and triple rooms.

Following information is given;

Type of Suits	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 rom suite and that of triple rooms suite as twice of the double room's suite.

The Other expenses for the year 202X are as follows;

Particulars	(₹)
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.

(ICAI SM, Modified MTP May 2020)

Ans. **Rent to be Charged: -**

Rent to be charged for single room suite	=	₹ 33.73
Rent for double rooms suites ₹ 33.73 × 2.5	=	₹ 84.33
Rent for triple rooms suites ₹ 33.73 × 5	=	₹ 168.65

Working Notes: -

1) Total equivalent single room suites;

Nature of Suite	Occupancy (Room-days)	Equivalent Single room suites (Room-days)
Single rooms suites	36,000 (100 rooms × 360 days × 100%)	36,000 (36,000 × 1)
Double rooms suites	14,400 (50 rooms × 360 days × 80%)	36,000 (14,400 × 2.5)
Triple rooms suites	6,480 (30 rooms × 360 days × 60%)	32,400 (6,480 × 5)
		1,04,400

2) Statement of total Cost;

Particulars	(₹)
Staff Salaries	14,25,000
Room attendant's wages	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,500
Laundry Charges	80,500
Interior decoration	74,000
Sundries	1,53,000
Total	**25,21,000**
Building rent {(₹ 10,000 × 12 months) + 5% on total taking)	1,20,000 + 5% on total takings
Total Cost	**26,41,000 + 5% on total takings**

- Profit is 20% of total takings
- ∴ Total takings = ₹ 26,41,000 + 25% (5% + 20%) of total takings.
- Let R be rent for single room suite
- Then 1,04,400 R = 26,41,000 + (0.25 × 1,04,400 R)
- Or, 1,04,400 R = 26,41,000 + 26,100 R
- Or, 78,300 R = 26,41,000
- Or, **R = ₹ 33.73**

Alternatively;
Kindly check the calculation

- Let total takings be X
- ∴ X = 26,41,000 + 0.25X(5% + 20%)
- ∴ X = 35,21,333
- Let the rent of single room be R
- Then 1,04,400 R = 35,21,333

Or, R = ₹ 33.73

12. 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: -

Particulars	(₹)
Loan processor monthly salary; (4 employees @ ₹ 60,000 each)	<u>**2,40,000**</u>
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;

(ICAI SM, Modified Nov. 2022)

Ans.

Statement Showing Computation of the Cost of Processing

<u>**A typical home loan application**</u>

Particulars	(₹)
Direct Professional labor Cost (4 employees @ ₹ 60,000 each)	2,40,000
Service Overhead Cost (25% of ₹ 1,81,000)	<u>45,250</u>
Total processing Cost per month	2,85,250
No. of applications processed per month	500
Total processing Cost per home loan application	570.5

13. BHG Toll Plaza Ltd. Built a 60 km. long highway and now operates a toll plaza to collect tolls from passing vehicles using the highway. The Company has estimated that a total of 12 crore vehicles (only single type of vehicle) will be using the highway during the 10 years toll collection tenure.

Toll Operating and Maintenance Cost for the month of April 202X are as follows;

i) Salary To-
  - ✓ Collection Personnel (3 Shifts and 4 Persons per shift)– ₹ 550 per day per person.
  - ✓ Supervisor (2 Shifts and 1 person per shift)–₹ 750 per day per person
  - ✓ Security Personnel (3 Shifts and 6 persons per shift)–₹ 450 per day per person
  - ✓ Toll Booth Manager (2 Shifts and 1 person per shift)–₹ 900 per day per person

ii) Electricity – ₹ 8,00,000

iii) Telephone–₹ 1,40,000

iv) Maintenance Cost –₹ 30 Lakh

Monthly depreciation and amortization expenses will be ₹ 1.50 crore. Further. The company needs 25% Profit Over total Cost to cover interest and other costs.

Required: -

1) Calculate Cost per kilometer per month.

2) Calculate the toll rate per vehicle.

(ICAI SM, Modified Nov. 2020)

Ans. **Calculation of Cost for the month of April 202X;**

Particulars		(₹)
Salary to Collection Personnel	(3 Shifts × 4 persons per shift × 30 days × ₹ 550 per day)	1,98,000

Salary to Supervisor	(2 Shifts × 1 persons per shift × 30 days × ₹ 750 per day)	45,000
Salary to Security Personnel	(3 Shifts × 6 persons per shift × 30 days × ₹ 450 per day)	2,43,000
Salary to Toll Booth Manager	(2 Shifts × 1 persons per shift × 30 days × ₹ 900 per day)	54,000
Electricity		8,00,000
Telephone		1,40,000
Maintenance Cost		30,00,000
Total Operating Cost (A)		44,80,000
Depreciation and amortization expenses (B)		1,50,00,000
Total Cost (A+B)		**1,94,80,000**

1) Calculation of Cost Per kilometer per month;

$$- \quad = \frac{\text{Total Cost}}{\text{Total Km.}} = \frac{₹\ 1,94,80,000}{60\ \text{km.}} = ₹\ 3,24,666.67$$

2) Calculation of toll rate per vehicle;

$$- \quad = \frac{\text{Total Cost+25\% profit}}{\text{Vechiles per month}} = \frac{₹\ 1,94,80,000+₹\ 48,70,000}{10,00,000\ \text{Vehicles}} = ₹\ 24.35$$

<u>Workings: -</u>

Calculation of number of vehicles passes through the toll plaza.

$$\text{No. of vehicles using the highway per month} = \frac{\text{Total estimated vehicles}}{10\ \text{years}} \times \frac{1\ \text{Month}}{12\ \text{Month}}$$

$$\text{No. of vehicles using the highway per month} = \frac{12\ \text{Crore}}{10\ \text{years}} \times \frac{1\ \text{Month}}{12\ \text{Months}} = 10\ \text{lakhs}$$

14. A Company is considering three alternative proposals for conveyance facilities for its sales personnel who has to do considerable travelling, approximately 20,000 kilometers 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 200,000 km.
Resale Value: -₹ 80,000 at the end of the fifth year.	
Work Out the relative Cost of three proposals and rank them.	

(ICAI SM, Modified MTP Nov 2022)

Ans. **Calculation of relative costs of three proposals and their ranking;**

Particulars	Per annum (₹)	I Use of Company's Car per km. (₹)	II Use of Own Car per km. (₹)	III Use of hired Car per km. (₹)
✓Reimbursement		----	10.00	9.00*
Fixed Cost;				
✓Insurance	1,200	0.06	0.06	----
✓Taxes	800	0.04	----	0.04
✓Depreciation (₹ 6,00,000—₹ 80,000) ÷ 5 years	1,04,000	5.20	----	----
Running and Maintenance Cost:				
✓Petrol	----	6.00	----	6.00
✓Repairs and Maintenance	----	0.20	----	----
✓Tyre		0.12		0.12
Total Cost per km.	----	**11.62**	**10.06**	**15.16**
✓Cost for 20,000 km.		2,32,400	2,01,200	3,03,200
✓Ranking of proposals		II	I	III

*(₹1,80,000 ÷ 20,000 km.)
The Second alternative I.e., use of own car by the executive and reimbursement of expenses by the company is the best alternative from company's point of view.

15. A lodging home is being run in a small hill station with 100 single rooms. The home offers concessional rates during six off- season months in a year when numbers of visitor are limited. 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 202X, [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;**

✓ Staff Salary [Excluding room attendants]:	₹ 5,50,000
✓ Repairs to building	₹ 2,61,000
✓ Laundry Charges	₹ 80,000
✓ Interior	₹ 1,75,000
✓ Miscellaneous expenses	₹ 1,90,800

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.

(ICAI SM, Modified MTP Dec 2021)

Ans.

Statement of total Cost: -

Particulars	(₹)
Staff Salary	5,50,000
Repairs to building	2,61,000
Laundry & Linen	80,000
Interior	1,75,000
Sundries Expenses	1,90,800
Depreciation on Building (₹ 200 Lakhs × 80% × 5%)	8,00,000
Depreciation on Furniture & Equipment (₹ 200 Lakhs × 20% × 15%)	6,00,000
Room attendant's wages (₹ 10 per Room Day for 21,600 Room Days)	2,16,000
Lighting Charges (W.N. 2)	72,000
Total Cost	29,44,800
Add: Profit Margin (20% on Room rent or 25% on Cost)	7,36,200
Total Rent to be charged	36,81,000

Calculation of Room Rent per day: -

- Total Cost/ Equivalent Full Room days = ₹ 36,81,000/18,000 = ₹ 204.50
- Room Rent during Season —₹ 204.50
- Room Rent during Off Season = ₹ 204.50 × 50% = ₹ 102.25

<u>Working Notes: -</u>

1) Total Room days in a year;

Season	Occupancy (Room-days)	Equivalent Full Room Charge days
Season – 80% Occupancy	100 Rooms × 80% × 6 months × 30 days in a month = 14,400 Room Days.	14,400 Room Days × 100% = 14,400
Off-season-40% Occupancy	100 Rooms × 40% × 6 months × 30 days in a month = 7,200 Room Days.	7,200 Room Days × 50% = 3,600
Total Room Days	14,400 + 7,200 = 21,600 Room Days	18,000 Full Room days

2) Lighting Charges: -

- ✓ It is given in the question that lighting Charges for 8 months is ₹120 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;

Seasons	Occupancy (Room-days)
✓ Season & Non-winter—80% Occupancy	– 100 Rooms × 80% × 6 months × ₹ 120 per month = ₹ 57,600
✓ Off-Season & Non-winter—40% Occupancy (8—6 months)	– 100 Rooms × 40% × 2 months × ₹ 120 per month = ₹ 9,600
✓ Off-Season & winter—40% Occupancy months.	– 100 Rooms × 40% × 4 months × ₹ 30 per month = ₹ 4,800
Total Lighting Charges	₹ 57,600 + 9,600 + 4,800 = ₹ **72,000**

16. ABC Hospital runs a Critical Care Unit (CCU) in a hired building. CCU consists of 35 beds and 5 more beds can be added, if required.

Rent per month - ₹ 75,000
Supervisors—2 persons—₹ 25,000 per month—each
Nurses—4 persons—₹ 20,000 per month—each
Word 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

i) It was estimated that for 150 days in a year 35 beds are occupied and for 80 days only 25 beds are occupied.

ii) 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.

(ICAI SM, Modified Jan 2021)

Ans. **1) Statement of Profitability;**

Particulars	**(₹)**	**(₹)**
Income for the year (₹ 2,000 per patient per day × 8,000 patient days)		1,60,00,000
Variable Costs;		
✓ Doctor Fees (₹ 2,50,000 per month × 12)	30,00,000	
✓ Food to Patients (Variable)	8,80,000	
✓ Other Services to Patients (Variable)	3,00,000	
✓ Laundry Charges (Variable)—(₹)	6,00,000	
✓ Medicines (Variable)—(₹)	7,50,000	
✓ Bed Hire Charges (₹ 100 × 750 Beds)	75,000	
✓ Total Variable Costs		56,05,000
✓ Contribution		1,03,95,000
Fixed Costs;		
✓ Rent (₹ 75,000 per month × 12)	9,00,000	
✓ Supervisor (2 persons × ₹ 25,000 × 12)	6,00,000	
✓ Nurses (4 persons × ₹ 20,000 × 12)	9,60,000	
✓ Ward Boys (4 persons × ₹ 5,000 × 12)	2,40,000	
✓ Repairs (Fixed)	81,000	
✓ Other fixed expenses—(₹)	10,80,000	
✓ Administration expenses allocated—(₹)	10,00,000	
✓ Total Fixed Costs		48,61,000
✓ Profit		55,34,000
✓ Profit Per Patient Day (55,34,000/8000)		691.75

2) Breakeven Point = Fixed Cost/Contribution per Patient day
= ₹ 48,61,000/₹ 1,299.375
= 3,741 Patient days

Working Notes: -

1) Calculation of number of patient days;

35 Beds × 150 days	=	5,250
25 Beds × 80 days	=	2,000
Extra beds	=	750
Total	=	**8,000**

2) Calculation of Contribution per Patient Day;

- Total Contribution –₹ 1,03,95,000
- Total Patient days–8,000

Contribution per Patient Day–₹ 1,03,95,000/8,000=₹ 1,299.5

17. In order to develop tourism, ABCL airline has been given permit to operate three flights in a week between X and Y cities (both side). The airline operates a single aircraft of 160 seats capacity. The normal occupancy is estimated at 60% throughout the year of 52 weeks. The one-way fare is ₹ 7,200. The cost of operation of flights are;

Fuel cost (variable) Food served on board on non-chargeable basis Commission	₹ 96,000 per flight ₹ 125 per passenger 5% of fare applicable for all booking
Fixed cost;	
Aircraft lease	₹ 3,50,000 per flight
Landing charges	₹ 72,000 per flight

Required: -

a) Calculate the net operating income per flight.

b) 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.

(May 2005)

Ans.

Particulars	**(₹)**	**(₹)**
1) Fare collection (96 × 7,200)		6,91,200
Less: **Variable costs;**		
✓ Fuel	96,000	
✓ Commission (5% of 6,91,200)	34,560	
✓ Food (96 × 125)	12,000	
✓ Total Variable cost		1,42,560
✓ Contribution per flight (6,91,200 – 1,42,560)		5,48,640
Less: **Fixed Costs;**		
✓ Landing charges	72,000	
✓ Lease	3,50,000	4,22,000
✓ **Net income per flight (5,48,640 – 4,22,000)**		**1,26,640**
2) Fare Collection (108 × 6,720)		**7,25,760**
Less: Variable Costs;		
✓ Fuel	96,000	
✓ Commission (5% of 7,25,760)	36,288	
✓ Food (108 × 125)	13,500	**1,45,788**
✓ Contribution		**5,79,972**

*There is an increase in contribution by ₹ 31,332. Hence, the proposal is acceptable.

Number of Passengers $160 \times \frac{60}{100} = 96$

18. A Mineral is transported from two mines ---- ‘A’ and ‘B’ and unloaded at plots in a Railway Station. Mine A is at a distance of 10 Kms. And B is at a distance of 15 Kms. From railhead plots. A fleet of lorries of 5 tonne carrying capacity is used for the transport of mineral from the mines. Records reveal that the lorries average a speed of 30 Kms. Per hour, when running and regularly take 10 minutes to unload at the railhead, at mine ‘A’ loading time averages 30 minutes per load while at mine ‘B’ loading time averages 20 minutes per load. Drivers’ wages, depreciation, insurance and taxes are found to cost ₹9 per hour operated. Fuel, oil, tyres, repairs and maintenance cost ₹1.20 per km.

Draw up a statement, showing the cost per tonne-kilometer of carrying mineral from each mine.

(Nov. 2000)

Ans. **Statement showing cost per tonne km of carrying mineral from each time;**

Particulars	**Mine A**	**Mine B**
Fixed cost per trip;		
✓ (Driver wages, Dep., Insurance, & Taxes) ✓ A: 1 hours. 20 Min @ ₹ 9 per hour ✓ B: 1 hours 30 Min @ ₹ 9 per hour ✓ (W.N.1)	12	13.50
Variable cost;		
✓ (Fuel, Oil, Tyre, Repair & Maintenance) ✓ A: 20 Km @ ₹ 1.20/Km. ✓ B: 30 Km @ ₹ 1.20/Km.	24	36
Total cost per trip (1)	**36**	**49.50**
✓ **Effective tonnes Km trip (2)** (W, N.2)	50	75
✓ **Cost per tonne Km ($^{1}/_{2}$)**	₹ 0.72	₹ 0.66

Working Notes: -

1) Total operated time 1 trip;

Particulars	**Mine A**	**Mine B**
✓ Running time to & from	40 Min $\left(\frac{60\text{ Min}}{30\text{ Km}} \times 10\text{ Km} \times 2\right)$	60 Min $\left(\frac{60\text{ Min}}{30\text{ Km}} \times 15\text{ Km} \times 2\right)$
✓ Unloading time	10 Min	10 Min
✓ Loading time	30 Min	20 Min
Total	**80 Min**	**90 Min**

2) Effective tonnes Km generated per trip;

Mine A	**Mine B**
5 tonnes × 10 Km. = 50 tonnes Km.	5 tonnes × 15 Km. 75 tonnes Km

19. A transport company has 20 vehicles, the capacities are as follows:

No. of Vehicles	**Capacity per vehicle**
5	9 MT
6	12 MT
7	15 MT
2	20 MT

The company provides the goods transport service between stations 'A' to station 'B'. Distance between these stations is 100 kilometers. Each vehicle makes one round trip per day on an average. Vehicles are loaded with an average of 90 per cent of capacity at the time of departure from station 'A' to station 'B' and at the time of return back loaded with 70 per cent of capacity. 10 per cent of vehicles are laid up for repairs every day. The following information is related to the month of August, 20X1:

Salary of Transport Manager	₹60,000
Salary of 30 drivers	₹20,000 each driver
Wages of 25 Helpers	₹12,000each helper
Loading and unloading charges	₹850 each trip
Consumable stores (depends on running of vehicles)	₹ 1,35,000
Insurance (Annual)	₹ 8,40,000
Road License (Annual)	₹ 6,00,000
Cost of Diesel per liter	₹ 78
Kilometers run per liter each vehicle	5 Km.
Lubricant, Oil etc.	₹ 1,15,000
Cost of replacement of Tyres, Tubes, other parts etc. (on running basis)	₹ 4,25,000
Garage rent (Annual)	₹ 9,00,000
Routine mechanical services	₹ 3,00,000
Electricity charges (for office, garage and washing station)	₹ 55,000
Depreciation of vehicles (on time basis)	₹ 6,00,000

There is a workshop attached to transport department which repairs these vehicles and other vehicles also. 40 per cent of transport manager's salary is debited to the workshop. The transport department has been apportioned ₹88,000 by the workshop during the month. During the month operation was for 25 days.

You are required:

i) CALCULATE per ton-km operating cost.

ii) DETERMINE the freight to be charged per ton-km, if the company earned a profit of 25 per cent on freight.

(RTP Nov. 2020)

Ans. **i) Operating Cost Sheet for the month of August, 2020**

	Particulars	Amount (₹)
A	**Fixed Charges**	
	Manager's salary (₹60,000 × 60%)	36,000
	Drivers' Salary (₹20,000 × 30 drivers)	6,00,000
	Helpers' wages (₹12,000 × 25 helpers)	3,00,000
	Insurance (₹8,40,000 ÷ 12 months)	70,000
	Road licence (₹6,00,000 ÷ 12 months)	50,000
	Garage rent (₹9,00,000 ÷ 12 months)	75,000
	Routine mechanical services	3,00,000
	Electricity charges (for office, garage and washing station)	55,000
	Depreciation of vehicles	6,00,000
	Apportioned workshop expenses	88,000
	Total (A)	**21,74,000**
B	**Variable Charges**	
	Loading and unloading charges (Working Note 1)	7,65,000

	Consumable Stores	1,35,000
	Cost of diesel (Working Note 2)	14,04,000
	Lubricant, Oil etc.	1,15,000
	Replacement of Tyres, Tubes & other parts	4,25,000
	Total (B)	28,44,000
C	**Total Cost (A+B)**	**50,18,000**
D	Total ton-km (Working Note.3)	9,43,200
E	**Cost per ton-km. (C ÷ D)**	**5.32**

ii) Calculation of Chargeable Freight

Cost per ton-km.	₹5.32
Add: Profit @ 25% on freight or 33⅓% on cost	₹1.77
Chargeable freight per ton-km.	₹7.09

Working Notes:

1) Wages paid to loading and unloading labour

Numbers of vehicles available per day × No. of days × trips × wages per trip

(20 vehicles × 90%) × 25 days × 2 trips × ₹850

18 × 25 × 2 × 850 = ₹7,65,000

2) Cost of Diesel:

Distance covered by each vehicle during August, 2020

= 100 km. × 2 × 25 days × 90% = 4,500 km.

