CA INTER

COST & MANAGEMENT ACCOUNTING

VOLUME II

SOLVED QUESTION BANK

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CHAPTER 12: SERVICE COSTING

PROBLEM – 1:

A Lorry starts with a load of 20 MT of Goods from Station A. It unloads 8 MT in Station B and balance goods in Station C. On return trip, it reaches Station A with a load of 16 MT, loaded at Station C. The distance between A to B, B to C and C to A are 80 Kms, 120 Kms and 160 Kms, respectively. COMPUTE "Absolute MT Kilometer" and "Commercial MT-Kilometer".

(MT Metric Ton or Ton)

SOLUTION:

Weighted Average or Absolute basis – MT – Kilometer:

= (20 MT × 80 Kms) + (12 MT × 120 Kms) + (16 MT × 160 Kms)

= 1,600 + 1,440 + 2,560 = 5,600 MT - Kilometer

Simple Average or Commercial basis – MT – Kilometer:

= [{(20 + 12 + 16) ÷ 3} MT × {(80 + 120 + 160) Kms]

= 16 MT × 360 Kms = 5,760 MT – Kilometer

PROBLEM – 2:

ABC Transport Company has given a route 40 kilometers long to run bus

1. **The bus costs the company a sum of ₹ 10,00,000**
2. **It has been insured at 3% p.a. and**
3. **The annual tax will amount to ₹ 20,000**
4. **Garage rent is ₹ 20,000 per month.**
5. **Annual repairs will be ₹ 2,04,000**
6. **The bus is likely to last for 2.5 years**
7. **The driver's salary will be ₹ 30,000 per month and the conductor's salary will be ₹ 25,000 per month in addition to 10% of takings as commission [To be shared by the driver and conductor equally.**
8. **Cost of stationery will be ₹ 1,000 per month.**
9. **Manager-cum-accountant's salary is ₹ 17,000 per month.**
10. **Petrol and oil will be ₹ 500 per 100 kilometer**
11. **The bus will make 3 up and down trips carrying on an average 40 passengers on each trip.**
12. **The bus will run on an average 25 days in a month.**

Assuming 15% profit on takings, CALCULATE the bus fare to be charged from each passenger.

SOLUTION:

Working Note:

(1) Total Kilometers run per annum:

= Number of Buses × Distance × Number of days in the Month × Number of trips × 12 months

= 1 Bus × 40 kms × 25 Days × 6 Single trips (3 Round Trips) × 12 months =72,000 kms.

(2) Total Passenger Kilometers per annum:

Total Kilometers run per annum × Seating Capacity

= 72,000 Kms × 40 Seats = 28,80,000 Passenger-Kms.

(3) Petrol & oil Consumption per annum:

Total Kilometers run per annum × Petrol Consumption per KM

= 72,000 Kms × (₹ 500 ÷ 100 Kms) = ₹ 3,60,000

Statement of Cost per Passenger – Km

Particulars	Per Annum	Per Passenger - Kilometer
A. Standing Charges:		
Insurance @ 3% on ₹ 10,00,000	30,000	
Annual Tax	20,000	
Garage rent (₹ 20,000 × 12)	2,40,000	
Depreciation	4,00,000	
Salary of Driver (Fixed part)	3,60,000	
Salary of Conductor (Fixed part)	3,00,000	
Stationary	12,000	
Manager-cum-accountant's salary	2,04,000	
Total Standing Charges	**15,66,000**	0.5438
B. Running Charges:		
Diesel and other Oil (WN - 3)	3,60,000	
Commission to Driver* (10% × ₹ 28,40,000 × 1 ÷ 2)	1,42,000	
Commission to Conductor* (10% × ₹ 28,40,000 × 1 ÷ 2)	1,42,000	
Total Running Charges	**6,44,000**	0.2236
C. Maintenance Charges:		
Repairs	2,04,000	0.0708

Grand Total (A + B + C)	**24,14,000**	0.8382
Profit (15% × ₹ 28,40,000)	4,26,000	0.1479
Fare per Passenger Kilometer		**0.9861**

*Total takings = Standing Charges + (Running cost + Commission on takings) + Maintenance cost + Profit

Let Takings = X

Or, X = ₹ 15,66,000 + (₹ 3,60,000 + 0.1X) + ₹ 2,04,000 + 0.15X

Or, X – 0.25X = 21,30,000

Or, X = ₹ 28,40,000

PROBLEM – 2A: (MTP 1 SEP 24)

A mini-bus, having a capacity of 32 passengers, operates between two places – 'A' and 'B'. The distance between the place 'A' and place 'B' is 30 km. The bus makes 10 round trips in a day for 25 days in a month. On an average, the occupancy ratio is 70% and is expected throughout the year. The details of other expenses are as under:

Amount	(₹)
Insurance	15,600 Per annum
Garage Rent	2,400 Per quarter
Road Tax	5,000 Per annum
Repairs	4,800 Per quarter
Salary of operating staff	7,200 Per month
Tyres and Tubes	3,600 Per quarter
Diesel: (one litre is consumed for every 5 km)	13 Per litre
Oil and Sundries	22 Per 100 km run
Depreciation	68,000 Per annum

Passenger tax @ 22% on total taking is to be levied and bus operator requires a profit of 25% on total taking.

PREPARE operating cost statement on the annual basis and find out the cost per passenger kilometer and one way fare per passenger.

SOLUTION:

Operating Cost Statement

	Particulars	Total Cost Per annum (₹)
A.	**Fixed Charges:**	
	Insurance	15,600
	Garage rent (₹ 2,400 × 4 quarters)	9,600
	Road Tax	5,000
	Salary of operating staff (₹ 7,200 × 12 months)	86,400
	Depreciation	68,000
	Total (A)	1,84,600
B.	**Variable Charges:**	
	Repairs (₹ 4,800 × 4 quarters)	19,200
	Tyres and Tubes (₹ 3,600 × 4 quarters)	14,400
	Diesel {(1,80,000 km. ÷ 5 km.) × ₹ 13}	4,68,000
	Oil and Sundries {(1,80,000 km. ÷ 100 km.) × ₹ 22}	39,600
	Total (B)	5,41,200
	Total Operating Cost (A+B)	**7,25,800**
	Add: Passenger tax (Refer to WN-1)	3,01,275
	Add: Profit (Refer to WN-1)	3,42,359
	Total takings	**13,69,434**

Calculation of Cost per passenger kilometre and one way fare per passenger:

$$\text{Cost per passenger - Km} = \frac{\text{Total Operating Cost}}{\text{Total Passenger - Km}}$$

$$= \frac{₹\ 7,25,800}{40,32,000\ \text{Passenger-Km}} = ₹\ 0.018$$

$$\text{One way fare per passenger} = \frac{\text{Total Takings}}{\text{Total Passengers - Km}} \times 30\text{Km}$$

$$= \frac{₹\ 13,69,434}{40,32,000\ \text{Passenger-Km}} \times 30\ \text{Km} = ₹\ 10.20$$

Working Notes:

1. Let total be X then passenger tax and profit will be as follows:

$X = ₹\ 7,25,8000 + 0.22\ X + 0.25X$

$X - 0.47\ X = ₹\ 7,25,800$

$$X = \frac{₹\ 7,25,800}{0.53} = ₹\ 13,69,434$$

Passenger tax = ₹ 13,69,434 x 0.22 = ₹ 3,01,275

Profit = ₹ 13,69,434 x 0.25 = ₹ 3,42,359

2. Total Kilometres to be run during the year

= 30 Km x 2 sides x 10 trips x 25 days x 12 months = 1,80,000 Kilometers

3. Total passenger kilometers

= 1,80,000 km x 32 passengers x 70% = 40,32,000 Passenger Km

PROBLEM – 3:

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 workload of the students has been so arranged that in the morning the first trip picks up senior students and the second trip plying an hour later picks up 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. The 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 (Salary payable for all 12 months) (one cleaner employed for all the five buses)	₹ 3,500 per month
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 liter

Each bus gives an average mileage of 4 km per liter of diesel

The seating capacity of each bus is 50 students.

The seating capacity is fully occupied during the whole year.

Students picked up and dropped within a range up to 4 km. of distance from the school are charged half fare and fifty per cent of the students travelling in each trip are in this category. Ignore interest.

Since the charges are to be based on average cost you are required to:

1. **PREPARE a statement showing the expenses of operating a single bus and the fleet of five buses for a year.**
2. **WORK OUT the average cost per student per month in respect of –**
   a. **students coming from a distance of up to 4 km. from the school and**
   b. **students coming from a distance beyond 4 km. from the school**

SOLUTION:

i. 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 Per Month	54,000	2,70,000
Cleaner's salary	3,500 Per Month	8,400	42,000
Licence fee, taxes etc.	8,600 Per Annum	8,600	43,000
Insurance	10,000 Per Annum	10,000	50,000
Depreciation (15,00,000 – 3,00,000) ÷ 12 yrs	1,00,000 Per Annum	1,00,000	5,00,000
(ii) Maintenance Charges:			
Repairs & maintenance	35,000 Per Annum	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 fareequivalent student		₹ 210	₹ 210

ii. Average cost per student per month:

A. Students coming from distance of upto 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

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 per annum: 14,400 km

Cost of diesel (per bus per annum): $\frac{14,400 \text{ km}}{4 \text{ kmpl}} \times ₹\ 45 = ₹\ 1,62,000$

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**

PROBLEM – 4:

GTC has a lorry of 6-ton carrying capacity. It operates a 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 the distance from city 'A' to 'C' is 140 km.

In January 20x1, 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 20x1 are ₹ 2,94,400 (includes ₹ 12,400 paid as a penalty for overloading)

You are required to:

1. CALCULATE the cost as per a. Commercial ton-kilometre. b. Absolute ton kilometre

2. CALCULATE Net Profit/ Loss for the month of January, 20x1

SOLUTION:

i. 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 tonne-km = $\frac{₹\,3,42,000}{44,856 \text{ ton - km.}}$ = ₹ 7.62

(Refer to working note-1)

b) Cost per Absolute tonne-km = $\frac{₹\,3,42,000}{44,720 \text{ ton - km.}}$ = ₹ 7.65

(Refer to working note-2)

ii. Calculation of Net Profit/Loss for the month of January:

Particulars	(₹)	(₹)
Truck hire charges received during the month:		
From Outward journey [(10 + 2) trips × 6 tonne × ₹ 2,400]	1,72,800	
From return journey {(5 trips × 8 tonne × ₹ 2,200) + [(6 + 1) trips × 6 tonne ×	1,80,400	3,53,200

₹ 2,200]}		
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 Tonne-km (Simple Average Calculation):**

Particulars		Tonne-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 tonne + 2 journeys × 4 tonne)	80	
Return (5 journeys × 8 tonne + 6 journeys × 6 tonne + 1 journey × 6 tonne)	82	
Total weight	162	
No. of journeys	26	
Average weight (in tonne) (162 ÷ 26)	**6.23**	
Total Commercial Tonne-km (A × B)		44,856

2. **Calculation of Absolute Tonne-km (Weighted Average Calculation):**

Particulars	Tonne-km.	Tonne-km.
Outward journeys:		
From city A to city B (10 journey × 300 km × 6 tonne)	18,000	
From city A to city C (2 journeys × 140 km × 6 tonne)	1,680	
From city C to city B (2 journeys × 160 km × 4 tonne)	1,280	20,960
Return journeys:		
From city B to city A (5 journeys × 300 km. × 8 tonne) + (6 journeys × 300 km. × 6 tonne)	22,800	
From city B to city C (1 journey × 160 km. × 6 tonne)	960	23,760
Total Absolute Tonne - km		**44,720**

PROBLEM – 4A: **(MTP 1 MAY 24)**

Chiku Transport Service is a Delhi based national goods transport service provider, owning four trucks for this purpose. The cost of running and maintaining these trucks are as follows:

Particulars	Amount
Diesel cost	₹ 19.20 per km.
Engine oil	₹ 4,200 for every 13,000 km.
Repair and maintenance	₹ 36,000 for every 10,000 km.
Driver's salary	₹ 24,000 per truck per month
Cleaner's salary	₹ 15,000 per truck per month
Supervision and other general expenses	₹ 14,000 per month
Cost of loading of goods	₹ 180 per Metric Ton (MT)

All four trucks were purchased for ₹ 30 lakhs with an estimated life of 7,20,000 km each.

During the next month, it is expecting 6 bookings, the details are as follows:

Sl. No.	Journey	Distance in km	Weight- Up (in MT)	Weight- Down (in MT)
1.	Delhi to Kochi	2,700	14	6
2.	Delhi to Guwahati	1,890	12	0
3.	Delhi to Vijayawada	1,840	15	0
4.	Delhi to Varanasi	815	10	0
5.	Delhi to Asansol	1,280	12	4
6.	Delhi to Chennai	2,185	10	8
	Total	10,710	73	18

Required

(i) Calculate the total absolute Ton-km for the vehicles.

(ii) Calculate the cost per ton-km.