Consumption of diesel = $\frac{4500\text{ km} \times 20\text{ vehicles}}{5\text{ k.m.}}$ = 18,000 litres.

Cost of diesel = 18,000 litres × ₹78 = ₹14,04,000.

3) Calculation of total ton-km:

Total Ton-Km. = Total Capacity × Distance covered by each vehicle × Average capacity utilisation

$=\{(5 \times 9\text{ MT}) + (6 \times 12\text{MT}) + (7 \times 15\text{ MT}) + (2 \times 20\text{MT})\} \times 4500\text{ k.m.} \times \frac{(90\% + 70\%)}{2}$

= (45 + 72 + 105 + 40) × 4,500 km. × 80%

= 262 × 4,500 km. × 80%

= 9,43,200 ton-km.

20. 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 liter
Diesel cost	₹ 60 per liter
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 analyzed into Running cost and Fixed cost.
2) Calculate the vehicle operating cost per km and per tonne km.
(Assume 52 weeks in a year.)

(May 2019)

Ans. **1) Statement showing Operating Cost**

Amount (₹)

	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- $\left(\frac{₹9,50,000-₹1,50,000}{1,60,000\ km} \times 3,200\ km\right)$	16,000	4,000
	Depreciation on tyres- $\left(\frac{₹52,500}{25,000\ km} \times 3,200\ km\right)$	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.

2) Calculation of vehicle operating cost:

Operating cost per k.m. $= \frac{₹\ 68,320}{3,200\ kms}$ or $\frac{₹17,080}{800\ kms}$ = 21.35

Operating cost per Tonne-k.m. $= \frac{₹\ 68,320}{16,000}$ or $\frac{₹\ 17,080}{4,000}$ = 4.27

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

21. Mention the cost units (physical measurements) for the following Industry/product:

i) Automobile
ii) Gas
iii) Brick works
iv) Power
v) Steel
vi) Transport (by road)
vii) Chemical

viii) Oil
ix) Brewing
x) Cement

(Nov. 2022)

Ans.

Industry/product	**Cost unit Basis**
Automobile	Number
Gas	Cubic feet
Brick works	Number of bricks
Power	Kilo-watt hour (kWh)
Steel	Ton
Transport (by road)	Passenger- kilometer
Chemical	Litre, gallon, kilogram, ton etc.
Oil	Barrel, tonne, litre
Brewing	Barrel
Cement	Ton/ per bag etc.

22. Following are the data pertaining to Infotech Pvt. Ltd. For the year 20X1-X2.

Particulars	**(₹)**
Salary to Software Engineers (5 persons)	15,00,000
Salary to Project Leaders (2 pe sons)	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 purchase 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.

(ICAI SM)

Ans. **Project Cost Sheet:**

Particulars		**(₹)**
Salary Cost;		
Salary of Software Engineers	(3 × ₹ 25,000 × 6 months)	4,50,000
Salary of Project Leader	(₹ 37,500 × 6 months)	2,25,000
Salary of Project Manager	(₹ 50,000 × 2 months)	1,00,000
Total Salary		7,75,000
Overheads	(50% of Salary)	3,87,500
Travel Expenses		1,87,500
Depreciation on Laptops	(₹ 1,00,000/2 years × 6 months)	25,000
To al Project Cost		**13,75,000**

Working Notes: -

1) Calculation of Cost per month and Overhead absorption rate;

Particulars	Total Per Annum	Per Person Per Annum	Per Person Per Month
Salary to Software Engineer (5 Persons)	₹ 15,00,000	₹ 3,00,000	₹ 25,000
Salary to Project Leaders (2 Persons)	₹ 9,00,000	₹ 4,50,000	₹ 37,500
Salary to Project Manager	₹ 6,00,000	₹ 6,00,000	₹ 50,000
Total	**₹ 30,00,000**		**₹ 1,12,500**

2) Total Overhead = Repairs & Maintenance + Administration Overheads

$$= ₹\ 3{,}00{,}000 + ₹\ 12{,}00{,}000 = ₹\ \mathbf{15,00,000}$$

3) Calculation of Overhead absorption rate;

$$= \frac{\text{Total Overhead}}{\text{Total Salary}} \times 100\% = \frac{₹15{,}00{,}000}{₹30{,}00{,}000} \times 100\% = 50\%$$

23. RST Toll Plaza Limited built an 80 kilometer long highway between two cities and operates a toll plaza to collect tolls from passing vehicles using the highway. The company has estimated that 50,000 light weight, 12,000 medium weight and 10,000 heavy weight vehicles will be using the highway in one month in outward journey and the same number for return journey. As per government notification, vehicles used for medical emergencies, Members of Parliament, and essential services are exempt from toll charges. It is estimated that 10% of light weight vehicles will pass the highway for such use.

It is the policy of the company that if vehicles return within 24 hours of their outward journey, the toll fare will be reduced by 25 percent automatically. It is estimated 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 operating and maintenance cost for a month is ₹59,09,090. The company requires a profit of 10% over the total cost to cover interest and other costs.

Required:

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 return journey concession facility is available, assuming that the revenue earned from light weight vehicles calculated in option (i) remains the same.

(May 2023)

Ans.

i) Calculation of toll rate for each type of vehicle (If concession is not available)

Toll rate= $\frac{\text{Cost+Profit}}{Number\ of\ vehicles}$

$= \frac{₹59{,}09{,}090+(10\%\ \text{of}\ ₹59{,}09{,}090)}{₹2{,}50{,}000\ (W.N)}$

$= \frac{65{,}00{,}000}{2{,}50{,}000}$

= ₹26 Per light Vehicle

Medium Vehicle = ₹26 X 2.5 = 65

Heavy Vehicle = ₹26 X 5 = 130

Working Note –

Calculation of Equivalent number of vehicles –

Type	Number of Journey (Both Ways)	Weight	Equivalent
Light	1,00,000 – (10% of 1,00,000) = 90,000	1	90,000
Medium	24,000	2.5	60,000
Heavy	20,000	**5**	1,00,000
			2,50,000

ii) New toll rates (assuming revenue unchanged)-

Total revenue earned = ₹23,40,000
Total Light vehicle journeys = 90,000
Light vehicles journeys (W/O Concession) = 76,500
Light vehicles journeys (With Concession) = 13,500
(Return journey X 30%)

Revenue from Light vehicles journeys (With Concession) = ₹23,40,000 / 90,000 X 13,500 = ₹3,51,000
Revenue from Light vehicles journeys (W/o Concession) = ₹23,40,000 / 90,000 X 76,500 = ₹19,89,000
Revenue lost due to concession = 13,500 X 26 X 25% = ₹87,750

Toll rate from –

a) Light vehicles journeys (W/O Concession)
= ₹19,89,000 +₹87,750 / 76500 =
27.14

b) Light vehicles journeys (With Concession)
= ***19.5**
***(26 – 25% of 26)**

Standard Costing
Assignment

Q. No. | **Question / Answers**

1. XYZ Ltd. Has furnished you the following information for the month of August, 20X1: -

Particulars	Budget	Actual
Output (units)	30,000	32,500
Hours	30,000	33,000
Fixed overhead	₹ 45,000	50,000
Variable overhead	₹ 60,000	68,000
Working days	25	26

Calculate overhead variances.

(ICAI SM modified, Modified in May.2017, Nov.2018, May 2014 RTP, MTP May 2020, RTP May 2014)

Ans. **Calculation of variances: -**

Fixed overhead variances: -

i) Fixed Overhead Cost Variance = Recovered Overhead − Actual Overhead
= 48,750 − 50,000
= **₹ 1,250 (A)**

ii) Fixed Overhead Expenditure Variance = Budgeted Overhead − Actual Overhead
= 45,000 − 50,000
= **₹ 5,000 (A)**

iii) Fixed Overhead Volume Variance = Recovered Overhead − Budgeted Overhead
= 48,750 − 45,000
= **₹ 3,750 (F)**

iv) Fixed Overhead Efficiency variance = Recovered Overhead − Standard Overhead
= 48,750 − 49,500
= **₹750 (A)**

v) Fixed Overhead Capacity Variance = Standard Overhead − Revised Budgeted Overhead
= 49,500 − 46,800
= **₹ 2,700 (F)**

vi) Calendar variance = (Actual Days − Budget Days) × Standard rate per day
= (26 − 25) × 1,800 = ₹ 1,800 (F)

Variable Overhead Variances: -

i) Variable Overhead Cost variance = Recovered Overhead − Actual Overhead
= 65,000 − 68,000 = ₹ 3,000(A)

ii) Variable Overhead Expenditure Variance = Standard Overhead − Actual Overhead
= 66,000 − 68,000 = ₹ 2,000 (A)

iii) Variable Overhead Efficiency Variance
= Recovered Overhead − Standard Overhead
= 65,000 − 66,000 = ₹ 1,000 (A)

Working Notes:

Basic Calculations: -

Standard hours per unit	$= \frac{\text{Budgeted hours}}{\text{Budgeted units}} = \frac{30,000}{30,000} = 1$ hour
Standard hours for actual output	$= 32,500$ units $\times 1$ hr $= 32,500$
Standard overhead rate per hour	$= \frac{\text{Budgeted overhead}}{\text{Budgeted hours}}$
For fixed overhead	$= \frac{45,000}{30,000} =$ ₹1.50 per hour
For Variable overhead	$= \frac{60,000}{30,000} =$ ₹2 per hour
Standard Fixed Overhead rate per day	= ₹ 45,000 ÷ 25 days = ₹1,800
Recovered overhead	= Standard hours for actual output × Standard rate
For fixed overhead	= 32,500 hrs.× ₹1.50 = ₹ 48,750
For Variable overhead	= 32,500 hrs.× ₹2 = ₹ 65,000
Standard overhead	= Actual hours × Std. rate
For fixed overhead	= 33,000 × 1.50 = ₹49,500
For variable overhead	= 33,000 × 2 = ₹66,000
Revised budget hours	$= \frac{\text{Budgeted hours}}{\text{Budgeted days}} \times$ Actual days
	$= \frac{30,000}{25} \times 26 = 31,200$ hours

*Revised Budgeted overhead (for fixed overhead)= 31,200 × 1.50 = ₹46,800

2. 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.

(Modified in ICAI SM, May 2009, RTP May 2013 and May 2018, Nov. 2017, Modified MTP May 2022 & MTP May 2019)

Ans. **Calculation of Variances: -**

a) Material Cost Variance = Standard cost − Actual cost

= 6,400 − 7,750 = ₹ 1,350(A)

b) Material Price Variance = (Standard Price − Actual Price) × Actual Quantity

A = (6 − 7) × 750 = ₹ 750 (A)

B = (4 − 5) × 500 = ₹ 500 (A)

Material Price Variance = ₹ 1,250 (A)

c) Material Usages Variance = (Standard Quantity − Actual Quantity) × Standard Price

A = (800 − 750) × 6 = ₹ 300(F)

B = (400 − 500) × 4 = ₹ 400(A)

Material Usages Variance = ₹ 100 (A)

Workings: -

i) Standard cost for 1,000 kg

A = 800 kg (8 ÷ 10 × 1000) × ₹6 = 4,800

B = <u>400</u> kg (4 ÷ 10 × 1000) × ₹4 = <u>1,600</u>

1,200 6,400

ii) Actual cost for 1,000 kg.

A = 750 kg × ₹7 = 5,250

B = <u>500</u> kg × ₹5 = <u>2,500</u>

1,250 7,750

3. LM Limited produces a product 'S×4' which is sold in a 10 kg. packet. The Standard Cost card per packet of 'S× 4' is as follows: -

Particulars	(₹)
Direct materials 10 kg @ ₹ 90 per kg	900
Direct labour 8 hours @ ₹ 80 per hour	640
Variable Overhead 8 hours @ ₹ 20 per hour	160
Fixed Overhead	250
	1,950

Budgeted output for a quarter of a year was 10,000 kg. Actual output is 9,000 kg. Actual costs for this quarter are as follows: -

Particulars	(₹)
Direct Materials 8,900 kg @ ₹ 92 per kg.	8,18,000
Direct Labour 7,000 hours @ ₹ 84 per hour	5,88,000
Variable Overhead incurred	1,40,000
Fixed Overhead incurred	2,60,000

You are required to Calculate: -

a) Material Usage Variance
b) Material Price Variance
c) Material Cost Variance.
d) Labour Efficiency Variance
e) Labour Rate Variance
f) Labour Cost Variance
g) Variable Overhead Cost Variance
h) Fixed Overhead Cost Variance

(May 2021 RTP, Nov. 2020 RTP, Modified Nov 2013, Modified RTP Nov 2019, Modified ICAI SM, Modified MTP May 2019)

Ans.

a) Material Usage Variance = Standard Price (Std. Quantity − Actual Quantity)

= ₹ 90 (9,000 kg − 8,900 kg.)

= ₹ **9,000** (**Favourable**)

b) Material Price Variance = Actual Quantity (Standard Price − Actual Price)

= 8,900 kg. (₹ 90 − ₹ 92) = ₹ **17,800** (**Adverse**)

c) Material Cost Variance = Standard Material Cost − Actual Material Cost

= (Standard Quantity × Standard Price) − (Actual Quantity × Actual Price)

= (9,000 kg.× ₹ 90) − (8,900 kg × ₹ 92)

= ₹ 8,10,000 − ₹ 8,18,800

= ₹ **8,800** (**Adverse**)

d) Labour Efficiency Variance $= \text{Standard Rate (Standard Hours} - \text{Actual Hours)}$

$$= ₹\,80\left(\frac{9{,}000}{10} \times 8 \text{ hours} - 7{,}000 \text{ hours.}\right)$$

$$= ₹\,80(7{,}200 \text{ hours} - 7{,}000 \text{ hours.})$$

$$= ₹\,\mathbf{16{,}000}\ (\mathbf{Favourable})$$

e) Labour Rate Variance $= \text{Actual Hours (Standard Rate} - \text{Actual Rate)}$

$$= 7{,}000 \text{ hours } (₹\,80 - ₹\,84)$$

$$= ₹\,\mathbf{28{,}000}\ (\mathbf{Adverse})$$

f) Labour Cost Variance $= \text{Standard Labour Cost} - \text{Actual Labour Cost}$

$$= (\text{Standard Hours} \times \text{Standard Rate}) - (\text{Actual Hours} \times \text{Actual Rate})$$

$$= (7{,}200 \text{ hours} \times ₹\,80) - (7{,}000 \text{ hours} \times ₹84)$$

$$= ₹\,5{,}76{,}000 - ₹\,5{,}88{,}000$$

$$= ₹\,\mathbf{12{,}000}\ (\mathbf{Adverse})$$

g) Variable Cost Variance $= \text{Standard Variable Cost} - \text{Actual Variance Cost}$

$$= (7{,}200 \text{ hours} \times ₹\,20) - ₹\,1{,}40{,}000$$

$$= ₹\,\mathbf{4{,}000}\ (\mathbf{Favourable})$$

h) Fixed Overhead Cost Variance $= \text{Absorbed Fixed Overhead} - \text{Actual Fixed Overhead}$

$$= \frac{₹\,250}{10 \text{ kgs}} \times 9{,}000 \text{ kgs} - ₹\,2{,}60{,}000$$

$$= ₹\,2{,}25{,}000 - ₹\,2{,}60{,}000 = ₹\,\mathbf{35{,}000}\ (\mathbf{Adverse})$$

4. Following data is extracted from the books of XYZ Ltd. For the month of January, 20X1: -

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

Other Information: -

Material Cost Variance = ₹3,625 (F)

Material Price Variance = ₹175 (F)

You are required to Calculate: -

a) Standard Price of Material-A;

b) Actual Quantity of Material-B;

c) Actual Price of Material-A;

d) Revised Standard Quantity of Material-A and Material-B;

e) Material Mix Variance.

(ICAI SM, Modified MTP Nov 2020, Modified MTP May 2022, Modified MTP May 2023-I)

Ans.

a) Material Cost Variance (A+B) = {(Standard Quantity × Standard Price) – (Actual Quantity × Actual Price)}

₹3,625 = (Standard Quantity × Standard Price) – ₹59,825

(Standard Quantity × Standrd Price) = ₹ 63,450

$(\text{Standard Quantity}_A \times \text{Standard Price}_A + (\text{Standard Quantity}_B \times \text{Standard Price}_B)$
$= ₹\ 63{,}450$

$(940\text{ kg} \times \text{Standard Price}_A) + (705\text{ kg} \times ₹30) = ₹\ 63{,}450$

$(940\text{ kg} \times \text{Standard Price}_A) + ₹\ 21{,}150 = ₹\ 63{,}450$

$(940\text{ kg} \times \text{Standard Price}_A) = ₹\ 42{,}300$

$\text{Standard Price}_A = \frac{₹\ 42{,}300}{940\text{ kg}}$

Standard Price of Material – A = ₹45

Working Notes: -

Standard Quantity i.e., quantity of inputs to be used to produce actual output

$= \frac{1{,}480\text{ kg}}{90\%} = 1{,}645\text{ kg}$

$\text{Standard Quantity}_A = \frac{800\text{ kg}}{(800+600)} \times 1{,}645\text{ kg.} = 940\text{ kg}$

$\text{Standard Quatity}_B = \frac{600\text{ kg}}{(800+600)} \times 1{,}645\text{ kg} = 705\text{ kg}$

b) Material Price Variance (A+B) = {(Actual Quantity × Standard Price) – (Actual Quantity × Actual Price)}

₹ 175 = (Actual Quantity × Standard Price) – ₹ 59,825

(Actual Quantity × Standard Price) = ₹ 60,000

$(\text{Actual Quantity}_A \times \text{Standard Price}_A) + (\text{Actual Quantity}_B \times \text{Standard Price}_B) = ₹60{,}000$

$900\ (\text{kg} \times ₹45(\text{from(i)above})) + (AQ_B \times ₹30) = ₹60{,}000$

$₹40{,}500 + (AQ_B \times ₹30) = ₹\ 60{,}000$

$(AQ_B \times ₹30) = ₹\ 19{,}500$

$AQ_B = \frac{19{,}500}{30} = 650\text{ kg}$

Actual Quantity of Material B =650kg.

c) (Actual Quantity × Actual Price) = ₹ 59,825

$(\text{Actual Quantity}_A \times \text{Actual Price}_A) + (\text{Actual Quantity}_B \times \text{Actual Price}_B)$
$= ₹\ 59{,}825$

$(900\text{ kg} \times \text{Actual Price}_A) + (650\text{ kg (from (ii)above)} \times ₹\ 32.5) = ₹\ 59{,}825$

$(900\text{ kg} \times \text{Actual Price}_A) + ₹\ 21{,}125 = ₹\ 59{,}825$

$(900\text{ kg} \times \text{Actual Price}_A) = 38{,}700$

$\text{Actual Price}_A = \frac{38{,}700}{900} = 43$

Actual Price of Material – A = ₹43

d) Total Actual Quantity of Material A and Material B

$= \text{Actual Quantity}_A + \text{Actual Quantity}_B = 900\text{ kg} + 650\text{ kg (from (ii) above)}$
$= 1{,}550\text{ kg}$

Now,

$\text{Revised Standard Quantity}_A = \frac{800\text{ kg}}{(800+600)} \times 1{,}550\text{ kg} = \mathbf{886\text{ kg}}$

$\text{Revised Standard Quantity}_B = \frac{600\text{ kg}}{(800+600)} \times 1{,}550\text{ kg} = \mathbf{664\text{ kg}}$

e) Material Mix Variance (A + B) = {(Revised Standard Quantity × Standard Price) − (Actual Quantity × Standard Price)}

= {(Revised Standard Quantity$_A$ × Standard Price$_A$) + (Revised Standard Qunatity$_B$ × Standard Price$_B$) − 60,000}

= (886 kg (from (iv) above) × ₹45 (from (i) above)) + (664 kg (from (iv) above) × ₹30) − ₹ 60,000

= (39,870 + 19,920) − 60,000 = **₹210** (**A**)

5. **QS Limited 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 working hours	74,000

Actual overheads amounted to ₹2,95,000, out of which ₹62,500 are fixed. Overheads are based on the following flexible budget: -

Production (units)	Total Overheads (₹)
8,000	1,80,000
10,000	2,10,000
14,000	2,70,000

Calculate following overhead variances on the basis of hours: -

a) Variable overhead Efficiency Variance.
b) Variable Overhead expenditure Variance.
c) Fixed overhead Efficiency Variance.
d) Fixed Overhead Capacity Variance.