SOLUTION:

(i) Calculation of Absolute Ton-km for the next month:

Journey	Distance in km	Weight-Up (in MT)	Ton-km	Weight-Down (in MT)	Ton-km	Total
	(a)	(b)	(c)=(a)×(b)	(d)	(e)= (a)×(d)	(c)+(e)
Delhi to Kochi	2,700	14	37,800	6	16,200	54,000
Delhi to Guwahati	1,890	12	22,680	0	0	22,680
Delhi to Vijayawada	1,840	15	27,600	0	0	27,600
Delhi to Varanasi	815	10	8,150	0	0	8,150
Delhi to Asansol	1,280	12	15,360	4	5,120	20,480
Delhi to Chennai	2,185	10	21,850	8	17,480	39,330
Total	10,710	73	1,33,440	18	38,800	1,72,240

Total Ton-Km = 1,72,240 ton-km

(ii) Calculation of cost per ton-km:

Particulars	Amount (₹)	Amount (₹)
A. **Running cost:**		
- Diesel Cost {₹ 19.20 × (10,710 × 2)}	4,11,264.00	
- Engine oil cost $\left(\frac{₹\ 4,200}{13,000\ km} \times 21,420\ km\right)$	6,920.31	
- Cost of loading of goods {₹ 180 × (73 + 18)}	16,380.00	
- Depreciation {(30,00,000 ÷ 720,000 × 21,420 km) × 4}	3,57,000.00	7,91,564.31
B. **Repairs & Maintenance Cost** (36,000 ÷ 10,000 × 21,420)		77,112.00
C. **Standing Charges**		
- Drivers' salary (₹ 24,000 × 4 trucks)	96,000.00	
- Cleaners' salary (₹ 15,000 × 4 trucks)	60,000.00	
- Supervision andother general exp.	14,000.00	1,70,000.00
Total Cost (A + B + C)		10,38,676.31

Total ton-km		1,72,240
Cost per ton-km		**6.03**

PROBLEM – 4B: (MTP 2 SEP 24)

SpeedEx Logistics, established in 2010 and headquartered in Mumbai, India, operates within the transportation and logistics industry as a third- party logistics (3PL) provider. The company's fleet consists of 10 trucks, 15 vans, and 5 trailer, each serving distinct purposes. The records of Truck R-40 reveal the following information for July 2024.

Days Maintained	30
Days Operated	25
Total Hours Operated	300
Total Kilometres Covered	2,500
Total Tonnage Carried (4 tonne-load per trip, return journey empty 2 round trips per day)	

The following further information is made available:

A. Operating Costs for the month: Petrol ₹ 400, oil ₹170, Grease ₹ 90, Wages to driver ₹ 550, Wages to Worker ₹ 350.

B. Maintenance Costs for the month: Repair ₹ 170, Overhaul ₹ 60, Tyres ₹ 150, Garage charges ₹ 100.

C. Fixed Costs for the month based on the estimates for the year: Insurance ₹ 50, Licence, tax etc. ₹ 80, Interest ₹ 40, Other Overheads ₹ 190

D. Capital costs: Cost of acquisition ₹ 54,000; Residual Value at the end of 5 years life ₹ 36,000.

You are required to CALCULATE:

(i) cost per days maintained

(ii) cost per days operated

(iii)cost per hours operated

(iv)cost per kilometres covered

(v) cost per commercial tonne km (5 Marks)

SOLUTION:

$$₹\ 180 - ₹\ 150 = \frac{\text{Time Saved}}{\text{Time Allowed}} \times ₹\ 150$$

	Particulars	Amount in ₹
A	**Operating costs:**	
	Petrol	400
	Oil	170
	Grease	90
	Wages to Driver	550
	Wages to Worker	350
	(A)	1,560
B	**Maintenance Costs:**	
	Repairs	170
	Overhead	60
	Tyres	150
	Garage Charges	100
	(B)	480
C	**Fixed Cost:**	
	Insurance	50
	License, Tax etc	80
	Interest	40
	Other Overheads	190
	Depreciation $\frac{(54{,}000 - 36000)}{5 \times 12}$	300
	(C)	660
	Total Cost (A + B + C)	2,700

(i) Cost per days maintained = ₹ 2700 ÷ 30 days = ₹ 90

(ii) Cost per days operated = ₹ 2700 ÷ 25 days = ₹ 108

(iii) Cost per hours operated = ₹ 2700 ÷ 300 hours = ₹ 9

(iv) Cost per kilometres covered = ₹ 2700 ÷ 2500 kms = ₹ 1.08

(v) Cost per commercial tonne kms = ₹ 2700 ÷ 5000 tonne kms = ₹ 0.54

*Commercial tonne kms = Total distance travelled x Average load

$$= \frac{(4 \text{ tonnes} + 0 \text{ tonnes})}{2} \times 2500 \text{ kms} = 5000 \text{ tonne Kms}$$

PROBLEM – 5: **(PYP May 24)**

Star Airlines operates a single aircraft of 180 seats capacity between city 'ND' and 'GA'. The average normal occupancy is estimated at 70% per flight. The average one-way fare is ₹ 12,500 from city 'ND" to 'GA'. The costs of operation of the flight as collected by an expert analyst are:

Fuel cost (Variable) per flight from 'ND' to 'GA'	₹ 2,28,000 per flight
Food served on flight from 'ND' to 'GA' (no charge to passenger)	₹ 270 per passenger
Commission paid to Travel Agents (All ticket booking through agents)	7.5% of fare
Fixed costs:	
Lease & landing charges per flight 'ND' to 'GA'	₹ 9,12,000
Salaries of flight crew per flight 'ND' to 'GA'	₹ 90,000

Note: Assume that fuel costs are unaffected by the actual number of passengers on a flight.

You are required to:

(i) Calculate the net operating income that Star Airlines makes per flight from 'ND' to 'GA'.

(ii) Star Airlines expects that its occupancy will increase to 144 passengers per flight if the fare is reduced to ₹ 11,670. Advise whether this proposal should be implemented or not.

SOLUTION:

(i) No. of passengers 180 seats x 70% = 126

	(₹)	(₹)
Fare collection (126 passengers x ₹ 12,500)		15,75,000
Variable costs:		
Fuel	2,28,000	
Food (126 passengers x ₹ 270)	34,020	
Commission (7.5 % of ₹ 15,75,000)	1,18,125	3,80,145
Contribution per flight		**11,94,855**
Fixed costs:		
Lease and Landing Charges	9,12,000	
Salaries of flight Crew	90,000	10,02,000
Net income per flight		**1,92,855**

(ii)

Fare collection (144 passengers x ₹ 11,670)		16,80,480
Variable costs:		
Fuel	2,28,000	
Food (144 passengers x ₹ 270)	38,880	
Commission (7.5% of ₹ 16,80,480)	1,26,036	3,92,916
Contribution		**12,87,564**
Fixed costs:		
Lease and Landing Charges	9,12,000	
Salaries of flight Crew	90,000	10,02,000
Net income per flight		**2,85,564**

There is an increase in contribution by ₹ 92,709. Hence the proposal is acceptable.

PROBLEM – 6:

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 ca₹ The average cost of a car is ₹ 6,00,000.

ii. Allow the Executive to use his own car and reimburse expenses at the rate of 10 per kilometer and also bear insurance costs.

iii. Hire cars from an agency at ₹ 1,80,000 per year per car. The company will have to bear the 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 an annual mileage of 20,000 km.**

Resale value: ₹ 80,000 at the end of the fifth year.

WORK OUT the relative costs of three proposals and rank them.

SOLUTION:

Calculation of relative costs of three proposals and their ranking

	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 year	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.

PROBLEM – 7:

Mr. X owns a bus which runs according to the following schedule:

i.	**Delhi to Chandigarh and back, the same day.**	
	Distance covered:	**250 km. one way.**
	Number of days run each month:	**8**
	Seating capacity occupied	**90%.**
ii.	**Delhi to Agra and back, the same day.**	
	Distance covered:	**210 km. one way**
	Number of days run each month:	**10**

	Seating capacity occupied	85%
iii.	Delhi to Jaipur and back, the same day.	
	Distance covered:	270 km. one way
	Number of days run each month:	6
	Seating capacity occupied	100%
iv.	Following are the other details:	
	Cost of the bus	₹ 12,00,000
	Salary of the Driver	₹ 24,000 p.m.
	Salary of the Conductor	₹ 21,000 p.m.
	Salary of the part-time Accountant	₹ 5,000 p.m.
	Insurance of the bus	₹ 4,800 p.a.
	Diesel consumption 4 km. per litre at	₹ 56 per litre
	Road tax	₹ 15,915 p.a.
	Lubricant oil	₹ 10 per 100 km.
	Permit fee	₹ 315 p.m.
	Repairs and maintenance	₹ 1,000 p.m.
	Depreciation of the bus	@ 20% p.a.
	Seating capacity of the bus	50 persons.

Passenger tax is 20% of the total takings.

CALCULATE the bus fare to be charged from each passenger to earn a profit of 30% on total takings. The fares are to be indicated per passenger for the journeys:

i. Delhi to Chandigarh ii. Delhi to Agra and iii. Delhi to Jaipur.

SOLUTION:

Working Notes:

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

Passenger- km. per month

	Total seats available per month (at 100% capacity)	Capacity utilised		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**

Monthly Operating Cost Statement

	(₹)	(₹)
i) Running Costs		
Diesel {(11,440 km ÷ 4 km) x ₹ 56}	1,60,160	
Lubricant oil {(11,440 km ÷ 100) x ₹ 10}	1,144	1,61,304
ii) Maintenance Costs		
Repairs & Maintenance		1,000
iii) 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)	1,326.25	
Permit fee	315	
Depreciation {(₹ 12,00,000 x 20%) ÷ 12}	20,000	72,041.25
Total costs per month before Passenger Tax (i) + (ii) + (iii)		**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

$$\text{Rate per passenger - km.} = \frac{\text{Total Takings Per Month}}{\text{Total Passenger Km. Per Month}} = \frac{₹\,4,68,690.50}{5,20,500 \text{ passenger - km.}} = ₹\,0.90$$

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

PROBLEM – 8:

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 the total taking. It has three types of suites for its customers, viz, single room, double rooms and triple rooms.

The following information is given:

Type of suite	Number	Occupancy percentage
Single room	100	100%
Double rooms	50	80%
Triple rooms	30	60%

The rent of a double room's suite is to be fixed at 2.5 times of the single room suite and that of triple room's suite as twice of the double room's suite.

The other expenses for the year 20x1 are as follows:

Staff salaries	₹ 14,25,000
Room attendants' wages	₹ 4,50,000
Lighting, heating and power	₹ 2,15,000
Repairs and renovation	₹ 1,23,500
Laundry charges	₹ 80,500
Interior decoration	₹ 74,000
Sundries	₹ 1,53,000

Provide profit 20% on total taking and assume 360 days in a year.

You are required to CALCULATE the rent to be charged for each type of suite

SOLUTION:

Working Notes:

(i) Total equivalent single room suites

Nature of suite	Occupancy (Room-days)	Equivalent single room suites (Room-days)
Single room suites	36,000 (100 rooms x 360 days x 100%)	36,000 (36,000 x 1)
Double rooms suites	14,400 (50 rooms x 360 days x 80%)	36,000 (14,400 x 2.5)
Triple rooms suites	6,480 (30 rooms x 360 days x 60%)	32,400 (6,480 x 5)
		1,04,400

(ii) Statement of total cost:

	(₹)
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
	25,21,000
Building rent {(₹10,000 x 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

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

Rent to be charged:

Rent to be charged for single room suite	=	₹ 33.73
Rent for double rooms suites ₹ 33.73 x 2.5	=	₹ 84.33
Rent for triple rooms suites ₹33.73 x 5	=	₹ 168.65

PROBLEM – 9:

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 the number of visitors is 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 20x1. (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 a 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.

SOLUTION:

Working Notes:

(i) 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

(ii) 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 consideredas part of Off season. Hence, the non-winter season of 8 months include – Peak season of 6 months and Off season of 2 months.

Accordingly, the lighting charges are calculated as follows:

Season	Occupancy (Room-days)
Season & Non-winter – 80% Occupancy	100 Rooms × 80% × 6 months × ₹120 permonth = ₹ 57,600
Off- season & non-winter – 40% Occupancy (8 – 6 months)	100 Rooms × 40% × 2 months × ₹120 permonth = ₹ 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

Statement of total cost:

	(₹)
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	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

PROBLEM – 10:

ABC Hospital runs a Critical Care Unit (CCU) in a hired building. CCU consists of 35 beds and 5 more beds can be added, it required

Rent per month	**₹ 75,000**
Supervisors - 2 persons	**₹ 25,000 Per month - each**
Nurses - 4 persons	**₹ 20,000 per month - each**
Ward Boys - 4 persons	**₹ 5,000 per month - each**

Doctors paid ₹ 2,50,000 per month-paid on the basis of the number of patients attended and the time spent by them.

Other expenses for the year are as follows:

Repairs (Fixed)	**₹ 81,000**
Food to Patients (Variable)	**₹ 8,80,000**
Other services to patients (Variable)	**₹ 3,00,000**
Laundry charges (Variable)	**₹ 6,00,000**
Medicines (Variable)	**₹ 7,50,000**
Other fixed expenses	**₹ 10,80,000**
Administration expenses allocated	**₹ 10,00,000**

It was estimated that for 150 days in a year 35 beds are occupied and for 80 days only 25 beds are occupied.

The hospital hired 750 beds at a charge of 100 per bed per day, to accommodate the flow of patients. However, this does not exceed more than 5 extra beds over and above the normal capacity of 35 beds on any day.

You are required

- **CALCULATE profit per patient day, if the hospital recovers on an average ₹ 2,000 per day from each patient**
- **FIND OUT Breakeven point for the hospital.**

SOLUTION:

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) Statement of Profitability

Particulars	Amount	Amount
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**

1. **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 = ₹ 1,299.375

2. **Breakeven Point = Fixed Cost / Contribution per Patient day**

   = ₹ 48,61,000 ÷ ₹ 1,299.375

   = 3,741 patient days

PROBLEM – 11:

Following are the data pertaining to InfoTech Pvt. Ltd. for the year 20x1-x2:

Particulars	Amount
Salary to Software Engineers (5 persons)	₹ 15,00,000
Salary to Project Leaders (2 persons)	₹ 9,00,000
Salary to Project Manager	₹ 6,00,000
Repairs & maintenance	₹ 3,00,000
Administration overheads	₹ 12,00,000

The company executes a Project XYZ, the details of the same as are as follows:

- **Project duration – 6 months**
- **One Project Leader and three Software Engineers were involved for the entire duration of the project, whereas the Project Manager spends 2 months of effort, during the execution of the project.**
- **Travel expenses incurred for the project – ₹ 1,87,500**
- **Two Laptops were purchased at a cost of ₹ 50,000 each, for use in the project and the life of the same is estimated to be 2 yea₹ PREPARE Project cost sheet.**

SOLUTION:

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 = ₹ 15,00,000

(3) Calculation of Overhead absorption rate

= Total Overhead ÷ Total Salary = ₹ 15,00,000 ÷ ₹ 30,00,000 = 50%

Project Cost Sheet

		(₹)
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
Total Project Cost		13,75,000

PROBLEM – 12:

SLS Infrastructure built and operates 110 km. highways on the basis of Built Operate-Transfer (BOT) for a period of 25 years. A traffic assessment carried out to estimate the traffic flow per day shows the following figures:

SL No.	Type of vehicle	Daily traffic volume
1	Two wheelers	44,500
2	Car and SUVS	3,450
3	Bus and LCV	1,800
4	Heavy commercial vehicles	816

The following is the estimated cost of the project

S. No.	Activities	Amount (In lakhs)
1	Site clearance	₹ 170.70
2	Land development and filling work	₹ 9,080.35
3	Sub base and base courses	₹ 10,260.70
4	Bituminous work	₹ 35,070.80
5	Bridge, flyovers, underpasses, pedestrian subway, footbridge	₹ 29,055.60

6	Drainage and protection work	₹ 9,040.50
7	Traffic sign, marking and road appurtenance	₹ 8,405.00
8	Maintenance, repairing and rehabilitation	₹ 12,429.60
9	Environmental management	₹ 982.00
	Total Project cost	₹ 1,14,495.25

An average cost of ₹ 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 have been assigned to the passing vehicles:

S. No.	Type of vehicle	%
1	Two wheelers	5%
2	Car and SUVs	20%
3	Bus and LCV	30%
4	Heavy commercial vehicles	45%

Required:

i. CALCULATE the total project cost per day of the concession period.

ii. COMPUTE toll fee to be charged for, per vehicle of each type, if the company wants to earn a profit of 15% on the total cost.

[Note: Concession period is a period for which infrastructure is allowed to operate and recovers its investment]

SOLUTION:

(i) Calculation of total project cost per day of concession period:

Activities	Amount (₹ in lakh)
Site clearance	170.70
Land development and filling work	9,080.35
Sub base and base courses	10,260.70
Bituminous work	35,070.80
Bridge, 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

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

(ii) 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

$$\text{Cost per equivalent vehicle} = \frac{₹\ 14,57,050}{76,444 \text{ units (Refer working note}}$$

= ₹ 19.06 per equivalent vehicle

Vehicle type-wise toll fee:

Sl. No.	Type of vehicle	Equivalent cost [A]	Weight [B]	Toll fee per vehicle [A×B]
1.	Two wheelers	₹ 19.06	1	19.06
2.	Car and SUVs	₹ 19.06	4	76.24
3.	Bus and LCV	₹ 19.06	6	114.36
4.	Heavy commercial vehicles	₹ 19.06	9	171.54

Working Note:

The cost per day has to be recovered from the daily traffic. The each type of vehicle is to be converted into equivalent unit. Let's convert all vehicle types equivalent to Two-wheelers.

Sl. No.	Type of vehicle	Daily traffic volume [A]	Weight	Ratio [B]	Equivalent Two- wheeler [A×B]
1.	Two wheelers	44,500	0.05	1	44,500
2.	Car and SUVs	3,450	0.20	4	13,800
3.	Bus and LCV	1,800	0.30	6	10,800
4.	Heavy commercialvehicles	816	0.45	9	7,344
	Total				**76,444**

PROBLEM – 12A:

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 costs for the month of April 20x1 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 ₹ 1.5 crores. Further, the company needs 25% profit over the total cost to cover interest and other costs.

Required:

- **CALCULATE cost per kilometer per month.**
- **CALCULATE the toll rate per vehicle.**

SOLUTION:

Calculation of cost for the month of April

Particulars		(₹)
Salary to CollectionPersonnel	(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 BoothManager	(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 amortisation expenses (B)	1,50,00,000
Total Cost (A + B)	**1,94,80,000**

(i) Calculation of cost per kilometer per month:

$$\frac{\text{Total cost}}{\text{Total km}} = \frac{₹\,1,94,80,000}{60\text{ km}} = ₹\,3,24,666.67$$

(ii) Calculation of toll rate per vehicle:

$$\frac{\text{Total cost + 25\% profit}}{\text{Vehicles per month}} = \frac{₹\,1,94,80,000 + ₹\,48,70,000}{10,00,000\text{ vehicles}} = ₹\,24.35$$

Working:

No. of vehicles using the highway per month

$$\frac{\text{Total estimated vehicles}}{10\text{ years}} \times \frac{1\text{ month}}{12\text{ months}} = \frac{12\text{ crore}}{10\text{ years}} \times \frac{1\text{ month}}{12\text{ months}} = 10\text{ lakhs}$$

PROBLEM – 13:

AD Higher Secondary School (AHSS) offers courses for 11 & 12 standards in three streams i.e. Arts Commerce and Science. AHSS runs higher secondary classes along with primary and secondary classes, but for accounting purposes, 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	Amount
Teachers' salary (25 teachers x 35,000 x 12 months)	₹ 1,05,00,000
Principal's salary	₹ 14,40,000
lab attendants' salary (2 attendants x 15,000 x 12 months)	₹ 3,60,000
Salary to library staff	₹ 1,44,000
Salary to peons (4 peons x 10,000 x 12 months)	₹ 4,80,000
Salary to other staffs	₹ 4,80,000
Examinations expenditure	₹ 10,80,000
Office & Administration cost	₹ 15,20,000
Annual day expenses	₹ 4,50,000
Sports expenses	₹ 1,20,000

Other information:

i.

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 Hrs	120 Hrs	240 Hrs	60 Hrs
Time spent by principal for administration	208 Hrs	312 Hrs	480 Hrs	1,400 Hrs
Teachers for 11 & 12 standard	4	5	6	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 to the higher secondary section. Other peons dedicate their 15% time to the higher secondary section.

v. All school students irrespective of section and age participate 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 a uniform fee of 1,000 per month from all higher secondary students, CALCULATE streamwise profitability.

c. If management decides to take 10% profit on cost. COMPUTE fee to be charged from the students of all three streams respectively,

SOLUTION:

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 & Mathematicsteachers' 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 & Administrationexpenses (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**

(i) 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 perannum	17,397	9,533	19,238	13,610

(ii) Calculation of profitability

Particulars	Arts (₹)	Commerce (₹)	Science (₹)	Total (₹)
Total Fees per annum	12,000	12,000	12,000	
Cost per student perannum	17,397	9,533	19,238	
Profit/ (Loss) perstudent 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)**

(iii)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	19,137	10,486	21,162
Fees per month	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 x 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

	Economics		Mathematics	
Particulars	**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 byhim for administration of classes.

(4) Lab attendants' salary has been apportioned on the basis of lab classesattended by the students.

(5) Salary of library staffs are apportioned on the basis of time spent by thestudents 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:

	Amount (₹)
Peon dedicated for higher secondary (1 peon × ₹10,000 × 12 months)	1,20,000
Add: 15% of other peons' salary {15% of (3 peons × ₹10,000 × 12 months)}	54,000
	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.

(8) Examination expenses has been apportioned taking number of students into account (It may also be apportioned on the basis of number of examinations).

PROBLEM – 14:

Sanziet Life care Ltd. operates in the life insurance business. Last year it launched a new term insurance policy for practicing professionals 'Professionals Protection Plus'. The company has incurred the following expenditures during the last year for the policy.

Particulars	Amount
Policy development cost	₹ 11,25,000
Cost of marketing of the policy	₹ 45,20,000
Sales support expenses	₹ 11,45,000
Policy issuance cost	₹ 10,05,900
Policy servicing cost	₹ 35,20,700
Claims management cost	₹ 1,25,600
IT cost	₹ 74,32,000
Postage and logistics	₹ 10,25,000
Facilities cost	₹ 15,24,000
Employees cost	₹ 5,60,000
Office administration cost	₹ 16,20,400

Number of policies sold- 528

Total insured value of policies 1,320 crores.

Required:

i. **CALCULATE total cost for Professionals Protection Plus' policy segregating the costs into four main activities namely a. Marketing and Sales support. b. Operations, c. IT and d. Support functions.**

ii. **CALCULATE cost per policy.**

iii. **CALCULATE cost per rupee of insured value.**

SOLUTION:

i) Calculation of total cost for 'Professionals Protection Plus policy

	Particulars	Amount (₹)	Amount (₹)
1.	**Marketing and Sales support:**		
	- Policy development cost	11,25,000	
	- Cost of marketing	45,20,000	
	- Sales support expenses	11,45,000	67,90,000
2.	**Operations:**		
	- Policy issuance cost	10,05,900	
	- Policy servicing cost	35,20,700	
	- Claims management cost	1,25,600	46,52,200
3.	**IT Cost**		74,32,000
4.	**Support functions**		
	- Postage and logistics	10,25,000	
	- Facilities cost	15,24,000	
	- Employees cost	5,60,000	
	- Office administration cost	16,20,400	47,29,400
	Total Cost		**2,36,03,600**

ii) Calculation of cost per policy = $\frac{\text{Total cost}}{\text{No. of policies}} = \frac{₹\,2,36,03,600}{528} = ₹\,44,703.79$

iii) Calculation of cost per policy = $\frac{\text{Total cost}}{\text{Total insured value}} = \frac{₹\,2.36 \text{ crore}}{₹\,1,320 \text{ crore}} = ₹\,0.0018$

PROBLEM – 15:

The loan department of a bank performs several functions in addition to the home loan application processing task. It is estimated that 25% of the overhead costs of the loan department are applicable to the processing of home-loan applications.

The following information is given concerning the processing of a loan application:

Particulars	Amount
Direct professional Labour:	
Loan processor monthly salary:	
(4 employees@ ₹ 60,000 each)	**₹ 2,40,000**
Loan department overhead costs (monthly):	
Chief loan officer's salary	**₹ 75,000**
Telephone expenses	**₹ 7,500**

Depreciation Building	₹ 28,000
Legal advice	₹ 24,000
Advertising	₹ 40,000
Miscellaneous	₹ 6,500
Total overhead costs	₹ 1,81,000

You are required to COMPUTE the cost of processing home loan applications on the assumption that five hundred home loan applications are processed each month.

SOLUTION:

Statement showing computation of the cost of processing a typical home loan application

	(₹)
Direct professional labour cost	2,40,000
(4 employees @ ₹ 60,000 each)	
Service overhead cost (25% of ₹ 1,81,000)	45,250
Total processing cost per month	**2,85,250**
No. of applications processed per month	500
Total processing cost per home loan application	**570.5**

PROBLEM – 16:

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 20x2-20x3.

Total units generated 20,00,000 kWh

	Amount ₹
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.