(May 2012, May 2015, ICAI SM)

Ans.

a) **Variable Overhead Efficiency Variance: -**

- ✓ = Standard Rate per hour (Standard Hours − Actual Hours)
- ✓ = ₹ 3 (77,800 hours − 74,000 hours)
- ✓ = ₹ **11,400** (**F**)

b) **Variable Overhead Expenditure Variance: -**

- ✓ = Actual Hours (Standard Rate − Actual Rate)
- ✓ = 74,000 hours (₹ 3 − ₹ 3.1419)
- ✓ = ₹ **10,500** (**A**)

c) **Fixed Overhead Efficiency Variance: -**

- ✓ = Standard Rate per Hour (Standard Hours − Actual Hours)
- ✓ = ₹ 1(77,800 hours − 74,000 hours)
- ✓ = ₹ **3,800** (**F**)

d) **Fixed Overhead Capacity Variance: -**

- ✓ = Standard Rate per Hour (Actual Hours − Budgeted Hours)
- ✓ = ₹ 1 (74,000 Hours − 60,000 Hours)
- ✓ = ₹ 74,000 − ₹ 60,000 = ₹ **14,000** (**F**)

Workings: -

1) Variable Overhead rate per unit

$$- \quad = \frac{\text{Difference of Overhead at two level}}{\text{Difference in Production units}}$$

$$- \quad = \frac{₹\,2,10,000 - ₹\,1,80,000}{10,000 \text{ units} - 8,000 \text{ units}} = ₹\,15$$

2) Fixed Overhead = ₹ 1,80,000−(8,000 units × ₹ 15) = ₹ 60,000

3) Standard hours per unit of production

$$= \frac{\text{Std.Overhead Absorption Rate}}{\text{Std.Rate per hour}} = \frac{₹\,20}{₹\,4} = 5 \text{ hours}$$

4) Standard Variable Overhead Rate per hour

$$= \frac{\text{Variable Overhead per unit}}{\text{Std.hour per unit}} = \frac{₹\,15}{5 \text{ hours}} = ₹\,3$$

5) Standard Fixed Overhead Rate per hour = ₹ 4 −₹ 3 = ₹ 1.

6) Actual Variable Overhead = ₹ 2,95,000 − ₹ 62,500 = ₹ 2,32,500.

7) Actual Variable Overhead Rate per hour$= \frac{₹\,2,32,500}{74,000 \text{ hours}}$

$$= ₹\,3.1419$$

8) Budgeted hours = 12,000 units × 5 hours = 60,000 hours

Standard Hours for Actual Production = 15,560 units × 5 hours = 77,800 hours.

6. The standard output of 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:

a) Total Labour Cost Variance.

b) Total Labour Rate Variance.

c) Total Labour Gang Variance.

d) Total Labour Yield Variance, and

e) Total Labour Idle Time Variance.

(July 2021, RTP May 2022 Modified, ICAI SM)

Ans. **i) Total Labour Cost Variance**

= (Standard hours × Standard Rate) – (Actual Hours × 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

$= 3800 \times \left(6 - \frac{3840 \times 6}{3,800}\right)$

= 0

Note - As the number of workers in the standard and actual is same , there is no difference in mix ratio, so labour gang variance will be NIL.

iv) Total Labour Yield Variance

= Average Standard Rate per hour of Standard Gang × {Total Standard Time (hours) - Total Actual Time worked (hours)}

= 6 × (3,840 – 3,800)

= 240F

v) Total Labour idle time variance

= Total Idle hours x standard rate per hour

= 200 hours × 6

= 1,200A

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) × SR = 240F

(3,840 – 3,800) x SR = 240

Standard Rate (SR) = ₹ 6 per hour

7. Gama Ltd. has furnished the following standard cost data per unit of production:

- ✓ Material 10 kg @ ₹ 10 per kg.
- ✓ Labour 6 hours @ ₹ 5.50 per hour.
- ✓ Variable overhead 6 hours @ ₹ 10 per hour.
- ✓ Fixed overhead ₹ 4,50,000 per month (Based on a normal volume of 30,000 labour hours).

The actual cost data for the month of August 20X1 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.

(Nov. 2011, Modified Dec. 2021, MTP July 2021)

Ans. **i)** Material Cost Variance = Total Standard Cost for Actual Output – Total Actual Cost
= 4,800 × 10 × 10 – 5,25,000
= 4,80,000 – 5,25,000
= 45,000 (A)

ii) Labour Cost Variance = Total Standard Cost of labour for Actual Output – Total Actual Cost of labour
= 4,800 × 6.0 × 5.50 – 1,55,000
= 1,58,400 – 1,55,000
= 3,400 (F)

iii) Fixed OH Cost Variance = Recovered Fixed overhead – Actual Fixed overhead
= 90 × 4,800 – 4,70,000
= 38,000 (A)

iv) Variable OH Cost Variance = Recovered Variable overheads – Actual Variables overheads
= [(4,800 × 6 × 10) – 293000]
= 2,88,000 – 2,93,000
= 5,000 (A)

Working Notes:

Budgeted Production 30,000/6 = 5,000 units
Budgeted Fixed Overhead Rate = 4,50,000/5,000
= ₹90 per unit

8. The following information is available from the cost records of Vatika & Co.
For the month of August, 2009:
Material purchased 24,000 kg ₹ 1,05,600
Material consumed 22,800 kg
Actual wages paid for 5,940 hours ₹ 29,700
Unit produced 2160 units
Standard rates and prices are:
Direct material rate is ₹ 4.00 per kg.
Direct labour rate is ₹4.00 per hour
Standard input is 10 kg. for one unit
Standard requirement is 2.5 hours per unit
Calculate all material and labour variances for the month of August, 2009.

(Modified ICAI SM, Nov. 2009, Modified MTP Nov. 2022)

Ans. **Material Variances**

i) Material Cost Variance

= (Standard Quantity × Standard Price) – (Actual Quantity × Actual Price)
= (2,160 × 4 × 10) – (22,800 × 4.40)
= ₹86,400 – ₹1,00,320
= 13,920 (A)

ii) Material Price Variance

= Actual Quantity (Standard Price – Actual Price)
= 22,800 Kg (4 – 4.40)
= 9,120 (A)

iii) Material Usage Variance

= Standard Price (Standard Quantity – Actual Quantity)
= 4 (21,600 – 22,800)
= 4,800 (A)

Note: unit basis for direct material has been taken as kg. hence, direct material rate is ₹4 per kg.

Verification

MCV = MPV + MUV
13,920 (A) = 9,120 (A) + 4,800 (A)

Labour Variances

i) Labour Cost Variance

= (Standard Hour × Standard Rate) – (Actual Hour × Actual Rate)
= (2,160 × 2.50 × 4) – (29,700)
= 21,600 -29,700 = 8,100 (A)

ii) Labour Rate Variance

= Actual Hour (Standard Rate – Actual Rate)
= 5,940 (4 – 5) = 5,940 (A)

iii) Labour Efficiency Variance

= Standard Rate (Standard Hour – Actual Hour)
= 4 (5,400 – 5,940) = 2,160 (A)

Verification:

LCV = LRV + LEV
8,100 (A) = 5,940 (A) + 2,160 (A)

9. **The standard cost of a chemical mixture is as follows: -**

- **i)** 40% Material A at ₹20 per kg
- **ii)** 60% Material B at ₹ 30 per kg
- **iii)** A Standard loss of 10% of input is expected in production. The cost records for a period showed the following usage: -
- **iv)** 90 kg material A at a cost of ₹ 18 per kg
- **v)** 110 kg material B at a cost of ₹ 34 per kg
- **vi)** The quantity produced was 182 kg of good product.

Calculate all material variances.

(ICAI SM, Nov. 2019)

Ans. **Calculation of Variances: -**

1) Material Cost Variance = (Standard cost of Actual output − Actual cost)
= (5,257.78 − 5,360) = ₹ 102.22 (A)

2) Material Price Variance = (Standard Price − Actual Price) × Actual Quantity
Material A = (20 − 18) × 90 = ₹ 180.00 (F)
Material B = (30 − 34)) × 110 = ₹ 440.00(A)
Material Price Variance = ₹ **260.00 (A)**

3) Material Usage Variance = (Standard Quantity for Actual output − Actual Quantity) × Standard Price

Material A = $\left(80 \times \frac{182}{180} - 90\right) \times 20$ = ₹ 182.22(A)

Material B = $\left(120 \times \frac{182}{180} - 110\right) \times 30$ = ₹ 340.00 (F)

Material Usage Variance = ₹ **157.78 (F)**

Workings: -

Standard cost for 180 kg. output

A = 80kg ×₹20 = 1600
B = 120kg ×₹30 = 3600
200
Less: loss 20
180 5200

Actual cost for 182 kg. output

A = 90kg × ₹18 = 1620
B = 110kg × ₹34 = 3740
200
Less: loss 18
182 5360

Standard cost of actual output = ₹ 5,200 × $\frac{182}{180}$ = ₹5,257.78

10. 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 of variable nature)	1,80,000
Variable	6,00,000

Actual production during the month of April, 20X1 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 20X1:

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

(Dec. 2021, Modified MTP Nov. 2019)

Ans. **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 = 13,08,000/20*12 = ₹ 5450
Fixed Overhead Calendar Variance = (19-20) x 5450 = 5450(A)

Working Notes

Fixed Overheads = $\frac{\text{Budgeted Fixed Overheads}}{\text{Budgeted Output}} = \frac{\text{₹ 12,00,000}}{\text{1,20,000 units}}$	₹ 10
Fixed Overheads element in Semi-Variable Overheads i.e. 60% of ₹1,80,000	₹ 1,08,000
Fixed Overheads = $\frac{\text{Budgeted Fixed Overheads}}{\text{Budgeted Output}} = \frac{\text{₹ 1,08,000}}{\text{1,20,000 units}}$	₹ 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 = $\frac{\text{Budgeted Variable Overheads}}{\text{Budgeted Output}} = \frac{\text{₹ 6,72,000}}{\text{1,20,000 units}}$	₹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 = $\frac{\text{Budgeted Fixed Overheads}}{\text{Budgeted Days}}$ × Actual Days = $\left[\frac{\text{*₹ 1,09,000}}{\text{20 Days}} \times \text{19 Days}\right]$	₹ 1,03,550

*109000= (12,00,000/12)+(1,08,000/12)	
Actual Fixed Overheads (₹1,10,000 + 60% of ₹ 19,200)	₹ 1,21,520
Actual Variable Overheads (₹48,000 + 40% of ₹19,200)	₹ 55,680

11. 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, 20X1, 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.

(ICAI SM, May 2019)

Ans. **a) i) Labour Cost Variance = (Standard Hour × Standard Rate – Actual Hour × Actual Rate)**

Skilled	20,000 × 6 – 18,000 × 7	= ₹ 6,000(A)
Semi-Skilled	30,000 × 4 – 33,000 × 3.5	= ₹ 4,500 (F)
Unskilled	50,000 × 3 – 58,000 × 4	= ₹ 82,000 (A)
Total		**= ₹ 83,500(A)**

ii) Labour Rate Variance = (Standard Rate – Actual Rate) × Actual Hour Paid

Skilled	(6 – 7) × 18,000	= ₹ 18,000 (A)
Semi-Skilled	(4 – 3.5) × 33,000	= ₹ 16,500 (F)
Unskilled	(3 – 4) × 58,000	= ₹ 58,000 (A)
Total		**= ₹ 59,500 (A)**

iii) Labour Efficiency Variance = (Standard Hour – Actual Hour worked) × Standard Rate

Skilled	(20,000 – 17,500) × 6	= ₹ 15,000 (F)
Semi-Skilled	(30,000 – 32,300) × 4	= ₹ 9,200 (A)
Unskilled	(50,000 – 57,200) × 3	= ₹ 21,600 (A)
Total		**= ₹ 15,800 (A)**

iv) Labour Idle Time Variance = (Idle Hours × Standard Rate)

Skilled	500 × 6	= ₹ 3,000 (A)
Semi-Skilled	700 × 4	= ₹ 2,800 (A)
Unskilled	800 × 3	= ₹ 2,400 (A)
Total		**= ₹ 8,200 (A)**

v) Labour Mix Variance = (Revised Standard Hour – Actual Hour $_{\text{Worked}}$) × Standard Rate

- ✓ Revised Standard hours = $\frac{\text{Standard Hours}}{\text{Total Standard hours}} \times$ Total Actual Hours
- ✓ Skilled $\left(\frac{20,000}{1,00,000} \times 1,07,000 - 17,500\right) \times 6 = ₹23,400$ (F)
- ✓ Semi-Skilled $\left(\frac{30,000}{1,00,000} \times 1,07,000 - 32,300\right) \times 4 = ₹\ 800$ (A)
- ✓ Unskilled $\left(\frac{50,000}{1,00,000} \times 1,07,000 - ₹57,200\right) \times 3 = ₹\ 11,100$ (A)
- ✓ **Total $= ₹\ \underline{11,500\ (F)}$**

vi) Labour Yield Variance = (Standard Hour – Revised Standard Hour) × Standard Rate

- ✓ Skilled $\left(20,000 - \frac{20,000}{1,00,000} \times 1,07,000\right) \times 6 = ₹\ 8,400$ (A)
- ✓ Semi-Skilled $\left(30,000 - \frac{30,000}{1,00,000} \times 1,07,000\right) \times 4 = ₹\ 8,400$ (A)
- ✓ Unskilled $\left(50,000 - \frac{50,000}{1,00,000} \times 1,07,000\right) \times 3 = ₹\ 10,500$(A)
- ✓ **Total $= ₹\ \underline{27,300\ (A)}$**

b) Labour Rate Variance = (Standard Rate – Actual Rate) × Actual Hour Paid

Skilled	(6 − 5.5) × 5,000	
	(6 − 7) × 13,000	= ₹ 10,500 (A)
Semi-Skilled	(4 − 3.5) × 33,000	= ₹ 16,500 (F)
Unskilled	(3 − 4) × 58,000	= ₹ 58,000(A)
Total		**= ₹ 52,000(A)**

Working Notes: -

Particulars	**Budget**			**Standard for Actual**			**Actual**		
	Hours	**Rate (₹)**	**(₹)**	**Hours**	**Rate (₹)**	**(₹)**	**Hours**	**Rate (₹)**	**(₹)**
Skilled	2	6	12	20,000	6	1,20,000	18,000	7	1,26,000
Semi-Skilled	3	4	12	30,000	4	1,20,000	33,000	3.5	1,15,500
Unskilled	5	3	15	50,000	3	1,50,000	58,000	4	2,32,000
	10		**39**	**1,00,000**		**3,90,000**	**1,09,000**		**4,73,500**

Particulars	**Idle Hours**	**Hours worked**
Skilled	500	17,500
Semi-skilled	700	32,300
Unskilled	800	57,200
Total	**2,000**	**1,07,000**

12. 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, 20X1, 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 Idle Time Variance
v) Labour Mix Variance

(Modified in ICAI SM & Nov. 2012)

Ans. **i)** Labour Cost Variance = (SH × SR) – (AH × AR)
= (1,14,400 – 1,54,400)
= ₹40,000 (A)

ii)

Labour Rate Variance = AH (SR – AR) or (AH × SR) – (AH × AR)		
Skilled	₹1,12,000 - ₹1,20,000	₹8,000 (A)
Semi-skilled	₹26,000 – ₹24,000	₹2,000 (F)
Unskilled	₹10,000 – ₹10,400	₹400 (A)
		₹6,400 (A)

iii)

Labour Efficiently Variance = SH (SH – AH) or (SR × SH) – (SR × AH)		
Skilled	₹67,200 - ₹1,12,000	₹44,800 (A)
Semi-skilled	₹31,200 – ₹26,000	₹5,200 (F)
Unskilled	₹16,000 – ₹10,000	₹6,000 (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

$$= 1{,}980 \text{ hour} \times \left(\frac{₹1{,}44{,}400}{1{,}760\ hrs.} - \frac{1{,}440\ hrs.\times ₹70+360\ hrs.\times ₹65+180\ hrs.\times ₹50}{1{,}980\ hrs.}\right)$$

= ₹4,500 (A)

v)

Labour Idle time variance = Idle time × Std. rate		
Skilled	(40 – 36) × 40 × 70	₹11,200 (A)
Semi-skilled	(40 – 36) × 10 × 65	₹2,600 (A)
Unskilled	(40 – 36) × 5 × 50	₹1,000 (A)
		₹14,800 (A)

Working Notes:

Category of workers	SH* × SR	AH$^{@}$ × SR	AH$^{@}$ × AR	RSH$^{\#}$ × SR
Skilled	960 × ₹ 70 = ₹67,200	1,600 × ₹70 = ₹1,12,000	1,600 × ₹75 = ₹1,20,000	1,200 × ₹70 = ₹84,000
Semi-skilled	480 × ₹65 = ₹31,200	400 × ₹65 = ₹26,000	400 × ₹60 = ₹24,000	600 × ₹65 = ₹39,000
Unskilled	320 × ₹50 = ₹16,000	200 × ₹50 = ₹10,000	200 × ₹52 = ₹10,400	400 × ₹50 = ₹20,000
Total	**1,14,400**	**1,48,000**	**1,54,400**	**1,43,000**

*Actual hours produced × $\frac{Std.labour\ hours}{Total\ Std.labour\ hours}$

Std. hrs. for actual output are calculated as follows:

Skilled = 1,200 $X\frac{1,600}{2,000} = 960\ hours$

Semi-skilled = 600 $X\frac{1,600}{2,000} = 480\ hours$

Unskilled = 400 $X\frac{1,600}{2,000} = 320\ hours$

@ Actual No. of workers × 40 hours

Actual hrs. worked × $\frac{Std.hrs}{Total\ hrs\ (Std.)}$

13. 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, 20X1 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, 20X1, 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: -

a) **Variable Overhead Variances: -**
  - **i)** Variable Overhead expenditure variance.
  - **ii)** Variable overhead efficiency variance.

b) **Fixed Overhead Variances: -**
  - **i)** Fixed overhead budget variance.
  - **ii)** Fixed overhead capacity variance.
  - **iii)** Fixed overhead efficiency variance.

c) **Control Ratios: -**
  - **i)** Capacity ratio.
  - **ii)** Efficiency ratio.
  - **iii)** Activity ratio.