SOLUTION:

Cost Statement of Ignus Thermal Power Station

Total units generated 20,00,000 kwh

	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 Note:

Coal cost (20,00,000 kwh. ÷ 5 kwh) × ₹ 4.25 per kg. = ₹ 17,00,000

PROBLEM – 16A:

Solar Power Ltd. has a power generation capacity of 1000 Megawatt per day. On an average it operates at 85% of its installed capacity. The cost structure of the plant is as under:

	Cost particulars	Amount (₹ in Lakh)
1.	**Employee cost per year**	**2500**
2.	**Solar panel maintenance cost per year**	**250**
3.	**Site maintenance cost per year**	**150**
4.	**Depreciation per year**	**5940**

CALCULATE cost of generating 1kW of power. [1 Megawatt = 1,000 kW]

SOLUTION:

Working:

Estimated power generated in a year

= 1000 Megawatt × 85% × 365 days

= 3,10,250 Megawatt

Calculation of 1 kW power generation cost:

	Cost particulars	Amount (₹ in Lakh)
A.	Employee cost per year	2500
B.	Solar panel maintenance cost per year	250
C.	Site maintenance cost per year	150
D.	Depreciation per year	5940
E.	Total Cost [A+B+C+D]	8840
F.	Estimated power generated (in Megawatt) (Refer working note-1)	3,10,250
G.	Cost of generating 1 Megawatt (₹) [(E ÷ F) × 1,00,000]	2,849.31
H.	**Cost of 1 kW (₹) [G ÷ 1,000]**	**2.849**

CHAPTER 13: MARGINAL COSTING

PROBLEM – 1:

A company producing a single article sells it at 10 each. The marginal cost of production is ₹ 6 each and the fixed cost is ₹ 400 per annum.

Calculate

a. **The P/V ratio;**
b. **The break-even sales;**
c. **The sales to earn at profit ₹ 5,000;**
d. **Profit at sales ₹ 3,000;**
e. **New break-even point if the Sale price is reduced by 10%.**
f. **MOS when the profit earned in ₹ 200 and PVR – 40%.**

SOLUTION:

a) PVR = $\frac{\text{Contribution Per Unit}}{\text{Sales price}} = \frac{₹\,4}{₹\,10} \times 100 = 40\%$

b) Break Even Sales (BES) = $\frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{₹\,400}{40\%} = ₹\,1000$

In Units = ₹ 400 ÷ ₹ 4 = 100 Units

c) PVR = $\frac{\text{Contribution}}{\text{Sales}} \times 100$

Particulars	**Amount (₹)**
Contribution	**5400**
Less: Fixed Cost (Given)	400
Profit (Given)	**5000**

Required Sales = ₹ 5400 ÷ 40% = ₹ 13500

In Units = ₹ 5400 ÷ 4 = 1350 Units

Total Sales = Break Even sales + Margin of Safety

= 100 Units + (₹ 5000 ÷ 4 Per Unit)

= 100 Units + 1250 Units = 1350 Units

In Value = ₹ 1000 + (₹ 5000 ÷ 40%) = ₹ 13500

d) Income Statement

Particulars	**Amount (₹)**
Sales	3000
Less: Variable Cost (3000 x 60%)	1800
Contribution @40%	**1200**
Less: Fixed Cost	400

Profit	800

Or Profit = Margin of Safety x PV Ratio

= (3000 – 1000) x 40% = ₹ 800

e) Existing Selling Price = ₹ 10

Reduction in Selling Price = 10% on ₹ 10 = ₹ 1

Revised Selling Price = ₹ 9

Particulars	Per Unit (₹)
Sales (Given)	9
Less: Variable Cost (Given)	6
Contribution	**3**

$$PVR = \frac{\text{Contribution Per Unit}}{\text{Sales price}} = \frac{₹\,3}{₹\,9} \times 100 = 33.333\%$$

$$\text{Break Even Sales (BES)} = \frac{\text{Fixed Cost}}{\text{PV Ratio}}$$

$$\text{Break Even Sales (BES)} = \frac{₹\,400}{33.333\%} = ₹\,1200$$

In units = ₹ 400 ÷ ₹ 3 = 133 Units

f) Margin of Safety = Profit ÷ PVR = ₹ 200 ÷ 40% = ₹ 500

In Units = ₹ 200 ÷ ₹ 4 = 50 Units

PROBLEM – 2:

Fill in the blanks for each of the following independent situations:

SITUATIONS	AYE	BYE	CEE
Selling price per unit	**(a)**	**₹ 50**	**₹ 20**
Variable cost as % of selling price	**60**	**(c)**	**75**
No. of units sold	**10,000**	**4,000**	**(e)**
Marginal contribution	**20,000**	**80,000**	**(f)**
Fixed costs	**₹ 12,000**	**(d)**	**₹ 1,20,000**
Profit or loss	**(b)**	**₹ 20,000**	**₹ 30,000**

SOLUTION:

Aye:

Profit = Contribution – Fixed Cost

= ₹ 20000 - ₹ 12000 = ₹ 8000

PV Ratio = 100% - VC Ratio = 100% - 60% = 40%

Sales = $\frac{\text{Contribution}}{\text{PV Ratio}}$ = ₹ 20000 ÷ 40% = ₹ 50000

Per Unit = ₹ 50000 ÷ 10000 Units = ₹ 5 Per Unit

Bye:

Fixed Cost = Contribution – Profit = ₹ 80000 - ₹ 20000 = ₹ 60000

Sales = Units Sold x Selling Price Per Unit = 4000 Units x ₹ 50 = ₹ 200000

PVR = $\frac{\text{Contribution}}{\text{Sales}} = \frac{₹\ 80000}{₹\ 200000} \times 100 = 40\%$

VC Ratio = 100% - PV Ratio = 100% - 40% = 60%

Cee:

Contribution = Fixed Cost + Profit = ₹ 120000 + ₹ 30000 = ₹ 150000

PV Ratio = 100% - VC Ratio = 100% - 25% = 75%

Sales = $\frac{\text{Contribution}}{\text{PV Ratio}}$ = ₹ 150000 ÷ 25% = ₹ 600000

Units Sold = Sales ÷ Selling Price Per Unit = ₹ 600000 ÷ ₹ 20 = 30000 Units

PROBLEM – 3:

The company estimates that next year it will earn a profit of ₹ 50,000. The budgeted fixed cost is ₹ 2,50,000 and the sales is ₹ 9,93,000. Find out the breakeven point for the company.

SOLUTION:

Contribution = Fixed Cost + Profit = ₹ 250000 + ₹ 50000 = ₹ 300000

PVR = $\frac{\text{Contribution}}{\text{Sales}} = \frac{₹\ 300000}{₹\ 993000} \times 100 = 30.2115\%$

Break Even Sales (BES) = $\frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{₹\ 250000}{30.2115\%}$ = ₹ 827500

PROBLEM – 4:

From the following particulars, find out the selling price per unit if BEP is to be brought down by 1800 units.

Particulars	Amount
Variable cost per unit	₹ 75
Fixed expenses	₹ 2,70,000
Selling price per unit	₹ 100

SOLUTION:

Step 1: Calculation of Existing Break Even Point

Contribution = Sales – variable Cost = ₹ 100 - ₹ 75 = ₹ 25 Per Unit

Existing BEP $\frac{\text{Fixed Cost}}{\text{Contribution Per Unit}}$ = ₹ 270000 ÷ ₹ 25 = 10800 Units

The company wants to reduce the BEP by 1800 Units

The Target BEP = 10800 Units – 1800 Units = 9000 Units

The Company wants to achieve this by increasing the selling price.

Step 2: Calculation of selling price for target BEP of 9000 Units

Target BEP = $\frac{\text{Fixed Cost}}{\text{Target Contribution Per Unit}}$ = ₹ 270000 ÷ 9000 Units = ₹ 30 Per Unit

Target Selling Price Per Unit = Variable Cost Per Unit + Contribution Per Unit

₹ 75 + ₹ 30 = ₹ 105 Per Unit

PROBLEM – 5:

1. **If margin safety is ₹ 2,40,000 (40% of sales) and PVR is 30%, Calculate a. BES b. amount of Profit on sales of 9,00,000.**
2. **X Ltd. has earned a Contribution of 2,00,000 and a Net Profit of ₹ 1,50,000 on sales of ₹ 8,00,000. What is its margin of safety?**
3. **The ratio of variable cost to sales is 70%. The break-even point occurs at 60% of the capacity sales. Compute the capacity sales when the fixed costs are ₹ 90,000. Also, compute profit at 75% of the capacity sales.**
4. **PV ratio of X Ltd. is 50% and the margin of safety is 40%. Calculate the net profit when sales is ₹ 1,00,000.**
5. **Ascertain profit when sales is ₹ 2,00,000, fixed cost is ₹ 40,000 and BEP is ₹ 1,60,000.**
6. **Ascertain sales when the fixed cost is ₹ 20,000, profit is ₹ 10,000 and BES is ₹ 40,000.**
7. **If BEP is 40% and the net profit ratio is 12%, find out the contribution sales ratio.**

SOLUTION:

1)

Margin of safety = ₹ 240000 (40% of sales)

Sales = ₹ 240000 ÷ 40% = ₹ 6,00,000

Sales = Margin of Safety (MOS) + Break Even Point (BEP)

₹ 6,00,000 = ₹ 240000 + Break Even Point (BEP)

Break Even Point (BEP) = ₹ 360000

2) Profit when sales is ₹ 9,00,000

Margin of Safety (MOS) = Sales - Break Even Point (BEP) = ₹ 9,00,000 – ₹ 360000

Margin of Safety (MOS) = ₹ 540000

Profit = Margin of Safety (MOS) x PV Ratio

= ₹ 5,40,000 x 30%

= ₹ 162000

$$\text{PV Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$\text{PV Ratio} = \frac{₹\ 2,00,000}{₹\ 8,00,000} \times 100 = 25\%$$

$$\text{Margin of Safety} = \frac{\text{Profit}}{\text{PV Ratio}} = \frac{₹\ 1,50,000}{25\%} = ₹\ 6,00,000$$

3) Capacity sales when Fixed Cost = ₹ 90000

PV Ratio = 100% - VC Ratio = 100% - 70% = 30%

$$\text{Break Even Point (₹)} = \frac{\text{Fixed Cost}}{\text{PV Ratio}} = ₹\ 90000 \div 30\% = ₹\ 300000$$

Break Even Point (₹) = 60% x Capacity Sales

Capacity Sales = Break Even Point ÷ 60% = ₹ 300000 ÷ 60% = ₹ 500000

Profit at 75% of Capacity Sales:

Actual Sales = 75% of Capacity Sales

= 75% x ₹ 500000 = ₹ 375000

Margin of Safety = Actual Sales - Break Even Point

= ₹ 375000 - ₹ 300000 = ₹ 75000

Profit = Margin of Safety x PV ratio

= ₹ 75000 x 30% = ₹ 22500

4) When sales = ₹ 100000 Net Profit?

Margin of Safety = 40% of Total Sales = 40% on ₹ 100000 = ₹ 40000

Profit = Margin of Safety x PV Ratio

= ₹ 40000 x 50% = ₹ 20000

5) PV Ratio = Fixed Cost ÷ Break Even Point

= (₹ 40000 ÷ ₹ 160000) x 100 = 25%

Margin of Safety = Total Sales - Break Even Point

= ₹ 200000 - ₹ 160000 = ₹ 40000

Profit = Margin of Safety x PV ratio = ₹ 40000 x 25% = ₹ 10000

6) Contribution = Fixed Cost + Profit = ₹ 20000 + ₹ 10000 = ₹ 30000

$$\text{PV Ratio} = \frac{\text{Fixed Cost}}{\text{Break Even Point}} \times 100$$

$$\text{PV Ratio} = \frac{₹\ 20000}{₹\ 40000} \times 100 = 50\%$$

$$\text{Sales} = \frac{\text{Contribution}}{\text{PV Ratio}} \times 100$$

$$= \frac{₹\ 30000}{50\%} = ₹\ 60000$$

7) PV Ratio = NP ratio ÷ MOS Ratio = (12% ÷ 60%) x 100 = 20%

PROBLEM – 5A:

A Ltd. Maintains margin of safety of 37.5% with an overall contribution to sales ratio of 40%. Its fixed costs amount to ₹ 5 lakhs.

CALCULATE the following:

i. Break-even sales

ii. Total sales

iii. Total variable cost

iv. Current profit

v. New 'margin of safety' if the sales volume is increased by 7 ½ %.

SOLUTION:

(i) We know that: Break- even Sales (BES) × P/V Ratio = Fixed Cost

Break-even Sales (BES) × 40% = ₹ 5,00,000

Break- even Sales (BES) = ₹ 12,50,000

(ii) Total Sales (S) = Break Even Sales + Margin of Safety

S = ₹ 12,50,000 + 0.375S

Or, S – 0.375S = ₹ 12,50,000 Or,

S = ₹ 20,00,000

(iii) 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

(iv) Current Profit = Sales – (Variable Cost + Fixed Cost)

= ₹ 20,00,000 – (12,00,000 + 5,00,000) = ₹ 3,00,000

(v) If sales value is increased by 7 ½ %

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

PROBLEM – 5B: **(MTP 1 MAY 24)**

PQ Ltd. sells bottles and currently is trying to find out the profitability of opening another store which will have the following expenses and revenues:

	Amount per piece (₹)
Selling Price	600
Variable costs:	
Material cost	410
Salesmen's commission	60
Total variable cost	470
Annual fixed expenses are:	(₹)
- Rent	6,00,000
- Office and administrative expenses	20,00,000
- Advertising	8,00,000
- Other fixed expenses	2,00,000

Calculate the annual break-even point in units and in value. Also determine the profit or loss if 35,000 units of bottles are sold.

SOLUTION:

Total Fixed Cost = ₹ 6,00,000 + ₹ 20,00,000 + ₹ 8,00,000 + ₹ 2,00,000

= ₹ 36,00,000

Contribution per unit = ₹ 600 - ₹ 470 = ₹ 130

$$\text{P/V Ratio} = \frac{\text{Contribution per unit}}{\text{Selling price}} \times 100 = \frac{₹\,130}{₹\,600} \times 100 = 21.67\%$$

$$\text{Break even point} = \frac{\text{Total Fixed cost}}{\text{Contribution per unit}}$$

$$= \frac{₹\,36,00,000}{₹\,130} = 27,692.31 \text{ or } 27,693 \text{ units}$$

$$\text{Break even sales} = \frac{\text{Total Fixed cost}}{\text{P/V ratio}} = \frac{₹\,36,00,000}{21.67\%} = ₹\,1,66,12,829$$

Calculation of Profit/ (loss):

Total Contribution (₹ 130 × 35,000 units)	= ₹ 45,50,000
Less: Fixed Cost	= ₹ 36,00,000
Profit	**= ₹ 9,50,000**

PROBLEM – 6:

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.**

SOLUTION:

(i) In the First half year:

Contribution = Fixed cost + Profit

= ₹ 4,50,000 + ₹ 3,00,000 = ₹ 7,50,000

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{₹\,7,50,000}{₹\,15,00,000} \times 100 = 50\%$$

$$\text{Break-even point} = \frac{\text{Fixed cost}}{\text{P/V ratio}} = \frac{₹\,4,50,000}{50\%} \times 100 = ₹\,9,00,000$$

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

$$\text{Expected sales volume} = \frac{\text{Fixed cost - Loss}}{\text{P/V ratio}} = \frac{₹\,3,00,000}{50\%} = ₹\,6,00,000$$

(iii) For the whole year:

$$\text{Break-even point} = \frac{\text{Fixed cost}}{\text{P/V ratio}} = \frac{₹\,4,50,000 \times 2}{50\%} = ₹\,18,00,000$$

$$\text{Margin of safety} = \frac{\text{Profit}}{\text{P/V ratio}} = \frac{₹\,3,00,000 - ₹\,1,50,000}{50\%} = ₹\,3,00,000$$

PROBLEM – 6A:

You are required to

	(₹)
(i) DETERMINE profit, when sales	**2,00,000**
Fixed Cost	**40,000**
BEP	**1,60,000**
(ii) DETERMINE sales, when fixed cost	**20,000**

Profit	**10,000**
BEP	**40,000**

SOLUTION:

(i) We know that: B.E. 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 B.E. 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.

PROBLEM – 7: **(RTP MAY 24)**

The analysis of cost sheet of A Ltd. for the last financial year has revealed the following information for it's product R:

Elements of Cost	Variable Cost portion	Fixed Cost
Direct Material	30% of cost of goods sold	--
Direct Labour	15% of cost of goods sold	--
Factory Overhead	10% of cost of goods sold	₹ 2,30,000
General & Administration Overhead	2% of cost of goods sold	₹ 71,000
Selling & Distribution Overhead	4% of cost of sales	₹ 68,000

Last year 5,000 units were sold at ₹185 per unit.

You being an associate to cost controller of the A Ltd.,

CALCULATE:

(i) Break-even Sales (in rupees),

(ii) Profit earned during last year,

(iii)Margin of safety (in %) and

(iv)the profit if the sales were 10% less than the actual sales.

SOLUTION:

Workings:

Calculation of Cost of Goods Sold (COGS):

$COGS = \{(DM - 0.3\ COGS) + (DL - 0.15\ COGS) + (FOH - 0.10\ COGS + ₹\ 2,30,000) + (G\ \&\ AOH - 0.02\ COGS + ₹\ 71,000)\}$

$Or\ COGS = 0.57\ COGS + ₹\ 3,01,000$

$Or\ COGS = \frac{₹\ 3,01,000}{0.43} = ₹\ 7,00,000$

Calculation of Cost of Sales (COS):

$COS = COGS + (S\ \&\ DOH - 0.04\ COS + ₹\ 68,000)$

$Or\ COS = ₹\ 7,00,000 + (0.04\ COS + ₹\ 68,000)$

$Or\ COGS = \frac{₹\ 7,68,000}{0.96} = ₹\ 8,00,000$

Calculation of total Fixed Costs:

Factory Overhead	₹ 2,30,000
General & Administration OH	₹ 71,000
Selling & Distribution OH	₹ 68,000
	₹ 3,69,000

Calculation of Variable Costs:

Direct Material	(0.3 × ₹ 7,00,000)	₹ 2,10,000
Direct Labour	(0.15 × ₹ 7,00,000)	₹ 1,05,000
Factory Overhead	(0.10 × ₹ 7,00,000)	₹ 70,000
General & Administration OH	(0.02 × ₹ 7,00,000)	₹ 14,000
Selling & Distribution OH	(0.04 × ₹ 8,00,000)	₹ 32,000
		₹ 4,31,000

Calculation of P/V Ratio:

$$P/V\ Ratio = \frac{Contribution}{Sales} \times 100 = \frac{Sales - Varaible\ Costs}{Sales} \times 100$$

$$= \frac{(₹\ 185 \times 5,000\ units) - ₹\ 4,31,000}{₹\ 185 \times 5,000\ units} \times 100 = 53.41\%$$

i) Break even sales $= \frac{Fixed\ costs}{P/V\ ratio} = \frac{₹\ 3,69,000}{53.41\%} = ₹\ 6,90,882$

ii) Profit earned during the last year

= (Sales – Total Variable Costs) – Total Fixed Costs

= (₹ 9,25,000 - ₹ 4,31,000) - ₹ 3,69,000

= ₹ 1,25,000

iii) Break even sales $= \frac{Sales - Break\ even\ sales}{Sales}$

$$= \frac{₹\,9,25,000 - ₹\,6,90,882}{₹\,9,25,000} \times 100 = 25.31\%$$

iv) 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

PROBLEM – 8:

You are given the following data for the current financial year of Rio Co. Ltd:

Variable cost	**60,000**	**60%**
Fixed cost	**30,000**	**30%**
Net profit	**10,000**	**10%**
Sales	**1,00,000**	**100%**

FIND OUT a. Break-even point, b. P/V ratio, and c. Margin of safety. Also DRAW a break-even chart showing contribution and profit.

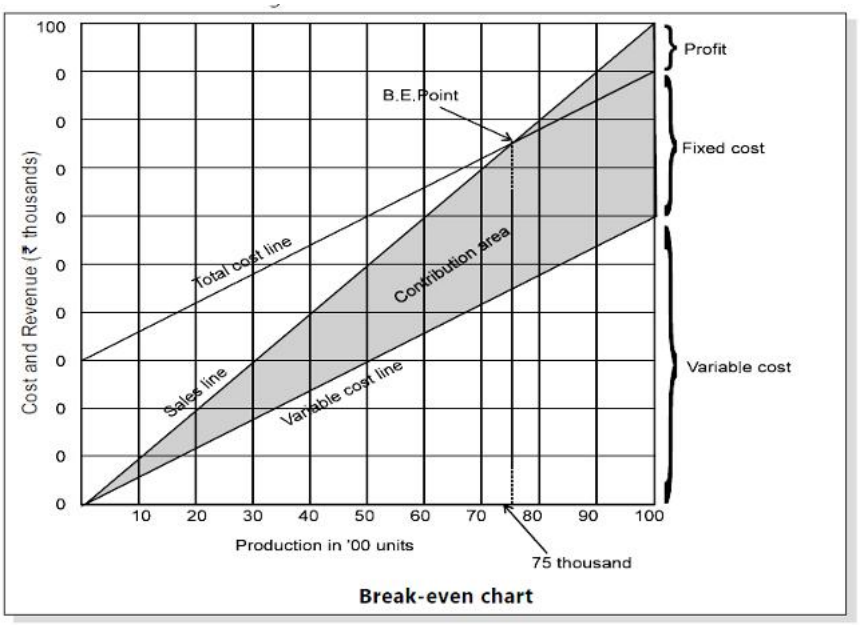
SOLUTION:

$$\text{P/V ratio} = \frac{\text{Sales - Variable cost}}{\text{Sales}} = \frac{₹\,1,00,000 - ₹\,60,000}{₹\,1,00,000} = 40\%$$

$$\text{Break-even point} = \frac{\text{Fixed cost}}{\text{P/V ratio}} = \frac{₹\,30,000}{40\%} = ₹\,75,000$$

Margin of safety = Actual Sales – BE point = ₹ 1,00,000 – ₹ 75,000 = ₹ 25,000

Break even chart showing contribution is shown below:



PROBLEM – 9:

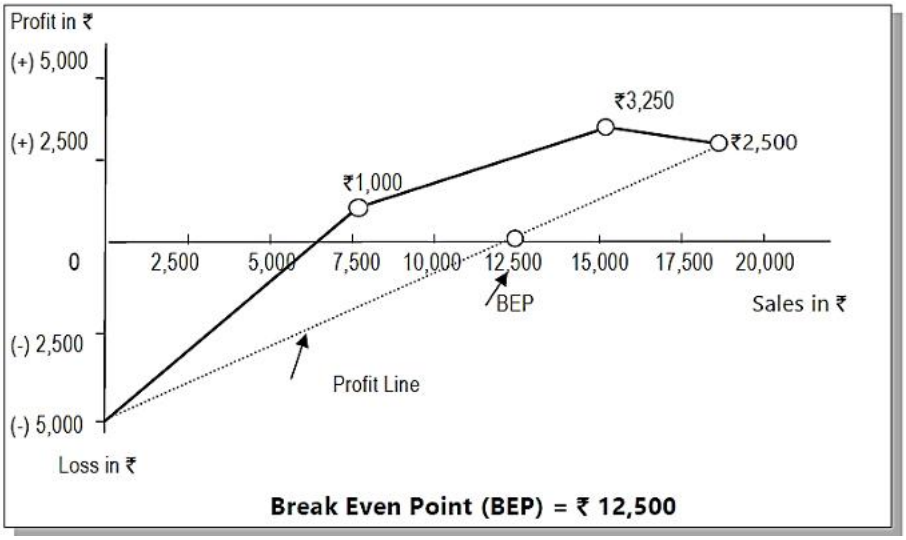
PREPARE a profit graph for products A, B and C and find break-even point from the following data:

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

SOLUTION:

Statement Showing Cumulative Sales & Profit

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



PROBLEM – 10:

MNP Ltd sold 2,75,000 units of its product at ₹ 37.50 per unit. Variable costs are ₹ 17.50 per unit (manufacturing costs of ₹ 14 and selling cost ₹ 3.50 per unit). Fixed costs are incurred uniformly throughout the year and amounting to ₹ 35,00,000 (including depreciation of ₹ 15,00,000). There is no beginning or ending inventories.

Required:

COMPUTE breakeven sales level quantity and cash breakeven sales level quantity.

SOLUTION:

$$\text{Break even Sales Quantity} = \frac{\text{Fixed cost}}{\text{Contribution margin per unit}} = \frac{₹\ 35,00,000}{₹\ 20} = 1,75,000 \text{ units}$$

$$\text{Cash Break-even Sales Quantity} = \frac{\text{Cash Fixed cost}}{\text{Contribution margin per unit}} = \frac{₹\ 20,00,000}{₹\ 20} = 1,00,000 \text{ units}$$

PROBLEM – 11:

Company	Variable Cost per unit	Fixed cost
P	9	₹ 60,000
Q	5	₹ 90,000

At what sale range is P more profitable than Q and vice versa? Assume that both the products have the same selling price.

SOLUTION:

$$\text{Indifference point} = \frac{\text{Difference in Fixed Cost}}{\text{Difference in Variable Cost}} = \frac{₹\ 90000 - ₹\ 60000}{₹\ 9 - ₹\ 5} = 7500 \text{ units}$$

When the volume is 7500 units the total cost of with the company will be the same.

Analysis:

Volume	Company	Reason
Less than 7500 units	P	Lower Fixed Cost
= 7500 units	P (or) Q	Indifference
> 7500 units	Q	Lower Variable Cost

PROBLEM – 12:

The following are cost data for three alternative ways of processing the clerical work for cases brought before the LC Court System:

Particulars	Manual	Semi-Automatic	Fully-Automatic
Monthly fixed costs:			
Occupancy	₹ 15,000	₹ 15,000	₹ 15,000
Maintenance contract	-	₹ 5,000	₹ 10,000
Equipment lease	-	₹ 25,000	₹ 1,00,000
Unit variable costs (per report):			
Supplies	₹ 40	₹ 80	₹ 20
Labour	₹200 (5hrs x ₹ 40)	₹60 (1hrs x ₹ 60)	₹20 (0.25hrs x ₹ 80)

Required:

- **CALCULATE cost indifference points. Interpret your results.**
- **If the present caseload is 600 cases and it is expected to go up to 850 cases in the near future, SELECT most appropriate on cost considerations?**

SOLUTION:

(i) Cost Indifference Point

	A and B	A and C	B and C
	₹	₹	₹
Differential Fixed Cost (I)	₹ 30,000	₹ 1,10,000	₹ 80,000
	(₹ 45,000 – ₹ 15,000)	(₹ 1,25,000 – ₹ 15,000)	(₹ 1,25,000 – ₹ 45,000)
Differential Variable Costs (II)	₹ 100	₹ 200	₹ 100
	(₹ 240 – ₹ 140)	(₹ 240 – ₹ 40)	(₹ 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'

(ii) 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.