(Jan 2021, May 2001)

Ans. **i) Computation of variable overhead Variances: -**

a) Variable overhead expenditure variance = Revised Standard variable overheads-
  - ✓ Actual variable overheads
  - ✓ Variable overhead expenditure variance = 1,05,600 − 1,02,000 −
  - ✓ Variable overhead expenditure variance = ₹3,600 (F)

b) Variable overhead efficiency variance = Revised standard overheads – Actual recovered overheads
  - ✓ Variable overhead efficiency variance = 1,05,600 − 8,100 × 12
  - ✓ Variable overhead efficiency variance = ₹ 8,400 (A)

Working Notes: -

- ✓ Variable overhead recovery rate $= \frac{\text{Budgeted variable overheads}}{\text{Estimated production hours}}$
- ✓ Total estimated variable labour hours = 52 workers × 25 days × 8 days
  = 10,400 hours
- ✓ Normal down time $= 15\%$ of $10,400 = 1,560$ hours
- ✓ Budgeted available hours $= 10,400$ hours $- 1560$ hours $= 8,840$ hours
- ✓ Variable overhead recovery rate$= \frac{1,06,080}{8,840} =$ ₹12 Per labour hour
- ✓ Revised Variable standard overhead $= \frac{1,06,080}{8,840} \times 8,800 =$ ₹ 1,05,600

ii) Computation of fixed overhead variance: -

a) Fixed overhead budgeted variance = Budgeted Fixed overhead− Actual Fixed overhead

- ✓ Fixed overhead budgeted variance $= 2,21,000 - 2,00,000$
- ✓ Fixed overhead budgeted variance = ₹21,000(F)

b) Fixed overhead capacity variance = (Actual hours − Budgeted hours) × Recoveryrate

- ✓ Fixed overhead capacity variance $= (8100 \times 25) - (8,840 \times 25)$
- ✓ Fixed overhead capacity variance = ₹ 18,500 (A)

c) Fixed overhead efficiency variance = (Standard hours − Actual hours) × Recovery rate

- ✓ Fixed overhead efficiency variance $= (8,800 - 8,100) \times 25$
- ✓ Fixed overhead efficiency variance = ₹ 17,500 (F)

Working Notes: -

- ✓ Recovery rate$= \frac{\text{Budgeted fixed overheads}}{\text{Budgeted hours}}$
- ✓ Recovery rate$= \frac{2,21,000}{8,840} =$ ₹25 per hour

iii) Computation of control ratios: -

a) Capacity Ratio$= \frac{\text{Actual hours worked}}{\text{Budgeted Hours}} \times 100$

Capacity Ratio$= \frac{8,100}{8,840} \times 100 = 91.6289\%$

b) Efficiency Ratio$= \frac{\text{Required time as per standard}}{\text{Actual hours worked}} \times 100$

Efficiency Ratio$= \frac{8800}{8100} \times 100 = 108.6419\%$

c) Activity Ratio$= \frac{\text{Standard Hours}}{\text{Budgeted Hours}} \times 100$

Activity$= \frac{8,800}{8,840} \times 100 = 99.5475\%$

14. Following data is available for ABC Ltd.:

Standard working hours	8 hours per day of 5 days per Week
Maximum Capacity	60 employees
Actual working	50 employees
Actual hours expected to be worked per four week	8,000 hours
Standard hours expected to be earned per four week	9,600 hours
Actual hours worked in the four week period	7,500 hours
Standard hours earned in the four week period	8,800 hours

The related period is of four weeks. Calculate the following Ratios :

i) Efficiency Ratio

ii) Activity Ratio
iii) Standard Capacity Usage Ratio
iv) Actual Capacity Usage Ratio
v) Actual Usage of Budgeted Capacity Ratio

(May 2019, Modified MTP Nov. 2019)

Ans.

i) Efficiency Ratio:

$$= \frac{\text{Standard Hours}}{\text{Actual Hours}} \times 100$$

$$\frac{8{,}800 \text{ hours}}{7{,}500 \text{ hours}} \times 100 = 117.33\%$$

ii) Activity Ratio:

$$= \frac{\text{Standard Hours}}{\text{Budgeted Hours}} \times 100$$

$$\frac{8{,}800 \text{ hours}}{8{,}000 \text{ hours}} \times 100 = 110\%$$

iii) Standard Capacity Usage Ratio:

$$\frac{\text{Budgeted Hours}}{\text{Maximum possible Hours in the budgeted period}} \times 100$$

$$\frac{8{,}000 \text{ hours}}{9{,}600 \text{ hours}} \times 100 = 83.33\%$$

iv) Actual Capacity Usage Ratio:

$$\frac{\text{Actual Hours Worked}}{\text{Maximum possible working Hours in a period}} \times 100$$

$$\frac{7{,}500 \text{ hours}}{9{,}600 \text{ hours}} \times 100 = 78.125\%$$

v) Actual Usage of Budgeted Capacity Ratio:

$$\frac{\text{Actual working Hours}}{\text{Budgeted Hours}} \times 100$$

$$\frac{7{,}500 \text{ hours}}{8{,}000 \text{ hours}} \times 100 = 93.75\%$$

Working Notes:

1) Maximum Capacity in a budget period
= 60 Employees × 8 Hrs. × 5 Days × 4 Weeks = 9,600 Hrs.
2) Budgeted Hours (Hrs)
= 50 Employees × 8 Hrs. × 5 Days × 4 Weeks = 8,000 Hrs.
3) Actual Hrs. = 7,500 Hrs. (given)
4) Standard Hrs. for Actual Output = 8,800 Hrs.

15. ABC Ltd. Had prepared the following estimation for the month of January: -

Particulars	Quantity	Rate (₹)	(₹)
Material-A	800 kg.	90.00	72,000
Material-B	600 kg.	60.00	36,000
Skilled labour	1,000 hours	75.00	75,000
Unskilled labour	800 hours	44.00	35,200

i) 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.
ii) At the end of the month the following information has been collected from the cost accounting department.
iii) The company has produced 1,480 kg. finished product by using the followings: -

Particulars	Quantity	Rate (₹)	(₹)
Material-A	900 kg.	86.00	77,400
Material-B	650 kg.	65.00	42,250
Skilled labour	1,200 hours	71.00	85,200
Unskilled labour	860 hours	46.00	39,560

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.

(May RTP 2020, Modified RTP May 2023)

Ans.

a) Material Cost Variance (A+B) = {(Standard Quantity × Standard Price) − (Actual Quantity × Actual Price)}

= {1,26,900 − 1,19,650} = 7,250 (F)

b) Material Price Variance (A+B) = {(Actual Quantity × Standard Price) − (Actual Quantity × Actual Price)

= {1,20,000 − 1,19,650} = 350 (F)

c) Material Mix Variance (A+B) = {(Revised Standard Quantity × Standard Price) − (Actual Quantity × Standard Price)}

= {1,19,580 − 1,20,000} = 420(A)

d) Material Yield Variance (A+B) = {(Standard Quantity × Standard Price) − (Revised Standard Quantity × Standard Price)}

= {1,26,900 − 1,19,580} = 7,320 (F)

Working Notes:

Material Variances: -

Computation of Standard Quantity (W.N.-1) × Standard Price

A = 940 kg × ₹ 90 = 84,600
B = 705 kg × ₹ 60 = 42,300
1645 kg 1,26,900

Computation of Revised Standard Quantity (W.N.-2) × Standard Price

A = 886 kg × ₹ 90 = 79,740
B = 664 kg × ₹ 60 = 39,840
1550 kg 1,19,580

Computation of Actual Quantity × Standard Price

A = 900 kg × ₹ 90 = 81,000
B = 650 kg × ₹ 60 = 39,000
1550 kg 1,20,000

Computation of Actual Quantity × Actual Price

A = 900 kg × ₹ 86 = 77,400
B = 650 kg × ₹ 65 = 42,250
1550 kg 1,19,650

W.N-1: -Computation of Standard Quantity : -

- ✓ **Material A -** $\left(\frac{800\text{ kg}}{0.9\times1{,}400\text{ kg}}\times 1{,}480\text{ kg.}\right) = 939.68$ or 940 kg.
- ✓ **Material B -** $\left(\frac{600\text{ kg.}}{0.9\times1{,}400\text{ kg.}}\times 1{,}480\text{ kg}\right) = 704.76$ or 705 kg.

WN-2: -Computation of Revised Standard Quantity: -

- ✓ Material A - $\left(\frac{800\text{ kg}}{1{,}400\text{ kg}}\times 1{,}550\text{ kg}\right) = 885.71$ or 886 kg.
- ✓ Material B - $\left(\frac{600\text{ kg}}{1{,}400\text{ kg}}\times 1{,}550\text{ kg}\right) = 664.28$ or 664 kg.

Please confirm this working note should be shifted above or not

e) Labour Cost Variance (Skilled+ Unskilled)
$= \{(\text{Standard Hours} \times \text{Standard Rate}) - (\text{Actual Hours} \times \text{Actual Rate})\}$
$= \{1{,}22{,}992 - 1{,}24{,}760\} = 1{,}768(A)$

f) Labour Efficiency Variance (Skilled + Unskilled)
$= \{(\text{Standard Hours} \times \text{Standard Rate}) - (\text{Actual Hours} \times \text{Standard Rate})\}$
$= \{1{,}22{,}992 - 1{,}27{,}840\} = 4{,}848\ (A)$

g) Labour Yield Variance (Skilled + Unskilled)
$= \{(\text{Standard Hours} \times \text{Standard Rate}) - (\text{Revised Standard Hours} \times \text{Standard Rate})\}$
$= \{1{,}22{,}992 - 1{,}26{,}104\} = 3{,}112\ (A)$

Labour Variances: -

Computation of Standard Hours(W.N.-3) × Standard Rate

Skilled = 1116 hrs × ₹ 75 = 83,700
Unskilled = 893 hrs × ₹ 44 = 39,292
2,009 hrs 1,22,992

Computation of Revised Standard Hours (W.N.-4) × Standard Rate

Skilled = 1144 hrs × ₹ 75 = 85,800
Unskilled = 916 hrs × ₹ 44 = 40,304
2,060 hrs 1,26,104

Computation of Actual Hours × Standard Rate

Skilled = 1200 hrs × ₹ 75 = 90,000
Unskilled = 860 hrs × ₹ 44 = 37,840
2,060 hrs 1,27,840

Computation of Actual Hours × Actual Rate

Skilled = 1200 hrs × ₹ 71 = 85,200
Unskilled = 860 hrs × ₹ 46 = 39,560
2,060 hrs 1,24,760

WN-3: -Computation of Standard Hours: -

- ✓ Skilled labour - $\left(\frac{0.95\times1{,}000\text{ hours}}{0.90\times1{,}400\text{ kg}} \times 1{,}480\text{ kg.}\right) = 1{,}115.87$ or 1,116 hours
- ✓ Unskilled labour - $\left(\frac{0.95\times800\text{ hours}}{0.90\times1{,}400\text{ kg}} \times 1{,}480\text{ kg}\right) = 892.69$ or 893 hours.

W.N.4: -Revised Standard Hours: -

- ✓ Skilled labour - $\left(\frac{1{,}000\text{ hours}}{1{,}800\text{ hours}} \times 2{,}060\text{ hours}\right) = 1{,}144.44$ or 1,144 hours
- ✓ Unskilled labour - $\left(\frac{800\text{ hours}}{1{,}800\text{ hours}} \times 2{,}060\text{ hours}\right) = 915.56$ or 916 hours

16. 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.

(ICAI SM, Modified MTP May 2022)

Ans.

a) Fixed Overhead Expenditure Variance = Budgeted fixed overhead – Actual fixed overhead
= ₹1,50,000 – ₹1,56,000 = ₹ 6,000 (A)

b) Fixed Overhead Volume Variance = Standard fixed overhead – Budgeted fixed overhead
= ₹1,53,090 – ₹ 1,50,000 = ₹ 3,090 (F)

c) Fixed Overhead Variance = Standard fixed overhead – Actual fixed overhead
= ₹1,53,090 – ₹ 1,56,000 = ₹2,910 (A)

Working Note:
For Fixed Overheads Variances:
Actual fixed overhead incurred = ₹1,56,000
Budgeted fixed overhead for the period = 1,50,000
Standard fixed overhead for production (Standard output for actual time × Standard Fixed Overhead per unit)
(6,300 hrs × 27 days × 0.9) × (₹1,50,000 ÷ 1,50,000 units) = ₹1,53,090

17. 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, 20X1, 60 batches were prepared to produce an output of 5,600 kg. of NXE. The standard and actual particulars for April, 20X1, are as follows: -

Raw	Standard		Actual		Quantity
Materials	Mix (%)	Price per kg. (₹)	Mix (%)	Price per kg. (₹)	Raw Materials Purchased (kg.)
A	50	20	60	21	5,000
B	30	10	20	8	2,000
C	20	5	20	6	1,200

You are required to Calculate: -

a) Material Price variance

b) Material usage variance

(ICAI SM)

Ans. Material Price Variance = Standard cost of actual material used− Actual cost of actual material used = ₹ 1,12,500 − ₹ 1,15,500 = ₹ 3,000 (A)

Material usage Variance= Standard cost of production− Standard cost of actual material used= ₹ 98,000 − ₹ 1,12,500 = ₹ 14,500 (A)

Actual material used = 125 kg × 60 = 7,500 kg.

Actual cost of actual material used (**Actual Quantity** × **Actual Rate**)

A	(60%) 4,500 kg × ₹21 =	94,500
B	(20%)1,500 kg × ₹8 =	12,000
C	(20%)1,500 kg × ₹6 =	9,000
	7, 500	**1,15,500**

Standard cost of actual material used (**Actual Quantity** × **Standard Rate**)

A	4,500 kg × ₹20 =	90,000
B	1,500 kg × ₹10 =	15,000
C	1,500 kg × ₹5 =	7,500
	7,500	**1,12,500**

Standard cost of material, if it had been used in standard proportion (Standard Proportion × Standard Rate)

A	(50%) 3,750 kg × ₹20 =	75,000
B	(30%) 2,250 kg × ₹10 =	22,500
C	(20%) 1,500 kg × ₹ 5 =	7,500
	7,500	**1,05,000**

Standard Cost of Production (Standard Quantity for actual production × Standard Rate)
Standard cost of output for 100 kg: -

A	62.50 kg × ₹20 =	1,250
B	37.50 kg × ₹10 =	375
C	25.00 kg × ₹5 =	125
	125.00	**1,750**

Standard cost for output of 5,600 kg.

$= \frac{1,750}{100}$ kg × 5,600 kg = ₹ 98,000

Note: -

Material Price Variance can be calculated at the time of purchase as well. In that case, material variance will be as follows: -

Actual cost of material purchase: -

A	5,000 kg × ₹21 =	₹ 1,05,000
B	2,000 kg × ₹8 =	₹ 16,000
C	1,200 kg × ₹6 =	₹ 7,200
		₹ 1,28,200

Standard cost of material Purchased: -

A	5,000 kg × ₹ 20 =	₹ 1,00,000
B	2,000 Kg × ₹ 10 =	₹ 20,000
C	1,200 kg × ₹5 =	₹ 6,000
		₹ 1,26,000

✓ Material Price Variance (if calculated at the time of purchase)
= Standard cost of actual material used − Actual cost of actual material used
= ₹ 1,26,000 − ₹1,28,200 = ₹2,200(A)

18. Paras Synthetics uses Standard costing system in manufacturing of its product 'Star 95 Mask'. The details are as follows;

Particulars	**(₹)**
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, 20X1 10,000 units of 'Star 95 Mask' were manufactured.

Details are as follows: -

i) Direct Material Consumed 5,700 meters @ ₹ 58 per meter
ii) Direct labour Hours @ ₹ 2,24,400
iii) Variable overhead incurred ₹ 1,12,200
iv) 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.

(ICAI SM)

Ans. **i) Material Variances: -**

✓ **Material Cost Variance = (Standard Quantity × Standrad Price − Actual Quantity × Actual Price)**
3,00,000 − 3,30,600 = ₹ 30,600 (A)

✓ **Material Price Variance = (Standard Price − Actual Price) Actual Quantity**
(60 − 58)5,700 = ₹ 11,400(F)

✓ **Material Usage Variance = (Standard Quantity − Actual Quantity) Standard Price**
(5,000 − 5,700)60 = ₹ 42,000 (A)

Workings: -

Budget Material = 0.5 × 60 = 30
Standard for Actual Material = 5,000 × 60 = 3,00,000
Actual Material = 5,700 × 58 = 3,30,600

ii) Variable Overheads Variances: -

✓ Variable overhead cost Variance = (Standard variable overhead − Actual variable overhead
✓ Standard Variable Overheads: 10,000 units × 10 = 1,00,000
✓ (1,00,000 − 1,12,200) = ₹ 12,200 (A)

- ✓ **Variable overhead Efficiency Variance = (Standard Hours − Actual Hours) × Standard Rate per Hour**

  Let Actual Hours be 'X'

(10,000 − X) × 10	= 2,000(A)
1,00,000 − 10X	= −2,000
X	= 1,02,000 ÷ 10
Therefore, Actual Hours (X)	= 10,200

- ✓ **Variable overhead Expenditure Variance = (Variable overhead at Actual Hours – Actual Variable Overheads)**
- ✓ 10,200 × 10 − 1,12,200 = ₹ 10,000 (A)

iii) Labour Variances

- ✓ **Labour Cost Variance=(Standard Hours × Standard Rate)- (Actual Hours × Actual Rate)**

  10,000 × 20 − 10,200 × 22 = ₹ 24,400 (A)
- ✓ **Labour Rate Variance = (Standard Rate − Actual Rate) × Actual Hours**

  (20 − 22) × 10,200 = ₹ 20,400 (A)
- ✓ **Labour Efficiency Variance = (Standard Hours − Actual Hours) × Standard Rate**

  (10,000 – 10,200) × 20 = ₹ 4,000 (A)

Workings: -

Budget Labour = 1 × 20 = 20

Standard for Actual Labour = 10,000 × 20 = 2,00,000

Actual Labour = 10,200 × 22 = 2,24,400

Actual Rate = ₹ 2,24,400 ÷ 10,200 hours = ₹ 22

19. ABC Ltd. Has furnished the following information regarding the overheads for the month of June 20X1: -

i)	Fixed overhead Cost Variance	₹2,800 (Adverse)
ii)	Fixed overhead volume variance	₹2,000 (Adverse)
iii)	Budgeted Hours for June,20X1	2,400 Hours
iv)	Budgeted Overheads for June,20X1	₹ 12,000
v)	Actual rate of recovery of overheads	₹ 8 Per Hour

From the above given information.

Calculate: -

a) Fixed Overhead Expenditure Variance
b) Actual Overheads Incurred
c) Actual Hours for Actual Production
d) Fixed Overhead Capacity Variance
e) Standard hours for Actual Production
f) Fixed Overhead Efficiency Variance.

(Nov. 2020)

Ans.

a) Fixed Overhead Expenditure Variance: -

= Budgeted Fixed Overheads − Actual Fixed Overheads

= ₹ 12,000 − ₹ 12,800 (as calculated below) = ₹ **800**(A)

b) Fixed Overhead Cost Variance = Absorbed Fixed Overheads − Actual Fixed Overheads

2,800 (A)	= ₹ 10,000 − Actual Overheads
Actual Overheads	= ₹ **12,800**

c) Actual Hours for Actual Production = $₹\frac{12,800}{₹8} = \mathbf{1,600}$ hrs.

d) Fixed Overhead capacity Variance: -

= Budgeted Fixed Overheads for Actual Hours − Budgeted Fixed Overheads

= ₹5 × 1,600 hrs. −₹ 12,000 = ₹**4, 000**(A)

e) Standard Hours for Actual Production: -

= Absorbed Overheads/Std. Rate

= ₹ 10,000/₹5 = **2, 000** hrs.

f) Fixed Overhead Efficiency Variance: -

= Absorbed Fixed Overheads − Budgeted Fixed Overheads for Actual Hours

= ₹ 10,000 − ₹5 × 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.)