PROBLEM – 12A:

Two businesses AB Ltd and CD Ltd. sell the same type of product in the same type of market. Their budgeted Profit and Loss Accounts for the year ending 20x1 are as follows:

	A.B. Ltd.		C.D. Ltd.	
Sales		₹ 1,50,000		₹ 1,50,000
Less:				
Variable costs	₹ 1,20,000		₹ 1,00,000	

Fixed costs	**₹ 15,000**	**₹ 1,35,000**	**₹ 35,000**	**₹ 1,35,000**
Net profit budgeted		**₹ 15,000**		**₹ 15,000**

You are required to:

a. **Calculating the break-even point of each business;**

b. **Calculate the sales volume at which each of the businesses will earn ₹ 5,000 profit; and**

c. **State which business is likely to earn greater profits in conditions of:**

   i. **Heavy demand for the product;**

   ii. **Low demand for the product.**

SOLUTION:

Part I: Break-Even Point:

	AB Ltd	CD Ltd
Fixed cost	₹ 15000	₹ 35000
$PVR\left(\frac{Contribution}{Sales}\right)$	20% $\left(\frac{₹\ 30000}{₹\ 150000}\right)$	33.33% $\left(\frac{₹\ 50000}{₹\ 150000}\right)$
$BEP\left(\frac{Fixed\ Cost}{PVR}\right)$	₹ 75000 $\left(\frac{₹\ 15000}{20\%}\right)$	₹ 105000 $\left(\frac{₹\ 35000}{33.33\%}\right)$

Part II: Sales volume at which profit ₹ 50000

	AB Ltd	CD Ltd
Profit	₹ 5000	₹ 5000
(+) Fixed Cost	₹ 15000	₹ 35000
Contribution	₹ 20000	₹ 40000
PVR	20%	33.33%
Sales	**₹ 1,00,000**	**₹ 1,20,000**

Part III: Analysis of volume and profit

$$\text{Indifference point} = \frac{\text{Difference in Fixed Cost}}{\text{Difference in PV Ratio}}$$

$$= \frac{₹\ 20000}{13.33\%}$$

$$= ₹\ 1,50,000$$

When the sales is ₹ 1,50,000 both AB Ltd and CDF Ltd earn the same profit

Sales	**Company:**	**Reason:**
Less than 1,50,000	AB Ltd	Low Fixed Cost
= 1,50,000	AB (or) CD	Indifference Point
> 150000	CD Ltd	Low Variable Cost Ratio or High PV Ratio

PROBLEM – 13:

You are given the following data:

	Sales	Profit
Year 2021-22	₹ 1,20,000	₹ 8,000
Year 20x2-23	₹ 1,40,000	₹ 13,000

FIND OUT

1. **P/V ratio,**
2. **B.E. Point,**
3. **Profit when sales are ₹ 1,80,000,**
4. **Sales required earn a profit of ₹ 12,000,**
5. **Margin of safety in year 20x2-20x3.**

SOLUTION:

	Sales	Profit
Year 2021-22	₹ 1,20,000	8,000
Year 2022-23	₹ 1,40,000	13,000
Difference	**₹ 20,000**	**5,000**

1) $\text{P/V Ratio} = \frac{\text{Difference in Profit}}{\text{Difference in sales}} \times 100 = \frac{₹\,5,000}{₹\,20,000} \times 100 = 25\%$

Contribution in 2021-22 (₹ 1,20,000 x 25%)	₹ 30,000
Less: Profit	₹ 8,000
Fixed Cost*	₹ 22,000

*Contribution = Fixed cost + Profit

∴ Fixed cost = Contribution - Profit

2) Break even point $= \frac{\text{Fixed cost}}{\text{P/V ratio}} = \frac{₹\,22,000}{25\%} = ₹\,88,000$

3) Profit when sales are ₹ 1,80,000

	₹
Contribution (₹ 1,80,000 × 25%)	45,000
Less: Fixed cost	22,000
Profit	**23,000**

4) Sales to earn a profit of ₹ 12,000

$\frac{\text{Fixed cost + Desired profit}}{\text{P/V ratio}} = \frac{₹\,22,000 + ₹\,12,000}{25\%} = ₹\,1,36,000$

5) Margin of safety in 2022-23 –

Margin of safety = Actual sales – Break-even sales

= ₹ 1,40,000 – ₹ 88,000 = ₹ 52,000.

PROBLEM – 13A:

A company sells its product at ₹ 15 per unit. In a period, if it produces and sells 8,000 units, it incurs a loss of ₹ 5 per unit. If the volume is raised to 20,000 units, it earns a profit of ₹ 4 per unit. CALCULATE break-even point both in terms of Value as well as in units.

SOLUTION:

We know that S – V = F + P

∴ Suppose variable cost = x, Fixed Cost = y

In first situation:

15 × 8,000 - 8,000 x = y – 40,000 (1)

In second situation:

15 x 20,000 - 20,000 x = y + 80,000 (2)

or, 1,20,000 – 8,000 x = y – 40,000 (3)

3,00,000 – 20,000 x = y + 80,000 (4)

From (3) & (4) we get x = ₹ 5, Variable cost per unit = ₹ 5

Putting this value in 3rd equation:

1,20,000 – (8,000 × 5) = y – 40,000

or, y = ₹ 1,20,000

Fixed Cost = ₹ 1,20,000

$$\text{P/V ratio} = \frac{S - V}{S} = \frac{15 - 5}{15} \times 100 = \frac{200}{3} = 66\frac{2}{3}\%$$

Suppose break-even sales = x

15x – 5x = 1,20,000 (at BEP, contribution will be equal to fixed cost)

x = 12,000 units.

or, Break-even sales in units = 12,000, Break-even sales in Value

= 12,000 × 15 = ₹ 1,80,000.

PROBLEM – 13B: **(PYP MAY 24)**

The following information is given by PQR Ltd:

Year	Sales (₹)	Profit (Loss (₹)
2022-23	1,80,00,000	(3,80,000)
2023-24	2,40,00,000	11,20,000

You are required to:

(i) Calculate the Break even sales.

(ii) In 2024-25, it is estimated that the variable cost will go up by 5% and fixed cost

will reduce by ₹ 4,80,000. Selling price will remain same. Calculate the sales volume to earn a profit of ₹ 15,00,000.

SOLUTION:

(i) Break-even sales = $\frac{\text{Fixed cost}}{\text{P/V ratio}}$

P/V ratio = $\frac{\text{Change in profit}}{\text{Change in sales}} \times 100$ or, $\frac{₹\,15,00,000}{₹\,2,40,00,000 - ₹\,1,80,00,000} \times 100$

or, $\frac{₹\,15,00,000}{₹\,60,00,000} \times 100$ or, 25%

Fixed Cost = Contribution – Profit

= ₹ 2,40,00,000 × 25% - ₹ 11,20,000

= ₹ 60,00,000 – ₹ 11,20,000 = ₹ 48,80,000

Break even sales = $\frac{₹\,48,80,000}{25\%}$ = ₹ 1,95,20,000

(ii) Desired Contribution in 2024-25 = Revised Fixed Cost + Target Profit

= (₹ 48,80,000 - ₹ 4,80,000) + ₹ 15,00,000

= ₹ 59,00,000

Earlier P/V ratio = 25%. So Variable Cost ratio =75%.

Selling price remain the same.

Variable cost increased by 5% i.e. Variable Cost ratio will be 78.75% (75+5%of 75).

Now revised P/V ratio=21.25%

Sales Volume in 2024-25 = $\frac{₹\,59,00,000}{21.25\%}$ = ₹ 2,77,64,706 (approx.)

If it is assumed that variable cost will go up by 5% on total. So, it will be increased from 75% to 80% and solution can be done in following way:

(i) Desired Contribution in 2024-25 = Revised Fixed Cost + Target Profit

= (₹ 48,80,000 - ₹ 4,80,000) + ₹ 15,00,000

= ₹ 59,00,000

Earlier P/V ratio = 25%. So Variable Cost ratio =75%.

Selling price remain the same.

Variable cost increased by 5% i.e. Variable Cost ratio will be 80% (75%+5%).

Now revised P/V ratio=20%

Sales Volume in 2024-25 = $\frac{₹\,59,00,000}{20\%}$ = ₹ 2,95,00,000

PROBLEM – 14:

A company has three factories situated in the north, east and south with its Head Office in Mumbai. The management has received the following summary report on the operations of each factory for a period:

	Sales		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:

i. **The fixed cost**

ii. **Break even sales**

SOLUTION:

Calculation of P/V Ratio **(₹ '000)**

	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)

	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)

	Sales	Profit
South : Actual	1,200	330
Add: Under budgeted	200	110
Budgeted	1,400	440

P/V Ratio = $\frac{₹\,110}{₹\,200}$ x 100 = 55%

i. Calculation of fixed cost

Fixed Cost = (Actual sales x P/V ratio) – Profit

North	= (1,100 x 45%) – 135	360
East	= (1,450 x 60%) – 210	660
South	= (1,200 x 55%) – 330	330
Total Fixed Cost		**1,350**

ii. Calculation of break-even sales (in ₹' 000)

B E 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

PROBLEM – 15:

Good luck Ltd has prepared the following estimate for the year 20x1-x2.

Sales	**15,000 units**
Fixed expenses	**₹ 34,000**
Sales value	**₹ 1,50,000**
Variable cost	**₹ 6 per unit**

You are required to;

- **Find the PVR, BEP and MOS**
- **Calculate the revised PVR, BEP and MOS in each of the following cases**
  - **i. Decrease of 10% in selling price**
  - **ii. Increase of 10% variable cost**
  - **iii. Increase of sales volume by 2,000 units.**
  - **iv. Increase of ₹6,000 in fixed cost.**

SOLUTION:

Part I: Calculation of PV Ratio, Break Even Point, Margin of Safety

Selling Price Per Unit = Sales Value ÷ Selling Price Per unit

= ₹ 150000 ÷ 15000 Units = ₹ 10

Contribution Per unit = SP – VC

= ₹ 10 – ₹ 6 = ₹ 4

Contribution = 15000 Units x ₹ 4 = ₹ 60000

PV Ratio = ₹ 60000 ÷ ₹ 150000 x 100 = 40%

Break Even Point = Fixed Cost ÷ PV Ratio = ₹ 34000 ÷ 40% = ₹ 85000 = ₹ 8500 Per unit

Margin of Safety = Sales – Break Even Point

= ₹ 150000 – ₹ 85000

= ₹ 65000 = ₹ 6500 Per Unit

Part II: Sensitivity analysis

Situation	**PV Ratio @ 40%** $\left(\frac{\text{Contribution}}{\text{Sales}} \times 100\right)$	**Break Even Point 8500 Units** $\left(\frac{\text{Fixed Cost}}{\text{Contribution Per Unit}}\right)$	**Margin of Safety 6500 Units (Sales – BES)**
1. Selling Price ↓ by 10%	33.33% $\left(\frac{3}{9}\right)$	11334 $\left(\frac{₹\ 34000}{3}\right)$	3666 (₹ 15000 – ₹ 11334)
2. Increase in VC by 10%	34% $\left(\frac{3.4}{10}\right)$	10000 $\left(\frac{₹\ 34000}{3.4}\right)$	5000 (₹ 15000 – ₹ 10000)
3. Volume ↑ by 2000 units	-	-	8500 units (17000 units – 8500 units)
4. Increase of ₹ 6000 in FC		10000 units $\left(\frac{₹\ 40000}{4}\right)$	5000 units (15000 units – 10000 units)

PROBLEM – 15A:

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.

SOLUTION:

Item no.	P/V Ratio	Reason
(i)	Will not change	The ratio of sales value and variable cost will remain same irrespective of change in sales volume.
(ii)	Will not change	Fixed cost is not considered in calculation of P/V ratio.
(iii)	Will increase	Decrease in variable cost increases contribution margin so does the P/V ratio.
(iv)	Will decrease	Decrease in contribution margin decreases the P/V ratio.
(v)	Will increase	Increase in selling price per unit increases the contribution margin per unit and the P/V ratio.
(vi)	Will not change	Fixed cost is not considered in calculation of P/V ratio.
(vii)	Will not change	The increase in selling price and variable cost by the same ratio will not change the P/V ratio. Please refer the example note- 1 below.
(viii)	Will increase	The increase in selling price will increase the contribution margin but the change in sales volume in any direction will not affect P/V ratio. Thus, increase in selling price with decrease in sales volume will increase the P/V ratio.
(ix)	Will decrease	The increase in variable cost reduces the contribution margin thus decreases the PV ratio. Increase or decrease in fixed cost will not affect the P/V ratio.
(x)	Will increase	Angle of incidence represents the rate of profit earning, after reaching the break-even point. Increase in angle of incidence means increase in rate of profit earning which is nothing but the P/V ratio that contributes towards the profitability after recovering the fixed cost. (Please also refer para 14.12)

A 10% increase in both selling price and variable cost per unit. Example note-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 = $\frac{₹100 - ₹90}{10}$

= 10% i.e. P/V ratio will not change

PROBLEM – 16:

A company has a P/V ratio of 40 % COMPUTE by what percentage must sales be increased to offset: 20% reduction in selling price?