20. A company produces a finished product by using three basic raw materials. The following standards have been set-up for raw materials: -

Material	Standard-Mix in percentages	Standard Price per kg. in (₹)
A	25	4
B	35	3
C	40	2

The standard loss in process is 20% of input. During a particular's month, the Company produced 2,400 kgs. Of finished product. The details of stock and purchases for the month are as under: -

Material	Opening Stock (Kgs.)	Closing Stock (Kgs.)	Purchase during the month (Quantity in kgs)	Cost in (₹)
A	200	350	800	3,600
B	150	200	1,000	3,500
C	300	200	1,100	1,980

The opening stock is valued at standard cost. Compute: -

a) Material price and Material cost variances, when:
  i) Variance is Calculated at the point of issue of 'First-in-First-out' basis.
  ii) Variance is Calculated at the point of issue on 'Last-in-First-Out' basis.

b) Material Usage Variance.

c) Material Mix Variance, and

d) Material Yield Variance.

(Nov.2000)

Ans. **<u>Variance: -</u>**

a) Material price and cost variance when variance is calculated at the point of issue on ''First in First out'' basis: -

i) Material Price Variance $=M_1 - M_2 = 8,295 - 7,850 = 445$ (A)

ii) Material Cost Variance $=M_1 - M_4 = 8,295 - 8,550 = 255$ (F)

Material Price and cost variance when variance is calculated at the point of issue on "Last in first out" basis: -

i) Material price variance $=M_1-M_2=8{,}430-7{,}850=580$ (A)

ii) Material cost variance $=M_1-M_4=8{,}430-8{,}550=120$ (F)

b) Material Mix Variance $=M_2-M_3=7{,}850-7{,}980=130$ (F)

c) Material yield variance $=M_3-M_4=7{,}980-8{,}550=570$ (F)

d) Material usage variance $=M_2-M_4=7{,}850-8550=700$ (F)

M1 - Actual material used: -

a) Based on FIFO Method: -

A-	200 kg × ₹ 4.00 =	800		
	450 kg × ₹ 4.50 =	2,025	2,825	
	650 kg			
B-	150 kg×₹ 3.00 =	450		
	800 kg×₹ 3.50 =	2,800	3,250	
	950 kg			
C-	300 kg ×₹ 2.00 =	600		
	900 kg ×₹ 1.80 =	1,620	2,220	8,295
	1200 kg			

b) Based on LIFO Method: -

A-	650 kg ×₹ 4.50 = 2,925	
B-	950 kg ×₹ 3.50 = 3,325	
C-	1,100 kg ×₹ 1.80 = 1,980	
	100 kg×₹ 2.00= 200	8,430

M_2-Standard Cost of Material used: -

A-	650 kg × ₹ 4.00 = 2,600	
B-	950 kg × ₹ 3.00 = 2,850	
C-	1,200 kg × ₹ 2.00 = 2,400	7,850

M_3-Standard Cost of Material if it had been used in standard proportion: -

A-	*2800 kg × 0.25 × ₹ 4.00 = 2,800	
B-	2800 kg × 0.35 × ₹ 3.00 = 2,940	
C-	2800 kg × 0.40 × ₹ 2.00 = 2,240	7,980

***(650+950+1200)**

M_4-Standard Material Cost of output: -

(It is given that output was 2,400 kg. Standard loss in process is 20% of input. Therefore, Input for an output of 2,400 kg =(2400÷80)×100=3,000 kg.

A-	3,000 kg × 25/100 = 750	Kg ×₹ 4.00=₹ 3,000
B-	3,000 kg × 35/100 = 1,050	Kg × ₹ 3.00 =₹ 3,150
C-	3,000 kg × $\frac{40}{100}$ = 1200	Kg×₹ 2.00 = =₹ 2,400
	Total Input Kg's 3,000 kg	₹ 8,550

21. UV Ltd. Presents the following information for November, 20X1: -

Budgeted production of product P = 200 units.

Standard Consumption of Raw Materials = 2kg per unit of P.

Standard price of Material A = ₹ 6 per kg.

Actually, 250 units of P were produced and material A was purchased at ₹ 8 per kg. and consumed at 1.8 kg. per unit of P.

Calculate the material cost variances. **(Nov. 2008 RTP)**

Ans.

1) Total Material Cost Variance = (Standard Price × Standard Quantity) – (Actual Price × Actual Quantity)
= (6 × 500) – (8 × 450)
= 3,000 – 3,600 = 600 (A)

2) Material Price Variance = (Standard price – Actual price) × Actual quantity
= (6 – 8) × 450 = 900 (A)

3) Material Usage Variance = (Standard quantity – Actual quantity) × Standard price
= (500 – 450) × 6 = 300 (F)

Working Notes:

Actual production of P = 250 units
Standard quantity of A for actual production = 2 × 250 = 500 kg. (SQ)
Actual quantity of A for actual production = 1.8 × 250 = 450 kg. (AQ)
Standard price / kg. of A = ₹6 (SP)
Actual price / kg/ of A = ₹8 (AP)

22. Following are the details of the product phomex for the month of April 20X1; 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.

<u>You are required to Calculate: -</u>

- **a)** Actual quantity and Actual price of materials used.
- **b)** Material Usage Variance
- **c)** Material Cost Variance

(May 2013 RTP)

Ans.

a) <u>Actual Quantity and Actual Price of Material used: -</u>

Material Price Variance = Actual Quantity (Standard 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 × 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

b) <u>Material Usage Variance: -</u>

✓ Std. Price (Std. Quantity—Actual Quantity)
✓ Or, SP (SQ—AQ)
✓ = ₹ 150 (1,000 units × 5 kg – 5,100 kg) = **₹ 15,000 (A)**

c) <u>Material Cost Variance: -</u>

- Std. Cost−Actual Cost
- = (SP×SQ)−(AP×AQ)
- = ₹ 150 × 5,000 − ₹ 140 × 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)**

23. A Company manufacturing two products uses Standard Costing System. The following data relating to April, 20X1 have been furnished to you: -

Products	**A (₹)**	**B (₹)**
Standard Cost per unit: -		
Direct Materials	2	4
Direct Wages	8	6
Fixed Overheads	<u>16</u>	<u>12</u>
	<u>26</u>	**22**

Units processed/in Process.

Beginning of the month: All Materials applied	A	B
And 50% complete in respect of labour and	4,000	12,000
Overheads		
End of the month: All Materials applied and		
80% complete in respect of labour and		
Overheads	8,000	12,000
Units completed and transferred to		
Warehouse during the month	16,000	20,000

You may use average cost method to analyse.

The following were the actual costs recorded during the month:

Direct materials purchased at standard price amount to ₹ 2,00,000 and actual cost of which is ₹ 2,20,000. Direct materials used for consumption at standard price amount to ₹ 1,75,000.

Direct wages for actual hours worked at standard wages rates were ₹ 4,20,000 and at actual wage rates were ₹ 4,12,000.

Fixed Overheads budgeted were ₹8,25,000 and actual fixed overheads incurred were ₹8,50,000.

<u>Required: -</u>

a) Direct material price variance at the point of consumption and at the point of purchase.
b) Direct material usage variance.
c) Direct wage rate and efficiency variance.
d) Fixed overheads volume and expenditure variance.
e) Standard cost of WIP at the end of the month.

(May 2000)

Ans. **a) Direct Material Price variance at the point of consumption.**

✓ M_1 = Actual Quantity × Actual Price.

$$= 1{,}75{,}000 \times \frac{2{,}20{,}000}{2{,}00{,}000}$$

= ₹ 1,92,500

✓ M_2 = Actual Quantity × Standard Price

= ₹ 1,75,000 (given)

Material price variance = $M_1 - M_2$

✓ = 1,92,500 − 1,75,000

✓ = **17, 500** (A)

Direct Material price variance (at the point of purchase)

✓ M_1 = Actual Quantity of material purchased × Actual Price

= ₹ 2,20,000 (given)

✓ M_2 = Actual Quantity of material purchased × Standard price

= ₹ 2,00,000 (given)

✓ Material Price Variance = $M_1 - M_2$

= ₹ 2,20,000 − ₹ 2,00,000

= ₹ **20, 000** (A)

b) Material Usage Variance = $M_2 - M_4$

✓ M_2 = Actual Quantity × Standard Price

= ₹ 1,75,000 given

✓ M_4 = Standard Quantity × Standard Price

Product A = 24,000 × 2 = 48,000

Product B = 32,000 × 4 = 1,28,000

<u>₹ 1,76,000</u>

Direct material usage variance

= ₹ 1,76,000 − ₹ 1,75,000

<u>= ₹ **1, 000** (F)</u>

c) Direct wage rate and efficiency variance: -

✓ Wage rate variance = $L_1 - L_2$

✓ L_1 = Actual labour hour × actual rate

= ₹ 4,12,000 (given)

✓ L_2 = Actual labour hour × Standard rate

= ₹ 4,20,000 (given)

Wage rate variance = $L_1 - L_2$

✓ = ₹ 4,12,000 − ₹ 4,20,000

✓ = ₹ 8,000 (F)

Efficiency Variance = $L_2 - L_5$

✓ L_2 = ₹ 4,20,000

✓ L_5 = Standard labour hour × Standard rate

✓ Product – A = 22,400 × 8 = 1,79,200

✓ Product – B = 29,600 × 6 = 1,77,600

<u>₹ 3,56,800</u>

✓ Efficiency variance = $L_2 - L_5$

= ₹ 4,20,000 − ₹ 3,56,800

= ₹ **63, 200** (A)

d) Fixed overhead volume and expenditure variance: -

✓ F_1 = Actual fixed overhead

= ₹ 8,50,000

✓ F_2 = Budgeted fixed overhead

✓ F_2 = ₹ 8,25,000

✓ I_5 = Standard fixed overhead for production

= 22,400 × 16 = 3,58,400

$= 29{,}600 \times 12 = 3{,}55{,}200$

₹ 7,13,600

Fixed overhead expenditure variance

$= F_1 - F_2$

= ₹ 8,50,000 – ₹ 8,25,000

= ₹ 25,000 (A)

Volume variance = $F_2 - F_5$

= ₹ 8,25,000 – 7,13,600

= ₹ **1, 11, 400 (A)**

e) Standard Cost of WIP

Equivalent unit	**Product A**		**Product B**	
	Material	**L & OH**	**Material**	**L & OH**
	8,000	**6,400**	**12,000**	**9,600**
Standard Cost	2/-	24/-	4/-	18/-
Value of WIP	**16,000**	**1,53,600**	**48,000**	**1,72,800**

- ✓ Product A = ₹1,69,600
- ✓ Product B = ₹2,20,800

Working Notes: -

- ✓ **Equivalent Production Statement**
- ✓ **Using average cost method**
- ✓ **Material Labour & Overhead**

Particulars	**Unit**	**Completion (%)**	**Units**	**Completion (%)**	**Units**
Product-A					
Units completed	16000	100	16000	100	16000
Closing WIP	8000	100	8000	80	6400
	24000		**24000**		**22400**
Product-B					
Units completed	20,000	100	20,000	100	20000
Closing WIP	12000	100	12000	80	9600
	32000		**32000**		**29600**

24. 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 20X1 performance, budgeted overhead is ₹ 98,000 for standard labour hours allowed. The following additional information pertains to the month of March 20X1: -

42429	Return-in-process (25% Complete)	200 Nos
	Return Started in March	825 Nos
42459	Return-in-process (80% complete)	125 Nos
Cost Data:		

42429	Return-in-process labour	₹ 12,000
	✓ Overheads	₹ 5,000
March 1 to 31	Labour: 4000 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.

(May 2016)

Ans. **a) Statement Showing Cost Elements Equivalent. Units of Performance and the Actual Cost per Equivalent Unit: -**

Detail of Returns	Detail of Input Units	Detail	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) <u>Actual Cost of returns in process on March 31: -</u>

Particulars	Numbers	Stage of Completion	Rate per Return (₹)	Total (₹)
	A	B	C	D= (A X BX C)
✓ Labour	125 returns	0.80	190.00	19,000
✓ Overhead	125 returns	0.80	95.00	9,500
				28,500

c) <u>Standard Cost per Return: -</u>

✓ Labour = 5 hrs × ₹ 40 per hour = ₹ 200

✓ Overhead = 5 hrs × ₹ 20 per hour = ₹ 100

<u>₹ 300</u>

✓ Budgeted Volume for March = ₹ $\frac{98,000}{1,000}$ = 980 Returns

✓ Actual labour rate = ₹ $\frac{1,78,000}{4,000}$ = ₹ 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.
- ✓ = 1,90,000 − 1,60,000 = ₹ **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)**

25. C Preserves produces Jams, Marmalade and Preserves. All the products are produced in a similar fashion; the fruits are cooked at low temperature in a vacuum process and then blended with glucose syrup with added citric acid and pectin to help setting.

Margins are tight and the firm operates, a system of standard costing for each batch of Jam.

The Standard cost data for a batch of raspberry Jam are

Fruit's extract	400 kgs @ ₹ 16 per kg.
Glucose syrup	700 kgs @ ₹ 10 per kg.
Pectin	99 kgs @ ₹ 33.2 per kg.
Citric acid	1 kg at ₹ 200 per kg
Labour	18 hours @ ₹ 32.50 per hour.

Standard processing loss 3%.

The climate conditions proved disastrous for the raspberry crop. As a consequence, normal prices in the trade were ₹ 19 per kg for fruits abstract although good buying could achieve some savings. The impact of exchange rates for imported sugar plus the minimum price fixed for sugarcane, caused the price of syrup to increase by 20%. The retail results for the batch were: -

Fruit extract	428 kgs at ₹ 18 per kg.
Glucose syrup	742 kgs at ₹ 12 per kg.
Pectin	125 kgs at ₹ 32.8 per kg.
Citric acid	1 kgs at ₹ 95 per kg.
Labour	20 hrs. at ₹ 30 per hour

Actual output was 1,164 kgs of raspberry Jam.

You are required to: -

1. Calculate the ingredients planning variances that are deemed uncontrollable.
2. Calculate the ingredients operating variances that are deemed controllable.
3. Calculate the mixture and yield variances.
4. Calculate the total variances for the batch.

(May 2005)

Ans.

1) Ingredient Planning Variance: -

- ✓ Standard Quantity × Standard Price: -
- ✓ Standard Quantity × revised Standard Price

a) Fruit extract; 400×16 = 6,400
b) Glucose Syrup 700×10 = 7,000
(A) 13,400
Fruit extract 400×19 = 7,600
Glucose Syrup 700×12 = 8,400
16,000
Planning variance = 13,400−16,000
= 2,600 (A)

2) Operating Variance: -

a) Price variance: -

- ✓ Revised Material Price−Actual Material Price×Actual Quantity consumed
  - **i)** Fruit extract; (19−18) × 428 428 (F)
  - **ii)** Glucose Syrup: Nil
  - **iii)** Pectin: (33.2−32.8) × 125 =50 (F)
  - **iv)** Citric acid: (200−95) × 1 =105(F)
  - Price Variance **=583 (F)**

b) Usage variance: -

- ✓ (Standard Quantity−Actual Quantity) × Revised Standard Price
  - **a)** Fruit extract : (400−428) × 19 = 532(A)
  - **b)** Glucose syrup; (700−742) × 12 = 504 (A)
  - **c)** Pectin; (99− 125) × 33.2 = 863.2 (A)
  - **d)** Citric Acid Nil
  - Usage variance **1899.2 (A)**

c) Mix variance: -

- ✓ (Revised Standard − Actual consumption) × Standard Price
- ✓ Fruit extract : $\left(\frac{1296}{1200} \times 400 - 428\right) \times 19 = 76$ (F)
- ✓ Glucose syrup : $\left(\frac{1296}{1200} \times 700 - 742\right) \times 12 = 168$ (F)
- ✓ Pectin: $\left(\frac{1296}{1200} \times 99 - 125\right) \times 33.2 = 600.3$(A)
- ✓ Citric Acid $\left(\frac{1296}{1200} \times 1 - 1\right) \times 200 = 16$ (F)

340.3 (A)

3) Mixture & Yield variance: -.

- (Actual yield− Standard yield for actual output × Standard Cost per unit.)
- (1,164−1,257.12) × $\frac{19,486.8}{1,164}$
- = **1, 558. 9** (A)

4) Labour Operating variance: -

– Standard Labour cost–Actual Labour Cost

$= 18 \times 32.50 - 20 \times 30$

$= 585 - 600 = \mathbf{15\ (A)}$

5) Total variance: -

– Planning variance + Usage variance + Price variance + labour operating variance

$= 2600\ (A) + 1899.2\ (A) + 583\ (F) + 15\ (A) = \mathbf{3931.2\ (A)}$

26. SB Constructions Limited has entered into a big contract at an agreed price of ₹1,50,00,000 subject to an escalation clause for material and labour as spent out on the contract and corresponding actuals are as follows: -

Material	Quantity (tonnes)	Standard Rate per tonne (₹)	Actual Quantity (tonnes)	Rate per tonne (₹)
A	3,000	1,000	3,400	1,100
B	2,400	800	2,300	700
C	500	4,000	600	3,900
D	100	30,000	90	31,500
Labour	**Hours**	**Hourly Rate**	**Hours**	**Hourly Rate**
		(₹)		**(₹)**
L_1	60,000	15	56,000	18
L_2	40,000	30	38,000	35

You are required to: -

1. Give your analysis of admissible escalation claim and determine the final contract price payable.
2. Prepare the contract account, if all the expenses other than material and labour related to the contract are ₹ 13,45,000.
3. Calculate the following variances and verify them: -
   - **i)** Material Cost variance.
   - **ii)** Material Price variance.
   - **iii)** Material Usage variance.
   - **iv)** Labour Cost variance
   - **v)** Labour rate variance
   - **vi)** Labour Efficiency variance.

(May 2010)

Ans. **1) Statement showing additional claim due to escalation clause: -**

Material	Std. Qty./ Hours (a)	Std. Rate (b)	Actual Rate (C)	Variation in Rate (₹) (d) = (C–b)	Escalation claim (₹) (e)=(a×d)
A	3,000	1,000	1,100	+ 100	+ 3,00,000
B	2,400	800	700	–100	–2,40,000
C	500	4,000	3,900	–100	–50,000
D	100	30,000	31,500	+1,500	+1,50,000
Material escalation claim					**1,60,000**
Labour					
L_1	60,000	15	18	+3	+1,80,000
L_2	40,000	30	35	+5	+2,00,000
Labour escalation claim					**3,80,000**

Statement Showing Final Contract Price

Particulars	**(₹)**	
✓ Agreed contract price		1,50,00,000
✓ **Add:** Agreed escalation claim:	**(₹)**	
✓ Material Cost	1,60,000	
✓ Labour Cost	3,80,000	5,40,000
✓ Final Contract Price		1,55,40,000

2)

Dr. **Contract Account** **Cr.**

Particulars	**(₹)**	**Particulars**	**(₹)**
To Material: -		By Contractee's A/c	1,55,40,000
A - 3,400 × ₹ 1,100			
B – 2,300 × ₹ 700			
C – 600 × ₹ 3,900			
D- 90 × ₹ 31,500	1,05,25,000		
To Labour: -			
L_1 – 56,000 × ₹ 18			
L_2 – 38,000 × ₹ 35	23,38,000		
To Other expenses	13,45,000		
To Profit and Loss A/c	13,32,000		
	1,55,40,000		**1,55,40,000**

3) Material Variances

SQ × SP (₹)	**AQ × AP (₹)**	**AQ × SP (₹)**
A-3,000×1,000=30,00,000	3,400×1,100=37,40,000	3,400×1,000=34,00,000
B-2,400×800=19,20,000	2,300×700=16,10,000	2,300×800=18,40,000
C-500×4,000=20,00,000	600×3,900=23,40,000	600×4,000=24,00,000
D-100×30,000=30,00,000	90×31,500=28,35,000	90×30,000=27,00,000
Total 99,20,000	**1,05,25,000**	**1,03,40,000**

- ✓ Material Cost Variance = (Standard Quantity × Standard Price) − (Actual Quantity × Actual Price)

  = ₹ 99,20,000 − ₹ 1,05,25,000

  = ₹ **6,05,000** (A)

- ✓ Material Price Variance = Actual Quantity (Standard Price − Actual Price)

  = ₹ 1,03,40,000 − ₹ 1,05,25,000

  = ₹ **1,85,000** (A)

- ✓ Material Usage Variance = (Standard Quantity × Standard Price) − (Actual Quantity × Standard Price)

  = ₹ 99,20,000 − ₹ 1,03,40,000

  = ₹ **4,20,000** (A)

Labour Variances

SH × SR (₹)	**AH × AR (₹)**	**AH ×SR (₹)**
L_1- 60,000×15 = 9,00,000	56,000×18=10,08,000	56,000×15=8,40,000
L_2 – 40,000×30=12,00,000	38,000×35=13,30,000	38,000×30=11,40,000
Total 21,00,000	**23,38,000**	**19,80,000**

- ✓ Labour Cost Variance = (Standard Hours × Standard Rate) − (Actual Hours × Actual Rate)

  = ₹ 21,00,000 − ₹ 23,38,000

  = ₹ **2,38,000 (A)**
- ✓ Labour Rate Variance = (Actual Hours × Standard Rate) − (Actual Hours × Actual Rate)

  = ₹ 19,80,000 − ₹ 23,38,000

  = ₹ **3,58,000 (A)**
- ✓ Labour Efficiency Variance = (Standard Hours × Standard Price) − (Actual Hours × Standard Price)

  = ₹ 21,00,000 − ₹ 19,80,000

  = ₹ **1,20,000 (F)**

27. 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, 20X1, 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.

Calculate: -

a) Expense Variance

b) Volume Variance

c) Total fixed overheads variance.

(ICAI SM)

Ans. **Variances: -**

i) Fixed Overhead Expenditure Variance = (Budgeted fixed overhead − Actual fixed overhead)

= 1,44,000 − 1,42,000 = ₹ 2,000 (F)

ii) Total Volume Variance = (Standard fixed overhead − Budgeted fixed overhead

= 1,27,320 − 1,44,000 = ₹ 16,680 (A)

a) Efficiency variance

= Std. rate per hr. (Std. hrs. for actual production – Actual hrs.)

= 6 × (21,220 – 20,160) = ₹6,360 (F)

b) Capacity variance

= Std. Rate (Actual hours - Budgeted hours)

= 6 × {20,160 – (24 days × 120 machine × 8 hrs.)} = ₹17,280 (A)

c) Calendar variance

= (Actual No. of days – Budgeted No. of days) × Std. rate per day

= (24 – 25) × 5,760 = ₹5,760 (A)

iii) Fixed overhead variance = (Standard fixed overhead − Actual Fixed overhead

= 1,27,320 − 1,42,000

= ₹ 14,680 (A)

Alternatively: -

- ✓ Expenditure variance + Volume Variance = 2,000 (F) + 16,680 (A) = ₹14,680 (A)

Working Notes: -

		Budget	Actual
1)	Fixed overheads for the month	1,44,000	1,42,000
2)	Working days per month	25	24
3)	Working hours per month	(120 machines × 8 hrs. × 25 days) = 24,000	(840 machines hours × 24 days) =20,160
4)	Production units per month	$\frac{24{,}000 \text{ hrs.}}{4 \text{ hrs.}}$ = 6,000	5,305

5) Standard hours for actual production
= Actual production units × Std. hours per unit
= 5,305 × 4 = 21,220 hrs.

6) Standard fixed overhead rate per unit = $\frac{₹1,44,000}{6000 \text{ units}}$ = ₹24

7) Standard fixed overhead rate per hour = $\frac{₹1,44,000}{24,000 \text{ hrs.}}$ = ₹6

Standard fixed overhead per day = $\frac{₹1,44,000}{25 \text{ days}}$ = ₹5,760

28. Baby Moon Ltd. Uses standard costing system in manufacturing one of its product 'Baby Cap'. The details are as follows:

Direct Material 1 Meter @ ₹ 60 per meter	₹ 60
Direct Labour 2 hour @ ₹ 20 per hour	₹ 40
Variable overhead 2 hour @ ₹ 10 per hour	₹ 20
Total	₹ 120

During the month of August, 10,000 units of 'Baby Cap' were manufactured. Details are as follows:

Direct material consumed	11,400 meters	@	₹ 58 per meter	
Direct labour Hours	?	@	?	₹ 4,48,800
Variable overhead incurred				₹ 2,24,400

Variable overhead efficiency variance is ₹ 4,000 A. Variable overheads are based on Direct Labour Hours.

You are required to CALCULATE the following Variances:

a) Material Variances- Material Cost Variance, Material Price Variance and Material Usage Variance.

b) Variable Overheads variances- Variable overhead Cost Variance, Variable overhead Efficiency Variance and Variable overhead Expenditure Variance.

c) Labour variances- Labour Cost Variance, Labour Rate Variance and Labour Efficiency Variance.

(RTP Nov. 2021)

Ans. **a) Material Variances**

Budget			Std. for actual			Actual		
Quantity (Meter)	Price (₹)	Amount (₹)	Quantity (Meter)	Price (₹)	Amount (₹)	Quantity (Meter)	Price (₹)	Amount (₹)
1	60	60	10,000	60	6,00,000	11,400	58	6,61,200

Material Cost Variance = (Standard Quantity × Standard Price – Actual Quantity × Actual Price)
= 6,00,000 – 6,61,200 = ₹ 61,200 (A)
Material Price Variance = (Standard Price – Actual Price) Actual Quantity
= (60 - 58) 11,400 = ₹ 22,800 (F)
Material Usage Variance = (Standard Quantity – Actual Quantity) Standard Price
= (10,000 – 11,400) 60 = ₹ 84,000 (A)

b) Variable Overheads variances Variable overhead cost Variance
= Standard variable overhead – Actual Variable Overhead
= (10,000 units × 2 hours × ₹ 10) – 2,24,400 = ₹ 24,400 (A)
Variable overhead Efficiency Variance = (Standard Hours – Actual Hours) × Standard Rate per Hour
Let Actual Hours be 'X', then:
(20,000 – X) × 10 = 4,000 (A)
2,00,000 – 10X = - 4,000
X = 2,04,000 ÷ 10

Therefore, Actual Hours (X) = 20,400

Variable overhead Expenditure Variance = Variable Overhead at Actual Hours - Actual Variable Overheads

= 20,400 × ₹ 10 – 2,24,400 = ₹ 20,400 (A)

c) Labour variances

Budget			Std. for actual			Actual		
Hours	**Rate (₹)**	**Amount (₹)**	**Hours**	**Rate (₹)**	**Amount (₹)**	**Hours**	**Rate (₹)**	**Amount (₹)**
2	20	40	20,000	20	4,00,000	20,400	22*	4,48,800

*Actual Rate = ₹4,48,800 ÷ 20,400 hours = ₹22

Labour Cost Variance = (Standard Hours × Standard Rate) – (Actual Hours × Actual Rate)

= 4,00,000 – 4,48,800 = ₹ 48,800 (A)

Labour Rate Variance = (Standard Rate – Actual Rate) × Actual Hours

= (20 – 22) × 20,400 = ₹ 40,800 (A)

Labour Efficiency Variance = (Standard Hours – Actual Hours) × Standard Rate

= (20,000 – 20,400) × 20 = ₹ 8,000 (A)

29. XYZ Company has established the following standards for factory overheads.

i)	Variable overhead per unit:	₹ 10/-
ii)	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: -

iii)	Actual overheads incurred	₹ 3,00,000
iv)	Actual output (units)	15,000 units

Required: -

Calculate Overhead Variances viz: -

a) Production Volume Variance

b) Overhead expense Variance

(ICAI SM)

Ans. **Production/Overhead volume variance (only for fixed overhead)**

a) Fixed Overhead Volume Variance: -

= Absorbed overhead − Budgeted Overhead

= (₹ 5 × 15,000 units) − (₹ 5 × 20,000 units)

= ₹ 75,000 − ₹ 1,00,000 = ₹ 25,000 (Adverse)

b) Overhead expense variances;

i) For Variable overhead: -

= AQ (SR − AR)

= 15,000 units (₹10 − ₹10) = Nil

ii) For fixed overhead: -

= Budgeted Overhead − Actual Overhead

= (₹5 × 20,000 units) − (Total overhead − Variable overhead)

= (₹5 × 20,000 units) − (₹3,00,000 − ₹10 × 15,000 units)

= ₹ 1,00,000 − (₹ 3,00,000 − ₹ 1,50,000)

= ₹ 1,00,000 − ₹ 1,50,000 = ₹ 50,000 (Adverse)

Working note-

Fixed overhead absorption rate = ₹1,00,000/20,000 = ₹5

30. 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	<u>15.00</u>
	32.00
Direct Labour, 3 hours @ ₹ 8 per hour	<u>24.00</u>
Total standard prime cost	<u>56.00</u>

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: -

a) Materials Price Variance & Usage Variance.
b) Labour rate & Efficiency Variances.

(ICAI SM)

Ans. **Variances: -**

✓ Material Price Variance= Actual Quantity (Standard price – Actual price)
= (Actual Quantity × Standard Price) – (Actual Quantity × Actual Price)
= ₹ 1,92,500 – ₹ 2,11,600
= ₹ 19,100 (A)

✓ Material Usage Variance= Standard Price (Standard Quantity – Actual Quantity)
= (Standard Price × Standard Quantity) – (Standard Price × Actual Quantity)
= ₹ 1,92,000 – ₹ 1,92,500 = ₹ 500(A)

Workings: -

For Material Cost Variances: -

	Standard Quantity×Standard Price	
A	12,000 × 4	= 48,000
B	18,000 × 3	= 54,000
C	90,000 × 1	= <u>90,000</u>
		₹ 1,92,000

	Actual Quantity×Actual Price	
A	12,500 × 4.40	= 55,000
B	18,000 × 2.80	= 50,400
C	88,500 × 1.20	= <u>1,06,200</u>
		₹ 2,11,600

	Actual Quantity×Standard Price	
A	12,500 × 4	= 50,000
B	18,000 × 3	= 54,000
C	88,500 × 1	= <u>88,500</u>
		₹ 1,92,500

Variances: -

Labour Rate Variance: - Actual Hours (Standard Rate − Actual Rate)
= (Actual Hours × Standard Rate) − (Actual Hours × Actual Rate)
= ₹ 1,40,000 − ₹ 1,50,000
= ₹ 10,000 (A)

Labour Efficiency Variance: Standard Rate (Standard Hours − Actual Hours)
= (Standard Rate × Standard Hours) − (Standard Rate × Actual Hours)
= ₹ 1,44,000 − ₹ 1,40,000
= ₹ 4,000 (F)

Workings: -

For Labour Cost Variance: -

Standard Hour × Standard Rate
Labour (6000 × 3) × ₹8 = 1,44,000

Actual Hour × Actual Rate
Labour 2500 × 12 = 30,000
15,000 × 8 = <u>1,20,000</u>
1,50,000

Actual Hour × Standard Rate
Labour 17,500 × 8 = 1,40,000

31. **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 <u>100 units</u> @ ₹ 25 per unit <u>= 2,500</u>
<u>240 units</u> <u>**= 5, 000**</u>

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 <u>870</u> units @ ₹ 27.50 per unit <u>= 23,925</u>
<u>2,460 units</u> <u>**= 52, 225**</u>

Calculate all Material Variances.

(ICAI SM)

Ans.

1) Material Cost Variance = Standard cost − Actual cost
= ₹ 50,000 − ₹ 52,225
Material Cost Variance = ₹ 2,225 (A)

2) Materials Price Variance = (Standard Price − Actual Price) × Actual Quantity
Material X = (15 − 17.50) × 640 = ₹ 1,600 (A)
Material Y = (20 − 18) × 950 = ₹ 1,900 (F)
Material Z = (25 − 27.50) × 870 <u>= ₹ 2,175 (A)</u>
Material Price Variance <u>= ₹ 1,875 (A)</u>

3) Material Usage Variance = (Standard Quantity − Actual Quantity) × Standard Price
Material X = (600 − 640) × 15 = ₹ 600 (A)
Material Y = (800 − 950) × 20 = ₹ 3,000(A)
Material Z = (1,000 − 870) × 25 <u>= ₹ 3,250 (F)</u>
Material Usage Variance <u>= ₹ 350 (A)</u>

4) Material Mix Variance = (Revised Standard Quantity − Actual Quantity) × Standard Price

Material X = (615* – 640) × 15 = ₹ 375 (A)
Material Y = (820* – 950) × 20 = ₹ 2,600 (A)
Material Z = (1,025 – 870) × 25 = <u>₹ 3,875 (F)</u>
MMV = <u>₹ 900 (F)</u>

*Revised Standard Quantity (RSQ) is calculated as follows: -

- Material X= $\frac{2,460}{2,400} \times 600 = 615$ units
- Material Y = $\frac{2,460}{2,400} \times 800 = 820$ units
- Material Z = $\frac{2,460}{2,400} \times 1,000 = 1,025$ units

5) Material Yield Variance = (Standard Quantity − Revised Standard Quantity) × Standard Price

Material X = (600 − 615) × 15 = ₹ 225 (A)
Material Y = (800 − 820) × 20 = ₹ 400(A)
Material Z = (1,000 − 1,025) × 25 = ₹ 625 (A)
Material Yield Variance = ₹ 1,250 (A)

Workings: -

Standard cost for 10 units

X = 600 units ×₹15 = 9,000
Y = 800 units ×₹20 = 16,000
X = <u>1,000</u> units ×₹25 = <u>25,000</u>
2,400 50,000

Actual cost for 10 units

X = 640 units ×₹17.50 = 11,200
Y = 950 units ×₹18.00 = 17,100
X = <u>870</u> units ×₹27.50 = <u>23,925</u>
2,460 52,225

32. A single product company has prepared the following cost sheet based on 8,000 units of output per month:

	₹
Materials 1.5 kg @ ₹ 24 per kg	36.00
Direct Labour 3 Hours @ ₹ 4 per hour	12.00
Factory overheads	12.00
Total	60.00

The flexible budget for factory overheads is as under:

Output (units)	6,000	7,500	9,000	10,500
Factory overheads (₹)	81,600	92,400	1,03,200	1,14,000

The actual results for the month of October, 20X1 are given below:

- ✓ Direct Materials purchased and consumed were 11,224 kg at ₹2,66,570.
- ✓ Direct Labour hours worked were 22,400 and Direct Wages paid amounted to ₹ 96,320.
- ✓ Factory overheads incurred amounted to ₹96,440 out of which the variable overhead is ₹ 2.60 per Direct Labour hour worked.:
- ✓ Actual output is 7,620 units.

✓ **Work-in-process:**

Opening WIP: 300 units:
Materials 100% complete
Labour and Overheads 60% complete

Closing WIP: 200 units:
Materials 50% complete
Labour and Overheads 40% complete

You are required to analyse the variances.

(Nov. 2002)

Ans.

1) Material Price variance **= $M_1 - M_2$**
= 2,66,570 – 2,69,376
= 2,806 (F)

2) Material usage variance = $M_2 - M_4$
= 2,69,376 – 2,67,120
= 2,256 (A)

3) Material cost variance **= $M_1 - M_4$**
= 2,66,570 – 2,67,120
= 550 (F)

<u>Working Notes for material variances:</u>

M_1 = Actual cost of actual material used
= AQ × AP
= 11,224 × 23.75
= 2,66,570

M_2 = Std. cost of actual material used
= AQ × SP
= 11,224 × 24
= 269,376

M_4 = Std. cost of Std. Material used.
= SQ × SP
= *7,420 × 1.5 × 24
= 2,67,120

*7,620 (Actual output)-300 (Opening WIP) +100 (Closing WIP X 50%)

4) Labour cost variance **= $L_1 - L_5$**
= ₹96,320 – ₹90,240
= ₹6,080(A)

5) Labour rate variance **= $L_1 - L_2$**
= ₹96,320 – 89,600
= ₹6,720 (A)

6) Labour efficiency variance **= $L_2 - L_5$**
= 89,600 – 90,240
= ₹640 (F)

Working Notes for labour variances:

L_1 = Actual labour cost
= (AHA × AR)
= 22400 hours × ₹4.30
= ₹96,320

L_2 = Standard labour cost for actual hours
=AHA × SR
= 22400 hours × ₹4
= ₹89,600

L5 = Standard labour cost for standard hours
=SH × SR
= **7520 × 3 × 4 (refer working notes for Std. hours)
= ₹90,240

**7,620 (Actual output)-300 (Opening WIP) +200 (Closing WIP)

Variable Overhead Variance

7) Variable overhead expenditure variance = $V_1 – V_3$

= ₹54,144-₹53,760
= ₹384 (F)

8) VOH cost variance = $V_1 – V_3$
= ₹58,240 – ₹54,144
= ₹4,096 (A)

Working Notes for variable overhead variance:

V_1 = Actual variable overhead
= 22,400 × 2.60
= ₹58,240

V_2 = Std. variable overhead for actual Hours.
AHA × SR
= 22,400 × 2.40**
= ₹53,760

V_3 = AY × SR / unit
= 7,520 × ₹7.20*
= ₹54,144

*Standard Rate Per unit: -

$$\frac{\text{Difference in budgeted variable overhead at highest and lowest activity level}}{\text{Difference in budgeted output at Highes and lowest activity level}}$$

$$= \frac{(1{,}14{,}000-81600)}{(10{,}500-6{,}000)}$$

= 7.20/unit

**Standard Rate Per hour $= \frac{\text{Standard Rate per unit}}{\text{Standard hours per unit}}$

$= \frac{7.2}{3}$

= ₹2.40/hour

Fixed overhead variance:

9) Fixed overhead cost variance = $F_1 – F_5$
= ₹38,200 – ₹36,096
= ₹2,104 (A)

10) Fixed overhead expenditure variance = $F_1 – F_2$
= ₹38,200 - ₹38,400
= ₹200 (F)

11) Fixed overhead capacity variance **= $F_2 – F_4$**
= ₹38,400 - ₹35,840
= ₹2,560 (A)

12) Fixed overhead efficiency variance = $F_4 – F_5$
= ₹38,840 - ₹36,096
= ₹256 (F)

13) Fixed overhead volume variance = $F_2 – F_5$
= ₹38,400 - ₹36,096
= ₹2,304

Working Notes for fixed overhead variances:

F_1 = Actual fixed overhead
= 96,440 – 58,240
= 38,200

F_2 = Budgeted fixed overhead
= 96,000 – 57,600
= 38,400

F_3 = SR × ADA
= Not applicable

F_4 = AHW × SR*
= 22,400 × 1.60
= 35,840

F_5 = AY × SR/unit**
= 7,520 × ₹4.80
= ₹36,096

*SR/hour $= \frac{\text{Budgeted fixed overhead}}{\text{Budgeted hours worked}}$
$= \frac{38,400}{24,000}$
= ₹1.60/hour

**SR Per unit = 3 hours Per unit X ₹1.60 Per hour
= ₹ 4.8 Per unit

33. Following information has been provided by a company:

Number of units produced and sold	9,000
Standard labour rate per hour	₹ 12
Standard hours required for 9,000 units	-
Actual hours required	25,641 hours

Labour efficiency	105.3%
Labour rate variance	₹ 1,53,846 (A)

You are required to CALCULATE:

i) Actual labour rate per hour
ii) Standard hours required for 9,000 units
iii) Labour Efficiency variance
iv) Standard labour cost per unit
v) Actual labour cost per unit.