SOLUTION:

Revised Sales Value = $\frac{\text{Desired Contribution}}{\text{Revised P/V ratio}} = \frac{0.40}{0.25}$ = 1.6

This means sales value to be increased by 60% of the existing sales.

**Revised P/V ratio = $\frac{\text{Revised Contribution}}{\text{Revised Selling Price}} = \frac{0.80 - 0.60}{0.80}$ = 0.25

Revised Sales Quantity = $\frac{\text{Desired Contribution}}{\text{Revised P/V ratio x Revised Selling Price}} = \frac{0.40}{0.25 \times 0.80}$ = 2

Therefore, Sales value to be increased by 60% and sales quantity to be doubled to offset the reduction in selling price.

Proof:

Let selling price per unit is ₹ 10 and sales quantity is 100 units.

Data before change in selling price:

	₹
Sales (₹ 10 × 100 units)	1,000
Contribution (40% of 1,000)	400
Variable cost (balancing figure)	**600**

Data after the change in selling price:

Selling price is reduced by 20% that means it became ₹ 8 per unit. Since, we have to maintain the earlier contribution margin i.e. ₹ 400 by increasing the sales quantity only. Therefore, the target contribution will be ₹ 400.

The new P/V Ratio will be

	₹
Sales	8.00
Variable cost	6.00
Contribution per unit	2.00

P/V Ratio	25%

$$\text{Sales value} = \frac{\text{Desired Contribution}}{\text{Revised P/V ratio}} = \frac{₹\,400}{0.25} = ₹\,1{,}600$$

$$\text{Sales quantity} = \frac{\text{Sales value}}{\text{Selling price per unit}} = \frac{₹\,1600}{₹\,8} = 200 \text{ units}$$

PROBLEM – 17:

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%	37.50%
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 the selling price.

You are required to CALCULATE the following:

i. Sales for 20x2 in Value.

ii. Fixed cost for 20x2 in Value,

iii. Break-even sales for 20x2 in Value.

SOLUTION:

In 2021-22, PV ratio = 50%

Variable cost ratio = 100% - 50% = 50%

Variable cost in 2021-22 = ₹ 8,00,000 × 50% = ₹ 4,00,000

In 2022-23, sales quantity has not changed. Thus, variable cost in 2022-23 is ₹ 4,00,000.

In 2022-23, P/V ratio = 37.50%

Thus, Variable cost ratio = 100% × 37.5% = 62.5%

(i) Thus, sales in 2022-23 $= \frac{4{,}00{,}000}{62.5\%} = ₹\,6{,}40{,}000$

In 2022-23, Break-even sales = 100% × 21.875% (Margin of safety) = 78.125%

(ii) Break-even sales = 6,40,000 × 78.125% = ₹ 5,00,000

(iii) Fixed cost = B.E. sales × P/V ratio

= 5,00,000 × 37.50% = ₹ 1,87,500.

PROBLEM – 18:

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	Amount
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.

SOLUTION:

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	60,000	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.

PROBLEM – 18A:

A single product company sells its product at ₹ 60 per unit. In 20x1-20x2, 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 20x2-20x3, 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 20x2-23 to earn the same P/V ratio as in 20x1-20x2.

ii. Assuming the same selling price of ₹ 60 per unit in 20x2-20x3, FIND the number of units required to be produced and sold to earn the same profit as in 20x1-20x2.

SOLUTION:

Profit earned in 2021-22:

Particulars	₹
Total contribution (50,000 x ₹ 12)	6,00,000
Less: Fixed cost	3,60,000
Profit	2,40,000
Selling price to be fixed in 2022-23:	
Revised variable cost (₹ 48 x 1.10)	52.80
Revised fixed cost (3,60,000 x 1.05)	3,78,000
P/V Ratio (Same as of 2021-22)	20%
Variable cost ratio to selling price	80%

Therefore, revised selling price per unit = ₹ 52.80 x 80% = ₹ 66

No. of units to be produced and sold in 2022-23 to earn the same profit:

We know that Fixed Cost plus profit = Contribution

	₹
Profit in 2021-22	2,40,000
Fixed cost in 2022-23	3,78,000
Desired contribution in 2022-23	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 2022-23 = ₹ 6,18,000 ÷ ₹ 7.20 = 85,834 units.

Workings:

1. PV Ratio in 2021-22

	₹
Selling price per unit	60

Variable cost (80% of Selling Price)	48
Contribution	12
P/V Ratio	**20%**

2. No. of units sold in 2021-22

Break-even point = Fixed cost x 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.

PROBLEM – 18B:

An automobile manufacturing company produces different models of Car The budget in respect of model 007 for the month of March 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:

i. **Profit with 10 percent increase in selling price with a 10 percent reduction in sales volume.**

ii. **Volume to be achieved to maintain the original profit after a 10 percent rise in material costs, at the originally budgeted selling price per unit.**

SOLUTION:

(i) 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

Statement of Calculation of Profit:

	(₹ In lakhs)
Sales 36,000 units at ₹ 5,77,500	2,07,900
Less: Variable cost: 36,000 × ₹ 3,30,000	1,18,800
Contribution	89,100
Less: fixed costs	60,750
Profit	**28,350**

(ii) 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	93,000
Variable cost per unit	3,49,800
Budgeted selling price per unit	5,25,000
Contribution per unit (5,25,000 – 3,49,800)	**1,75,200**

$$\text{Sales volume} = \frac{\text{Fixed costs + Profit}}{\text{Contribution per unit}} = \frac{60{,}750 \text{ lakhs} + 17{,}250 \text{ lakhs}}{₹\,1.752 \text{ lakhs}}$$

= 44,521 units are to be sold to maintain the original profit of ₹ 17,250 lakhs.

PROBLEM – 18C: **(MTP 2 SEP 24)**

A company manufactures and sells a product, the price of which is controlled by the Government. Raw material required for this product is also made available at a fixed controlled price. The following figures have been called for the previous two accounting years of the company:

	Year- I	Year- II
Quantity Sold (tones)	**1,26,000**	**1,44,000**
Price per tone	**₹ 185**	**₹ 185**
		(₹ In thousands)
Sales Value	**23,310**	**26,640**
Raw Materials	**11,340**	**12,960**
Direct Labour	**1,512**	**1,872**
Factory, Administration and Selling Expenses	**9,702**	**11,232**
Profit	**756**	**576**

During the year II direct labour rates increased by 8 $^{1}/3$%. Increases in factory, administration and selling expenses during the year were ₹ 8,10,000 on account

of factors other than the increased quantities produced and sold. The managing director desires to know, what quantity if they had produced and sold would have given the company the same net profit per tonne in Year II as it earned during the Year I Advise him.

SOLUTION:

Contribution per tonne	**(₹)**
Sales Price	185.00
Variable Cost:	
Material (W.N.-1)	90.00
Labour (W.N.-2)	13.00
Variable Overhead (W.N.-3)	40.00
Contribution	42.00
Profit Required (₹ 7,56,000 ÷ 1,26,000 tonnes)	6.00
Balance Contribution *per tonne* for meeting Fixed Costs	36.00
Fixed Costs (W.N.-4)	54,72,000
Quantity Required (₹ 54,72,000 ÷ ₹ 36)	1,52,000 tonnes

Working Notes

1.	Materials Cost per tonne in Year II $\left(\frac{₹\,1,29,60,000}{1,44,000\ \text{tonnes}}\right)$	₹ 90
2.	Labour Cost per tonne in Year II $\left(\frac{₹\,18,72,000}{1,44,000\ \text{tonnes}}\right)$	₹ 13
3.	Variable portion of Factory, Administration and Selling Expenditure, etc Total in Year II Less: Increase otherwise than on account of increased turnover Less: Amount Spent in Year I Increase Increase in Quantity Sold Variable Expenses per tonne $\left(\frac{₹\,7,20,000}{18,000\ \text{tonnes}}\right)$	₹ 1,12,32,000 8,10,000 **1,04,22,000** 97,02,000 7,20,000 18,000 ₹ 40

4.	Fixed portion of Factory, Administration and Selling Expenses (Year 2)	₹ 1,12,32,000
	Variable Expenses @ ₹ 40 per tonne	₹ 57,60,000
	Fixed Portion	₹ 54,72,000

PROBLEM – 19:

The following set of information is presented to you by your client AB Ltd producing two products X and Y.

Particulars	X	Y
Direct materials	₹ 20	₹ 18
Direct wages	₹ 6	₹ 4

- **Fixed expenses during the period are expected to be ₹ 1,600.**
- **Variable expenses are allocated to the products at the rate of 100% of direct wages.**
- **Selling price per unit X: ₹ 40 and Y: ₹ 30.**
- **Proposed sales mix:**
  - i. **100 units of X and 200 units of Y**
  - ii. **150 units of X and 150 units of Y**
  - iii. **200 units of X and 100 units of Y**

As a cost accountant, you are required to present to the management the following:

a. **The total contribution and profit from each of the above sales mix.**

b. **The proposed sales mix to earn of profit of ₹ 300 and ₹ 600 with the total sales of X and Y being 300 units.**

c. **Calculate BEP when the sales mix is 2:1**

d. **Recalculate BEP when sales mix is 1:2**

SOLUTION:

Part I:

Step 1: Calculation of Contribution Per Unit:

Particulars	X	Y
Selling Price	40	30
(-) Direct Material	(20)	(18)
(-) Direct Wages	(6)	(4)
(-) Wages	(6)	(4)
Contribution	**8**	**4**

Step 2: Calculation of profit under difference sales mix

Scenario 1 = 100 units of X

Y = 200 units

Contribution = (100 Units x ₹ 8) (+) (200 Units x ₹ 4)

= ₹ 800 + ₹ 800 = ₹ 1600

(-) Fixed Cost = (₹ 1600)

Profit = ₹ 0

Scenario 2 = 150 units of X

Y = 150 units

Contribution = (150 Units x ₹ 8) (+) (150 Units x ₹ 4)

= ₹ 1200 + ₹ 600 = ₹ 1800

(-) Fixed Cost = (₹ 1600)

Profit = ₹ 200

Scenario 3 = 200 units of X

Y = 100 units

Contribution = (200 Units x ₹ 8) (+) (100 Units x ₹ 4)

= ₹ 1600 + ₹ 400 = ₹ 2000

(-) Fixed Cost = (₹ 1600)

Profit = ₹ 400

Part II: Sales Mix to earn a profit ₹ 300

Step 1: volume of 300 units

Let No. of units of X be "x"

Let No. of units of Y be "300 – x"

Contribution = 8x + 4 (300 – x)

(-) Fixed Cost = ₹ (1600)

Profit ₹ **300**

8x – 4x + ₹ 1200 – ₹ 1600 = ₹ 300

4x = 700

X = 175 Units

Y = 300 - 175 = 125 Units

The co sells when x = 175 units

y = 125 units

It will earn the profit of ₹ 300

Volume = 300 units

Profit = ₹ 600

Contribution = 8x + 4 (300 – x)

(-) FC = (₹ 1600)

Profit ₹ 600

8x + 1200 – 4x – 1600 = 600

4x = 1000

X = 250 units

Y = 300 – 250

= 50 units

The co sells 250 units of x and 50 units of y

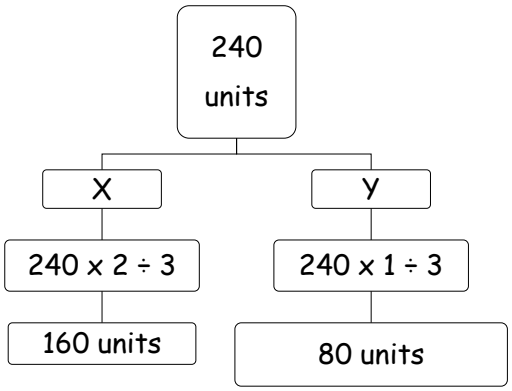
Part III: Calculation of Break Even Point: When the sales mix 2: 1:

Weighted Contribution Per Unit = $\left[8 \times \frac{2}{3}\right]$ (+) $\left[4 \times \frac{1}{3}\right]$

= 5.33 + 1.33

= 6.67

$$BES = \frac{\text{Fixed Cost}}{\text{Weighted Contribution Per Unit}} = \frac{₹\ 1600}{6.67} = 240 \text{ units}$$



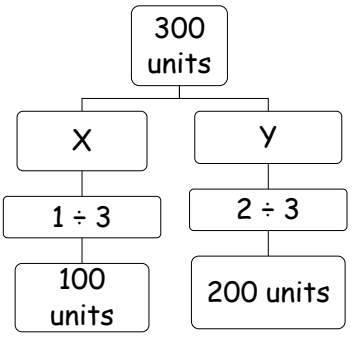
When the co sells 160 units of X and 80 units of Y it earns 0 profit

Part IV: Calculation of BEP when the sales mix of 1 : 2:

Weighted Contribution Per Unit = $\left[8 \times \frac{1}{3}\right]$ (+) $\left[4 \times \frac{2}{3}\right]$

= 2.67 (+) 2.67 = 5.33 units

$$BES = \frac{\text{Fixed Cost}}{\text{Weighted Contribution Per Unit}} = \frac{₹\ 1600}{5.33} = 300 \text{ units}$$



When the co sells the 100 units of X and 200 units of Y to earn a profit of 0.