(MTP Dec. 2021)

Ans.

i) Labour rate Variance = AH (SR – AR)

-1,53,846 = 25,641 (12-AR)

-6 = 12 – AR

AR = ₹ 18

ii) Labour Efficiency

$$= \frac{S}{H} \times 100 = 105.3$$

$$SH = \frac{AH \times 105.3}{100} = \frac{25{,}641 \times 105.3}{100}$$

$$SH = 26{,}999.973$$

$$SH = 27{,}000\ hours$$

iii) Labour Efficiency Variance = SR (SH – AH)

= 12(27,000 – 25,641)

= ₹ 16,308 (F)

iv) Standard Labour Cost per Unit

$= \frac{27{,}000 \times 12}{9{,}000} =$ ₹ 36

v) Actual Labour Cost Per Unit

$= \frac{25{,}641 \times 18}{9{,}000} =$ ₹ 51.282

Working Notes:

SR – Standard labour Rate per Hour
AR – Actual labour rate per hour
SH – Standard Hours
AH – Actual hours

34. 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
Total	**₹ 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 variance.

(ICAI SM)

Ans.

i) Overhead's volume variance (in case of fixed overhead): -

✓ Standard fixed overheads per unit (SR): ₹ 3,000 (Given)

Actual production	: 100 units
Standard production (capacity)	: 200 units

✓ Fixed Overhead Volume Variance: -

= Absorbed overhead – Budgeted Overhead

= (₹ 3,000 × 100 units) – (₹3,000 × 200 units)

= ₹ 3,00,000 – ₹ 6,00,000 = ₹ 3,00,000(Adverse)

ii) Overhead expense variances: -

✓ **For variable overhead: -**

= Actual Quantity (Standard Rate – Actual Rate)

= 100 units (₹ 1,500 – ₹1,500) = Nil

Kindly show the calculation of standard rate

✓ **For fixed overhead: -**

= Budgeted Overhead – Actual Overhead

= (₹ 3,000 × 200 units) – (Total overhead – Variable overhead)

= (₹3,000 × 200 units) – (₹11,50,000 – ₹1,500 × 100 units)

= ₹ 6,00,000 – (₹ 11,50,000 – ₹1,50,000)

= ₹6,00,000 – ₹10,00,000 = ₹4,00,000(Adverse)

35. Y Ltd. manufactures "Product M" which requires three types of raw materials – "A", "B" & "C". Following information related to 1st quarter of the F.Y. 2022-23 has been collected from its books of accounts. The standard material input required for 1,000 kg of finished product 'M' are as under:

Material	**Quantity (Kg.)**	**Std. Rate per Kg. (₹)**
A	500	25
B	350	45
C	250	55
	1,100	
Standard Loss	100	
Standard Output	1,000	

During the period, the company produced 20,000 kg of product 'M' for which the actual quantity of materials consumed and purchase prices are as under:

Material	**Quantity (Kg.)**	**Purchase Price per Kg. (₹)**
A	11,000	23
B	7,500	48
C	4,500	60

You are required to calculate:

i) Material Cost Variance

ii) Material Price Variance for each raw material and Product 'M'

iii) Material Usage Variance for each material and Product 'M'

iv) Material Yield Variance

Note: Indicate the nature of variance i.e., Favourable or Adverse.

(Nov. 2022)

Ans.

Output	**Given Standard 1000 kgs**			**Revised Standard 2000 kgs**			**Actual 20000 kgs**		
	Quantity	Rate	Amount	Quantity	Rate	Amount	Quantity	Rate	Amount
A	500	25	12,500	10,000	25	250,000	11,000	23	253,000
B	350	45	15,750	7,000	45	315,000	7,500	48	360,000
C	250	55	13,750	5,000	55	275,000	4,500	60	270,000
	1,100		42,000	22,000		840,000	23,000		883,000

1) Material Cost variance = standard Cost – actual Cost 8,40,000 – 8,83,000 = 43,000A

2) Material Price Variance = (Standard Rate – Actual rate) × Actual Quantity
   a) (25-23) × 11,000 = 22,000F
   b) (45-48) × 7,500 = 22,500A
   c) (55-60) × 4,500 = 22,500A   23,000A

3) Material Usage Variance = (standard quantity – Actual Quantity) × Actual Rate
   a) (10,000 – 11,000) × 25 = 25,000A
   b) (7000 – 7500) × 45 = 22,500A
   c) (5000 – 4500) × 55 = 27,500F   20,000A

4) Material Yield Variance
   = (Std. Total Quantity – Actual Total Quantity × Standard weighted average purchase price
   = (22,000 – 23,000) × 8,40,000/22,000 = 38,182 (Adverse)

36. Ahaan Limited operates a system of standard costing in respect of one of its products 'AH1' which is manufactured within a single cost centre. Details of standard per unit are as follows:

- ✓ The standard material input is 20 kilograms at a standard price of ₹24 per kilogram.
- ✓ The standard wage rate is ₹72 per hour and 5 hours are allowed to produce one unit.
- ✓ Fixed production overhead is absorbed at the rate of 100% of wages cost.

During the month of April 2022, the following was incurred:

- ✓ Actual price paid for material purchased @ ₹22 per kilogram.
- ✓ Total direct wages cost was ₹43,92,000
- ✓ Fixed production overhead cost incurred was ₹45,00,000

Analysis of variances was as follows:

Variances	**Favourable**	**Adverse**
Direct material price	₹ 4,80,000	-
Direct material usage	₹ 48,000	
Direct labour rate	-	₹ 69,120
Direct labour efficiency	₹ 33,120	-
Fixed production overhead expenditure		₹ 1,80,000

You are required to CALCULATE the following for the month of April, 2022

i) Material cost variance

ii) Budgeted output (in units)

iii) Quantity of raw materials purchased (in kilograms)

iv) Actual output (in units)

v) Actual hours worked

vi) Actual wage rate per labour hour
vii) Labour cost variance
viii) Production overhead cost variance

(RTP Nov 2022)

Ans.

i) **Direct Material Cost Variance =** Direct Material Price Variance + Direct Material Usage Variance = ₹4,80,000 F + ₹ 48,000 F = ₹ 5,28,000 F

ii) **Budgeted Output (units)**

iii)

Fixed Production Overhead Expenditure Variance = Budgeted Fixed Overhead - Actual Fixed Overheads

(Budgeted Output x Standard Overhead Rate - Actual Fixed Overheads)

= ₹ 1,80,000 A = Budgeted Output x ₹ 360 (5 hrs @₹ 72) - ₹ 45,00,000

Budgeted Output = $\frac{₹45,00,000 - ₹1,80,000}{₹360}$ **= 12,000 units**

iv) **Quantity of Materials purchased (in kilograms)**

Material Price Variance = Actual Usage X (Standard Price per kg - Actual price per kg)

₹ 4,80,000 F = Actual Usage (₹ 24 -₹ 22)

Actual usage in kgs = $\frac{₹4,80,000}{₹2}$ = **2,40,000 kgs**

v) **Actual Output (units)**

Actual Direct wages	₹43,92,000
Direct labour rate variance	₹69,120A
Direct labour efficiency variance	₹33,120 F
Standard labour cost for actual output	₹43,56,000

Actual Output = $\frac{\text{Standard labour cost for actual output}}{\text{Standard wage rate per unit}}$

= $\frac{₹43,56,000}{₹360\ (72\times5)}$ = 12,100 units

Alternatively, let X be the actual quantity of output Then, Standard Quantity of input for actual output 'X'

20X = SQ

Material cost variance = (SQ x SP) - (AQ × AP)

₹ 5,28,000 = (20 X × ₹24) - (2,40,000 kgs × ₹22)

480X = ₹52,80,000 + ₹5,28,000

480X = ₹58,08,000

x = $\frac{₹58,08,000}{480}$ = 12,100 units

vi) **Actual hours worked**

Labour Efficiency Variance = Standard Labour Rate (Standard time for actual output - Actual time)

₹ 33,120 F = ₹72 (5 hours × 12100 units - Actual time)

460 hours = 60,500 hours - Actual time

Actual time= 60,500 - 460 **= 60,040 hours**

vii) **Actual wage rate per hour**

Actual Wages paid = ₹43,92,000

Actual hours worked = 60,040 hours

Actual Wage rate per hour = $\frac{₹43,92,000}{60,040\ hours}$ = ₹73.15 per hour

viii) Labour cost variance

= Labour rate variance + Labour efficiency variance

=₹ 69,120 A + ₹33,120 F

= ₹36,000 A

ix) Production Overhead Cost Variance

= Actual Output × Standard overhead rate - Actual Overheads Incurred

= 12,100 units x₹ 360 - ₹ 45,00,000

= ₹ 43,56,000 - ₹ 45,00,000

= ₹ 1,44,000 A

37. NC Limited uses a standard costing system for the manufacturing of its product 'X'. The following information is a 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 hours 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.

(May 2023)

Ans.

i) Calculation of Standard Price Per Kg and the Standard Quantity of raw material:

Material Price Variance = (SP – AP) x Actual Mat. Purchase

12500 = (SP – 12.5) x 25000

12500 = 25000 S.P – 312500

S.P = ₹13

Material Cost Variance = (SQ X SP) – (AQ X AP)

- 1800 = (SQ X 13) – 312500

- 1800 = 13 SQ – 312500

SQ = 23,900

ii) Material usage variance = (Std. Q for actual output – Actual Q.) X S.P

= (23,900 – 25,000) 13

= 14,300 (A)

Labour Cost Variance = (Std. Labour hours X SR) – (Actual Labour hours X AR)

Skilled:

= (75 x 40 x 50) – (75 x 40 x 50)

= 0

Semi-skilled:

= (50 X 40 X 50) – (50 X 40 X 40)

= 1,00,000 – 80,000

= ₹20,000 (f)

Labour Efficiency Variance = (Std hours for actual output – Actual hours) X SR
= {(125 workers x 40) – (125 X 40)} x 50
= 0

iii) Fixed overhead Cost Variance = (Fixed Overhead Absorbed – Actual Fixed Overhead)

Fixed overhead Absorption Rate = $\frac{Budgeted\ OHS}{\text{Budgeted output}}$

= ($\frac{76{,}480 \div 4}{2{,}00{,}000}$)
= ₹0.0956/Unit.
= {(0.0956 X 191200) – 19500}
= ₹1221 (A)

Fixed Overhead Expenditure Variance: = (Budget Fixed OH – Actual Fixed OH)
= 19120 – 19500
= 380 (A)

Fixed Overhead Volume Variance = {Fixed overhead Absorbed – Budgeted Fixed overhead}
= 18,279 – 19120
= 841 (A)

Unit & Batch Costing
Assignment

Q. No.	Question
1.	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: -** **1)** What would be the optimum run size for Stent manufacture? **2)** What is the minimum inventory holding cost? **3)** 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 (a) above? **(Jan 2021, Modified RTP Nov 2021, Nov 2020, ICAI SM, MTP Dec 2021 & MTP May 2019, May 2022, Modified May 2023)**
Ans.	**1) Computation of optimum run size for stent manufacture: -** ✓ Total market Demand of Stents = 40 million or 400 lakhs ✓ Market share of GHI Ltd., = 2.5% of total market demand. ✓ Market share of GHI Ltd. = 2.5% of 400 lakhs = 10 lakhs ✓ Carrying cost per unit per annum = 1.50 × 12 = ₹ 18 per unit per annum ✓ Set-up cost per run = ₹ 225 ✓ Optimum run size = $\sqrt{\frac{2\ AS}{C}}$ ✓ Annual demand for the product = A; ✓ Carrying Cost/ Holding Cost = C; ✓ Setting-up Cost = S ✓ Annual demand = 10,00,000, S = ₹ 225, C = ₹ 18 ✓ Optimum run size = $\sqrt{\frac{2 \times 10,00,000 \times 225}{18}}$ = 5,000 Stents. **2) Computation of minimum inventory holding cost;** ✓ Holding cost is minimum at the Optimum run size. ✓ Total holding cost = ½ of Run size × Carrying cost per unit per annum ✓ Total holding cost = ½ × 5,000 × ₹ 18= ₹ 45,000 **3) Computation of extra cost as compared to the optimum run size;** <u>Total running & Setup cost at 5,000 stents</u> ✓ Total holding cost = ₹ 45,000 ✓ Number of setups required = $\frac{10,00,000}{5,000}$ = 200 setups; Set-up cost per run = ₹ 225 ✓ Total setup cost = 200 × 225 = ₹ 45,000 ✓ Total cost at 5,000 run size = 45,000 + 45,000 = ₹ 90,000 <u>Total running & Setup cost at 4,000 stents</u> ✓ Total holding cost = ½ × 4,000 × ₹ 18 = ₹ 36,000 ✓ Number of setups required = $\frac{10,00,000}{4,000}$ = 250 setups; Set-up cost per run = ₹ 225 ✓ Total setup cost = 250 × 225 = ₹ 56,250 ✓ Total cost at 5,000 run size = 36,000 + 56,250 = ₹ 92,250 Extra cost as compared to the optimum run size = 92,250 – 90,000 = ₹ 2,250

2. 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 equal to 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	270h
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

(ICAI SM Modified 2 Ques, RTP, MTP July 2021, Modified MTP Nov 2020, Modified RTP May 2023)

Ans.

Particulars	January	February	March	April	May	June	Total
Batch output (in units)	210	200	220	180	200	220	1,230
Sale Value (₹)	1,680	1,600	1,760	1,440	1,600	1,760	9,840
Material Cost (₹)	650	640	680	630	700	720	4,020
Direct Wages (₹)	120	140	150	140	150	160	860
Chargeable expenses * (₹)	600	672	672	621	780	800	4,145
Total Cost (₹)	1,370	1,452	1,502	1,391	1,630	1,680	9,025
Profit per batch (₹)	310	148	258	49	(30)	80	815
Total Cost per unit (₹)	6.52	7.26	6.83	7.73	8.15	7.64	7.34
Profit per unit (₹)	1.48	0.74	1.17	0.27	(0.15)	0.36	0.66

Overall position of the order for 1,200 Units;

Particulars	(₹)
Sales Value of 1,200 units @ ₹ 8 per unit	9,600
Total Cost of 1,200 units @ ₹ 7.34 per unit	8,808

Profit	792

Working Note:

Calculation of chargeable overheads in each month:

$*\frac{\text{Chargeable expenses}}{\text{Direct labour hour for the month}} \times$ Direct labour hours for batch

$\text{Jan} = \frac{12{,}000}{4800} \times 240 = ₹600$

$\text{Feb} = \frac{10{,}560}{4{,}400} \times 280 = ₹672$

$\text{Mar} = \frac{12{,}000}{5{,}000} \times 280 = ₹672$

$\text{Apr} = \frac{10{,}580}{4{,}600} \times 270 = ₹621$

$\text{May} = \frac{13{,}000}{5{,}000} \times 300 = ₹780$

$\text{Jan} = \frac{12{,}000}{4{,}800} \times 320 = ₹800$

3. Arnav Confectioners (AC) owns a bakery which is used to make bakery items like pastries, cakes and muffins. AC use to take at most 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.

(ICAI SM, Modified Nov. 2022, RTP Nov 2022, Modified MTP May 2023-I)

Ans. **Statement of Cost per batch and per order;**

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

Particulars	Cost per batch (₹)	Total Cost (₹)
✓ Direct Material Cost	500.00	6,000
✓ Direct Wages	50.00	600
✓ Oven set-up cost	150.00	1,800
✓ **Add:** Production Overheads (20% of Direct wages)	10.00	120
✓ Total Production cost	710.00	8,520
✓ **Add:** S & D and Administration Overheads (10% of Total production cost.)	71.00	852
✓ Total Cost	781.00	9,372
✓ **Add:** Profit (1/3rd of total cost)	260.33	3,124
✓ Selling price	1,041.33	12,496
✓ Selling Price per unit = 1041.33 ÷ 50 = ₹ 20.83 ✓ Or, 12,496÷600 = ₹20.83		

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%.

a) Find the most economic production run.

b) Calculate the extra cost that company incur due to processing of 18,000 columns in a batch.

(ICAI SM, Modified July 2021)

Ans.

a) Calculation of Economic Batch Quantity (EBQ):

Optimum production run size (Quantity) = $\sqrt{\frac{2\ DS}{C}}$

where,

D = No. of units to be produced within one year.

S = Set-up cost per production run.

C = Carrying cost per unit per annum.

$$EBQ = \sqrt{\frac{2 \times 90{,}000 \times \text{₹}\ 1{,}500}{5\%\ of 2{,}200*}}$$

$$= \sqrt{\frac{27{,}00{,}00{,}000}{\text{₹}\ 110}} = 1{,}567 \text{ columns.}$$

*Total Cost of production = ₹ 2,120 + 60 + 20 = ₹ 2,200

b) Calculation of Extra Cost due to processing of 18,000 columns in a batch;

Particulars	When run size is 1,567 columns	When run size is 18,000 columns
Total set up cost	No. of setups $= \frac{90,000}{1567} =$ 57.43 (58 setups) $= \frac{90,000}{1,567} \times$ ₹ 1,500 = ₹ 87,000	$= \frac{90,000}{18,000} \times$ ₹ 1,500 = ₹ 7,500
Total Carrying Cost	½ × 1,567 × ₹ 110 = ₹ 86,185	½ × 18,000 × ₹ 110 = ₹ 9,90,000
Total Cost	**₹ 1,73,185**	**₹ 9,97,500**

*Thus, extra cost = ₹ 9,97,500 − ₹ 1,73,185 = ₹ 8,24,315.

5. 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:

- **i)** compute the optimum run size and number of runs for bearing manufacture.
- **ii)** compute the interval between two consecutive runs.
- **iii)** 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.
- **iv)** give your opinion regarding run size of bearing manufacture. Assume 365 days in a year.

(ICAI SM, RTP May 2022)

Ans.

i) Optimum batch size or Economic Batch Quantity (EBQ):

EBQ = $\sqrt{\frac{2DS}{C}} = \sqrt{\frac{2 \times 48,000 \times 384}{2.4}}$ = 3919.18 or 3,920 units

Number of Optimum runs = 48,000 ÷ 3,920 = 12.25 or 13 run

ii) Interval between 2 runs (in days) = 365 days ÷ 13 = 28 days

Or 365 ÷ 12.24 = 29.82 days

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 (C×D)	₹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 (F×G)	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

iv) To save cost the company should run at optimum batch size i.e. 3,920 Units. It saves ₹ 2,498. 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.

6. 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.

Weeks 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.

(ICAI SM)

Ans. **Statement of Cost and Selling price for 2,000 units of output;**

Particulars	Cost per unit (₹)	Total Cost (₹)
Direct Materials W.N-1	7.50	15,000
Direct Labour W.N-1	3.00	6,000
Prime Cost	10.50	21,000
Add: Factory Overheads (Refer working note-2)	17.50	35,000
Total Cost	28.00	56,000
Add: Profit (20% of Sales is equivalent to 25% of Cost)	7.00	14,000
Sales	35.00	70,000

Working Notes: -

1) Direct Material and Direct Labour Cost is varying directly in proportion to units produced and shall remain same per unit of output. Thus, direct material cost is equal to ₹ 9000 ÷ 1200 units = ₹ 7.50 per unit and labour cost is equal to ₹ 3,600 ÷ 1200 units = ₹ 3 per unit.
2) Calculation of Factory Overheads: - An Observation of cost related to different output level for factory overheads shall reveal 2 things.
    a) Total Cost increases from ₹ 31,000 to ₹ 34,000 along with increase in output from 1,200 units to 1,800 units but cost per unit is not constant. Thus, it is not a variable Cost. Cost per unit is reducing along with increase in output from ₹ 25.83 (₹ 31,000 ÷ 1200 units) to ₹ 18.89 (₹ 34,000 ÷ 1,800 units.)
    b) Since the cost is varying with the output, it is also not a fixed cost.

Hence, we can see that the cost is a semi-variable cost and has to be calculated for 2,000 units by analysing its fixed and variable components.

Week Number	Units Manufactured	Factory Overheads
1	1,200	31,000
2	1,600	33,000
Difference	**400**	**2,000**

Therefore, Variable Cost per unit = Change in Factory Overheads ÷ Change in output
= 2,000 ÷ 400 = ₹5

- ✓ Now total factory overheads for week 2 = ₹ 33,000
- ✓ Out of this, Variable Overheads = 1,600 units × ₹ 5 = ₹ 8,000
- ✓ Thus, fixed component = ₹ 33,000— ₹ 8,000 = ₹ 25,000
- ✓ Therefore, Variable Cost for 2,000 units = 2,000 units × ₹ 5 = ₹ 10,000
- ✓ Fixed Cost will not change and hence will be = ₹ 25,000
- ✓ Therefore, Total Factory Cost = Variable Overheads + Fixed Overheads for 2,000 units = ₹ 10,000 + ₹ 25,000 = ₹ 35,000

7. The following data relate to the manufacture of a standard product during the 4-week ended 28th February 20X1: -

Raw Materials Consumed – ₹ 4,00,000
Direct Wages – ₹ 2,40,000
Machine Hours Worked – 3,200 hours
Machine Hours 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 20X1.

(ICAI SM)

Ans. **Statement of Cost per Unit;**

No. of units produced: 10,000 units

Particulars	**Cost per unit (₹)**	**Amount (₹)**
Raw Materials Consumed	40.00	4,00,000
Direct Wages	24.00	2,40,000
Prime Cost	64.00	6,40,000
Add: Manufacturing Overheads (3,200 hours×₹ 40)	12.80	1,28,000
Works Cost	76.80	7,68,000
Add: Office Overheads (10% of Works Cost)	7.68	76,800
Cost of goods sold	84.48	8,44,800
Add: Selling Overheads (10,000 units × ₹ 20)	20.00	2,00,000
Cost of Sales/Total Cost	**104.48**	**10,44,800**
Add: Profit (Balancing Figure)	15.52	1,55,200
Sales	120.00	12,00,000

8. 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 on outside company as required.

The Holding costs are incurred on rented storage space which costs ₹ 50 per square meter per annum. Each square meter can hold 250 Litres suitably stacked.

You are required to: -

1) 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.
2) Use the economic batch size formula to Calculate the batch size which will minimise total cost.

(ICAI SM)

Ans.

1)

Production Batch Size (Litre.)	Set-up Costs per annum (₹)	Holding Costs per annum (₹)	Total Costs per annum (₹)
4,000	1,250	400	1,650
5,000	1,000	500	1,500
6,000	833	600	1,433
7,000	714	700	1,414
8,000	625	800	1,425
9,000	556	900	1,456
10,000	500	1000	1,500

As the total cost is minimum at 7,000 litres, i.e., ₹1,414, thus economic production lot would be 7,000 Litres.

2) Economic Batch Quantity (EBQ);

- EBQ = $\sqrt{\frac{2\ DS}{C}}$
- Where,
- D = Annual demand for the product = 50,000 Litres
- S = Setting up cost per batch = ₹ 100 per set-up
- C = Carrying cost per unit of production
- = ₹ 50/250 litres = 0.20 per litre per annum
- = $\sqrt{\frac{2 \times 50,000 \times 100}{0.2 \times 1}}$ = 7,071 Litres

Working Notes: -

1) For Production batch size of 7,000 litres.
   Number of set ups per year = 50,000 ÷ 7,000 = 7.14 or 8 set-ups.
   Hence, annual set up cost per year = 8 × ₹ 100 = ₹ 800
   Average Quantity = 7,000 ÷ 2 = 3,500 litres
   Holding Costs = 3,500 litre ÷ 250 × 50 = ₹ 700

It can be seen that EBQ determined with mathematical formulae (7,071 litres) slightly varies from the one determined by trial-and-error method (7,000 Litres)

9. Wonder Ltd. has a capacity of 1,20,000 units per annum as its optimum capacity. The production costs are as under;

Direct Material – ₹ 90 per unit
Direct Labour – ₹ 60 per unit.

Overheads;

Fixed ₹30,00,000 per annum

Variable; ₹ 100 per unit

Semi Variable; ₹ 20,00,000 per annum up to 50% capacity and an extra amount of ₹ 4,00,000 for every 25% increase in capacity or part thereof. The production is made to order and not for stocks.

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.

(ICAI SM)

Ans. **Statement of Cost and Total Sales**

(Amount ₹)

Particulars	**First 3 Months**	**Next 9 Months**	**Total**
✓ Capacity Utilisation (No of units)	120,000 × 3/12 × 50% = 15,000	120,000 × 9/12 × 80% = 72,000	87,000
✓ Direct Material	13,50,000	64,80,000	78,30,000
✓ Direct Labour	9,00,000	43,20,000	52,20,000
✓ **Add:** Overheads:			
✓ Fixed (1:3)	7,50,000	22,50,000	30,00,000
✓ Variable	15,00,000	72,00,000	87,00,000
✓ Semi Variable	5,00,000 (For first 3 months at the rate of ₹ 20,00,000)	21,00,000 (at the rate of ₹ 28,00,000 for 9 months)	26,00,000
✓ Total Cost	50,00,000	2,23,50,000	2,73,50,000
✓ **Add:** Profit			20,00,000
✓ Sales			**2,93,50,000**

*Average Selling Price = ₹ 2,93,50,000 ÷ 87,000 units = ₹ 337.356.

10. **A Company produces product X to order and has the following budgeted OH;**

Department	Budgeted Overhead	Budgeted Activity Levels
Welding	₹ 6,000	1,500 Labour Hours
Assembly	₹ 10,000	1,000 Labour Hours

Selling and Administration OH are 20% of Factory Cost. An order for 250 widgets type X – 128 and made as Batch S – 937, had the following costs – (1) Materials — ₹ 12,000, (2) Labour — 100 hours in Welding Shop at ₹ 10 per hour, 200 hours in Assembly Shop at ₹ 8 per hour, (3) ₹ 500 was paid for hire of special scan equipment for testing the widgets.

From the given data Calculate the cost per unit for Batch S – 937.

(RTP)

Ans. **Batch Cost Sheet;**

Particulars	**(₹)**
✓ Direct Material Given	12,000
✓ Direct Wages 100 hours in Welding Shop at ₹ 10 per hour	1,000
✓ 200 hours in Assembly Shop at ₹ 8 per hour	1,600
✓ Direct Expenses Hire of Special Scan Equipment	500

✓ Prime Cost	15,100
✓ **Add:** Overheads; 100 hours in welding Shop at ₹ 4 per hour	400
✓ 200 hours in Assembly Shop at ₹ 10 per hour	2,000
✓ **Factory Cost;**	17,500
✓ **Add:** SOH absorbed at 20% on Factory Cost of ₹ 17,500	3,500
✓ **Total Cost**	21,000

*Cost per unit = $\frac{₹\ 21,000}{250}$ = ₹ 84.00

Working note-

Computation of OH Absorption Rates;

✓ Welding Department $\frac{₹\ 6,000}{1,500}$ = ₹ 4 per Labour Hour.

✓ Assembly Department $\frac{₹\ 10,000}{1,000}$ = ₹ 10 per Labour Hour.

11. BTL LLP. manufactures glass bottles for HDL Ltd., a pharmaceutical company, which is in ayurvedic medicines business.

BTL can produce 2,00,000 bottles in a month. Set-up cost of each production run is ₹ 5,200 and the cost of holding one bottle for a year is ₹ 1.50. As per an estimate HDL Ltd. can order as much as 19,00,000 bottles in a year spreading evenly throughout the year.

At present the BTL manufactures 1,60,000 bottles in a batch.

Required:

i) COMPUTE the Economic Batch Quantity for bottle production.

ii) COMPUTE the annual cost saving to BTL by adopting the EBQ of a production.

(RTP Nov. 2019)

Ans.

i) Economic Batch Quantity = $\sqrt{\frac{2\ DS}{C}}$

- ✓ Annual demand for the product = D;
- ✓ Carrying Cost/ Holding Cost = C;
- ✓ Setting-up Cost = S
- ✓ Annual demand = 19,00,000; S = ₹ 5,200; C = ₹ 1.5
- ✓ Economic Batch Quantity = $\sqrt{\frac{2 \times 19,00,000 \times 5,200}{1.5}}$ = 1,14,775 bottles

ii) Computation of savings in cost by adopting EBQ:

Batch Size	No. of Batch	Set-up Cost	Carrying Cost	Total Cost
1,60,000 Bottles	12 (W.N-1)	62,400 (₹ 5,200 × 12)	1,20,000 (₹ 1.5 × ½ × 1,60,000)	1,82,400
1,14,775 Bottles	17 (W.N-2)	88,400 (₹ 5,200 × 17)	86,081.25 (₹ 1.5 × ½ × 1,14,775)	1,74,481.25
Saving				7,918.25

Working note-

Number of batches –

1. If Batch size is 1,60,000 = 19,00,000 / 1,60,000 = 11.875 or 12 Batches
2. If Batch size is 1,14,775 = 19,00,000 / 1,14,775= 16.55 or 17 Batches

12. Arnav Ltd. operates in beverages industry where it manufactures soft -drink in three sizes of Large (3 litres), Medium (1.5 litres) and Small (600 ml) bottles. The products are processed in batches. The 5,000 litres capacity processing plant consumes electricity of 90 Kilowatts per hour and a batch takes 1 hour 45 minutes to complete. Only symmetric size of products can be processed at a time. The machine set-up takes 15 minutes to get ready for next batch processing. During the set-up, power consumption is only 20%.

i) The current price of Large, Medium and Small are ₹ 150, ₹ 90 and ₹ 50 respectively.
ii) To produce a litre of beverage, 14 litres of raw material-W and 25 ml of Material-C are required which costs ₹ 0.50 and ₹1,000 per litre respectively.
iii) 20 direct workers are required. The workers are paid ₹ 880 for 8 hours shift of work.
iv) The average packing cost per bottle is ₹3
v) Power cost is ₹ 7 per Kilowatt -hour (Kwh)
vi) Other variable cost is ₹ 30,000 per batch.
vii) Fixed cost (Administration and marketing) is ₹ 4,90,00,000.
viii) The holding cost is ₹ 1 per bottle per annum.

The marketing team has surveyed the following demand (bottle) of products:

Large	Medium	Small
3,00,000	7,50,000	20,00,000

Required:

CALCULATE net profit/ loss of the organisation and also COMPUTE Economic Batch Quantity (EBQ).

(MTP May 2022)

Ans. **Calculation of Profit/ loss per batch:**

	Particulars	Large	Medium	Small	Total
A	Demand (bottle)	3,00,000	7,50,000	20,00,000	30,50,000
B	Price per bottle (₹)	150	90	50	
C	**Sales value (₹) [A×B]**	**4,50,00,000**	**6,75,00,000**	**10,00,00,000**	**21,25,00,000**
	Direct Material cost:				
E	Material-W (₹) [Qty in WN-3 × ₹0.50]	63,00,000	78,75,000	84,00,000	2,25,75,000
F	Material-C (₹) [Qty in WN-3 × ₹1,000]	2,25,00,000	2,81,25,000	3,00,00,000	8,06,25,000
G	**[E+F]**	**2,88,00,000**	**3,60,00,000**	**3,84,00,000**	**10,32,00,000**
H	Direct Wages (₹) [Man- shift in WN-4 × × ₹880]	7,92,000	10,03,200	10,56,000	28,51,200
I	Packing cost (₹) [A×₹3]	9,00,000	22,50,000	60,00,000	91,50,000
	Power cost (₹)				
J	For processing (₹) [WN-5 × ₹7]	1,98,450	2,48,062.5	2,64,600	7,11,112.5
K	For set-up time (₹) [WN-5 × ₹7]	5,670	7,087.5	7,560	20,317.5
L	[J+K]	**2,04,120**	**2,55,150**	**2,72,160**	**7,31,430**
M	Other variable cost (₹) [No. of batch in WN-2 × ₹30,000]	54,00,000	67,50,000	72,00,000	1,93,50,000

N	**Total Variable cost per batch [G+H+I+L+M]**	**3,60,96,120**	**4,62,58,350**	**5,29,28,160**	**13,52,82,630**
O	**Profit/ loss before fixed cost [C-N]**	**89,03,880**	**2,12,41,650**	**4,70,71,840**	**7,72,17,370**
P	Fixed Cost				4,90,00,000
Q	**Net Profit [O-P]**				**2,82,17,370**

Computation of Economic Batch Quantity (EBQ):

$EBQ = \frac{\sqrt{2DS}}{C}$

D = Annual Demand for the Product = Refer A below
S = Set-up cost per batch = Refer D below
C = Carrying cost per unit per annum =Refer E below

	Particulars	**Large**	**Medium**	**Small**
A	**Annual Demand (bottle)**	**3,00,000**	**7,50,000**	**20,00,000**
B	Power cost for set-up time (₹) [Consumption per batch in WN-5 × ₹7]	31.50	31.50	31.50
C	Other variable cost (₹)	30,000	30,000	30,000
b	**Total Set-up cost [B+C]**	**30,031.50**	**30,031.50**	**30,031.50**
E	**Holding cost:**	**1.00**	**1.00**	**1.00**
F	**EBQ (Bottle)**	**1,34,234**	**2,12,243**	**3,46,592**

Workings:

1) Maximum number of bottles that can be processed in a batch:

$= \frac{5{,}000\ ltrs}{Bottle\ volume}$

Large		**Medium**		**Small**	
Qty (ltr)	**Max bottles**	**Qty (ltr)**	**Max bottles**	**Qty (ml)**	**Max bottles**
3	1,666	1.5	3,333	600	8,333

For simplicity of calculation small fractions has been ignored.

2) Number of batches to be run:

		Large	**Medium**	**Small**	**Total**
A	Demand	3,00,000	7,50,000	20,00,000	
B	Bottles per batch (Refer WN-1)	1,666	3,333	8,333	
C	No. of batches [A÷B]	180	225	240	645

For simplicity of calculation small fractions has been ignored.

3) Quantity of Material-W and Material C required to meet demand:

	Particulars	**Large**	**Medium**	**Small**	**Total**
A	Demand (bottle)	3,00,000	7,50,000	20,00,000	
B	Qty per bottle (Litre)	3	1.5	0.6	
C	Output (Litre) [A×B]	9,00,000	11,25,000	12,00,000	32,25,000

D	Material-W per litre of output (Litre)	14	14	14	
E	Material-W required (Litre) [C×D]	**1,26,00,000**	**1,57,50,000**	**1,68,00,000**	**4,51,50,000**
F	Material-C required per litre of output (ml)	25	25	25	
G	Material-C required (Litre) [(C×F) ÷1000]	**22,500**	**28,125**	**30,000**	**80,625**

4) No. of Man-shift required:

		Large	Medium	Small	Total
A	No. of batches	180	225	240	645
B	Hours required per batch (Hours)	2	2	2	
C	Total hours required (Hours) [A×B]	360	450	480	1,290
D	No. of shifts required [C÷8]	45	57	60	162
E	**Total manshift [D×20 workers]**	**900**	**1,140**	**1,200**	**3,240**

For simplicity of calculation small fractions has been ignored.

5) Power consumption in Kwh

		Large	Medium	Small	Total
For processing					
A	No. of batches	180	225	240	645
B	Hours required per batch (Hours)	1.75	1.75	1.75	1.75
C	Total hours required (Hours) [A×B]	315	393.75	420	1,128.75
D	Power consumption per hour (Kwh)	90	90	90	90
E	**Total Power consumption (Kwh) [C×D]**	**28,350**	**35,437.5**	**37,800**	**1,01,587**
F	**Per batch consumption* (Kwh) [E÷A]**	**157.5**	**157.5**	**157.5**	**157.5**
For set-up					
G	Hours required per batch (Hours)	0.25	0.25	0.25	0.25
H	Total hours required (Hours) [A×G]	45	56.25	60	161.25
I	Power consumption per hour (Kwh) [20%×90]	18	18	18	18
J	**Total Power consumption (Kwh) [H×I]**	**810**	**1,012.5**	**1,080**	**2,902.5**

K	**Per batch consumption* (Kwh) [J÷A]**	**4.5**	**4.5**	**4.5**	**4.5**

* Per batch consumption can be directly calculated as [Hours required per batch x Power consumption per hour]

13. A manufacturing process yields the following products out of the raw materials introduced in the process:

Main Product X 60% of Raw Materials By-

Product Y	15% of Raw Materials
By Product Z	20% of Raw Materials
Wastage	5% of Raw Materials

Other information is as follows:

a) Total Cost: Raw Materials 1,000 units of ₹9,200; Labour ₹8,200; Overheads ₹12,000

b) One unit of product z requires ½ the raw materials required for one unit of product Y, one unit of product X requires1½ times the raw materials required for product Y.

c) Product X required double the time needed for production of one unit of Y and one unit of Z.

d) Product Z requires ½ the time required for the production of one unit of product Y.

e) Overheads are to be apportioned in the ratio of 6:1:1.

You are required to CALCULATE the total and per unit of cost of each of the products.

(MTP Nov 2022)

Ans.

Statement of Distribution of Costs

Cost Elements	Basis	Total Cost	Main Product X (600 Units)		By-Product Y (150 Units)		By-Product Z (200 Units)	
			Total	Per Unit	Total	Per Unit	Total	Per Unit
Raw Materials	18:3:2	9,200	7,200	12	1,200	8	800	4
Labour	36:3:2	8,200	7,200	12	600	4	400	2
Overheads	6:1:1	12,000	9,000	15	1,500	10	1,500	7.50
Total		**29,400**	**23,400**	**39**	**3,300**	**22**	**2,700**	**13.50**

Working Notes:

1) Calculation of Units produced:

Main Product X	60% of Raw Materials	600 Units
By-Product Y	15% of Raw Materials	150 Units
By Product Z	20% of Raw Materials	200 Units
Wastage 5% of Raw Materials		50 Units
		1000 Units

2) Cost Allocation

Raw Materials

Let Product Z requires 1 unit of raw materials then, Product Y will require 2 units of raw materials and Product X will require 3 units of raw materials.

Product	**X**		**Y**		**Z**
Individual Unit ratio (a)	3	:	2	:	1
Units (b)	600		150		200
Ratio for Cost Allocation (a*b)	1800	:	300	:	200
Ratio	18	:	3	:	2

Labour:

Let Product Z requires 1 hour of Labour then, Product Y will require 2 hours of Labour and Product X will require 6 hours of Labour.

Product	**X**		**Y**		**Z**
Individual hour ratio (a)	6	:	2	:	1
Units (b)	600		150		200
Ratio for Cost Allocation (a*b)	3600	:	300	:	200
Ratio	36	:	3	:	2

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