PROBLEM – 19A: **(RTP SEP 24)**

RS Ltd. manufactures and sells a single product X whose selling price is ₹100 per unit and the variable cost is ₹60 per unit.

(i) If the Fixed Costs for this year are ₹24,00,000 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 ₹150 per unit and the variable cost ₹100 per unit. The total fixed costs are estimated at ₹28,00,000. The sales mix of X : Y would be 5 : 3. COMPUTE the break-even sales in units for both the products.

SOLUTION:

(i) Contribution per unit = Selling price – Variable cost

= ₹ 100 – ₹ 60

= ₹ 40

Break-even Point $= \frac{₹\ 24,00,000}{₹\ 40}$

= 60,000 units

Percentage Margin of Safety $= \frac{\text{Actual Sales - Break -even sales}}{\text{Actual Sales}}$

Or, 60% $= \frac{\text{Actual Sales - 60,000 units}}{\text{Actual Sales}}$

∴ Actual Sales = 1,50,000 units

	(₹)
Sales Value (1,50,000 units × ₹ 100)	1,50,00,000
Less: Variable Cost (1,50,000 units × ₹ 60)	(90,00,000)
Contribution	60,00,000
Less: Fixed Cost	(24,00,000)

Profit	36,00,000
Less: Income Tax @ 40%	(14,40,000)
Net Return	**21,60,000**

Rate of Net Return on Sales = 14.40% $\left(\frac{₹\ 21,60,000}{₹\ 1,50,00,000} \times 100\right)$

(ii) Products

	X (₹)	Y (₹)
Selling Price per unit	100	150
Variable Cost per unit	60	100
Contribution per unit	40	50

Composite contribution will be as follows:

Contribution per unit = $\left(\frac{40}{8} \times 5\right) + \left(\frac{50}{8} \times 3\right)$

= 25 + 18.75 = ₹ 43.75

Break even sale = 64,000 units $\left(\frac{₹\ 28,00,000}{₹\ 43.75}\right)$

Break-even Sales Mix:

X (64,000 units × 5/8) = 40,000 units

Y (64,000 units × 3/8) = 24,000 units

PROBLEM – 19B:

Prisha Limited manufactures three different products and the following information has been collected from the books of accounts:

	Products		
	A	**B**	**C**
Sales Mix	**40%**	**35%**	**25%**
Selling Price	**₹ 300**	**₹ 400**	**₹ 200**
Variable Cost	**₹ 150**	**₹ 200**	**₹ 120**
Total Fixed Costs	**₹ 18,00,000**		
Total Sales	**₹ 60,00,000**		

The company has currently under discussion, a proposal to discontinue the manufacture of Product C and replace it with Product E, when the following results are anticipated:

	Products		
	A	**B**	**E**
Sales Mix	**45%**	**30%**	**25%**

Selling Price	**₹ 300**	**₹400**	**₹ 300**
Variable Cost	**₹ 150**	**₹200**	**₹ 150**
Total Fixed Costs	**₹ 18,00,000**		
Total Sales	**₹ 64,00,000**		

Required:

i. **CALCULATE the total contribution to sales ratio and present break-even sales at existing sales mix.**

ii. **CALCULATE the total contribution to sales ratio and present break-even sales at proposed sales mix.**

iii. **STATE whether the proposed sales mix is accepted or not?**

SOLUTION:

(i) Calculation of Contribution to sales ratio at existing sales mix:

	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

(ii) Calculation of Contribution to sales ratio at proposed sales mix:

	Products			
	A	**B**	**C**	**Total**
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 x 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	

(iii) 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.

PROBLEM – 20:

Aravind Ltd. manufactures and sells four products under the brand names A, B, C, & D. the following details are provided in respect of the products.

PRODUCT	A	B	C	D
% in Sales Value	30	40	20	10
% of Variable cost to selling price	60	70	80	30

The total budgetary sales (100%) are ₹ 10,00,000 p.m. fixed costs are ₹ 2,50,000 p.m. The Company's new sales manager Aravind has suggested a change in sales mix keeping the total sales at ₹ 10,00,000 per month. His suggestion is as under:

Product	A	B	C	D
% in sales Value	25	40	30	5

- **Calculate the break-even point for the company, under the existing sales mix.**
- **Compute the effect of implementing the suggested change in the sales mix.**
- **Explain the reasons for the effect of change in sales mix despite total sales and fixed cost being the same.**

SOLUTION:

Step 1: Calculated of budgeted profit with existing sales mix:

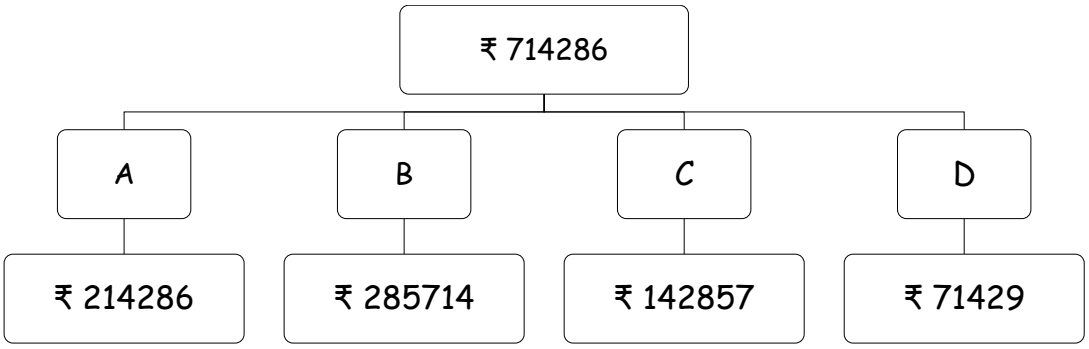
Product	Sales ₹	PVR	Contribution ₹
A	3,00,000	40%	1,20,000

B	4,00,000	30%	1,20,000
C	2,00,000	20%	40,000
D	1,00,000	70%	70,000
	10,00,000		**3,50,000**
(-) Fixed Cost			(2,50,000)
Profit			**1,00,000**

Step 2: Break even sales with current sales mix:

Product	Sales mix	PV Ratio	Weighted PV Ratio
A	0.30	40%	12%
B	0.40	30%	12%
C	0.2	20%	4%
D	0.10	70%	7%
		Weighted PV Ratio	**35%**

$$\text{Break Even Sales} = \frac{\text{Fixed Cost}}{\text{Weighted PV Ratio}} = \frac{₹\ 2,50,000}{35\%} = ₹\ 714286$$



When the company sells its product work ₹ 714286 in the proportion.

70 : 40 : 20 : 10 of A : B : C : D profit 0.

Step 3: Calculation of profit under charged sales mix

Product	Sales ₹	PVR	Contribution
A (25%)	250000	40%	1,00,000
B (40%)	400000	30%	1,20,000
C (30%)	300000	20%	60,000
D (5%)	50000	70%	35,000
	10,00,000		**3,15,000**
(-) Fixed Cost			2,50,000
Profit			**65000**

Step 4: understanding the reason for drop in profit:

⇉ Despite the sales & FC remaining the same the profit has dropped by ₹35000

⇉ This is way of drop in PV ratio due to change in sales mix

⇉ Existing PVR is 35% New PVR = $\frac{₹\ 3,15,000}{₹\ 1,00,000}$ = 31.5%

Decrease in PV Ratio = 35 – 31.5%

= 3.5%

Decrease in profit = Sales x Decrease in PVR

₹ 10,00,000 x 3.5% = ₹ 35000

The PV Ratio has dropped due to change in sales mix which can be analysed as follows

Product	Sales Mix	PV Ratio	Δ PV Ratio
A	↓ 5%	40%	↓ 2%
B	-	30%	-
C	↑ 10%	20%	↑ 2%
D	↓ 5%	70%	↓ 3.5%
			↓ 3.5%

PROBLEM – 21:

A, B and C are three similar plants under the same management who want them to be merged for better operation. The details are as under:-

Plant	A	B	C
Capacity Operated %	100	70	50
	(in lakhs)	(in lakhs)	(in lakhs)
Turnover	₹ 300	₹ 280	₹ 150
Variable Cost	₹ 200	₹ 210	₹ 75
Fixed Costs	₹ 70	₹ 50	₹ 62

Find out:

a. The capacity of the merged plant for break-even

b. The profit at 75% capacity of the merged plant.

c. The turnover from the merged plant to give a profit of ₹28 lakhs.

SOLUTION:

Step 1: Details of merged plant at 100% capacity:

(₹ In lakhs)

Particulars	A	B	C	Merged
Sales	300	400 (280 x 100 ÷ 70)	300	1000
(-) Variable Cost	(200)	(300)	(150)	(650)

Contribution	100	100	150	350
(-) Fixed Cost	(70)	(50)	(62)	(182)
Profit	**30**	**50**	**88**	**168**

If the merged plant works at 110% capacity it can earn a profit of ₹ 168 Lakhs

Step 2:

Part I: Capacity to break even:

$$\text{PV Ratio} = \frac{\text{Contribution}}{\text{Sales}} = \frac{₹\ 350}{₹\ 1000} = 35\%$$

$$\text{Break Even Sales} = \frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{₹\ 182}{35\%} = ₹\ 520 \text{ Lakhs}$$

$$\%\text{ capacity to break even} = \frac{₹\ 520}{₹\ 1000} \times 100 = 52\%$$

Part II: Profit at 75% capacity of the merged plant:

Contribution (350 x 75%) = ₹ 262.5

(-) Fixed Cost ₹ (182)

Profit = ₹ 80.5

Part III: Turnover for the merged plant to given a project ₹ 28 Lakhs

Contribution = Fixed Cost + Required profit

= ₹ 182 + ₹ 28

= ₹ 210

Sales = Contribution ÷ PV Ratio = ₹ 210 ÷ 35% = ₹ 600 Lakhs

PROBLEM – 22:

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 (units)	3,000	2,000	1,000
Production Capacity (units)	2,000	3,000	900
Fixed Costs (₹)	₹ 30,000		

Required:

COMPUTE the opportunity costs for each of the products.

SOLUTION:

	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).

PROBLEM – 23:

The following particulars are extracted from the records company:-

Particulars	Product A	Product B
	Per Unit	Per Unit
Sales	₹ 100	₹ 120
Consumption of Material	2 Kg.	3 Kg.
Material Cost	₹ 10	₹ 15
Direct wages cost	₹ 15	₹ 10
Direct expenses	₹ 5	₹ 6
Machine Hours used	3	2
Overhead expenses :		
- Fixed	₹ 5	₹ 10
- Variable	₹ 15	₹ 20

Direct wages per hour is ₹ 5.

a. **Comment on the profitability of each product (both use the same raw material) when**
   i. **Raw material is in short supply;**
   ii. **Production capacity (in terms of machine-hours) is the limiting factor.**

b. **Assuming Raw material as the key factor availability of which is 10,000 Kg. and the maximum sales potential of each product being 3,500 units, find out the product mix which will yield the maximum profit.**

SOLUTION:

Step 1: Calculation Contribution of A and B:

Particulars	A	B
Selling Price	100	120

Less: Variable Cost		
Direct Material	(10)	(15)
Direct Wages	(15)	(10)
Direct Expenses	(5)	(6)
Less: Variable Overhead	(15)	(20)
Variable Cost	**45**	**51**
Contribution Per Unit	**55**	**69**

Note: Fixed Overheads to be ignored for decision making

Step 2: Ranking the products when raw material is a Limiting factor:

Particulars	A	B
Contribution Per Unit	55	69
Kgs	2 Kg	3 Kg
Contribution Per Unit Per Kg	27.5	23
Rank	I	II

Step 3: Ranking the products when machine hrs is a Limiting factor:

Particulars	A	B
Contribution Per Unit	55	69
Hours	3 Hours	2 Hours
Contribution Per Unit Per Hour	18.33	34.5
Rank	II	I

Step 4: Allocation of 10000 kg of raw materials to maximize contribution:

Rank	Product	Units	Kg Per unit	Kg Per Unit Consumed	Kgs consumed
I	A	3500 units	2 kg	7000 kg	7000 kg
II	B	1000 units	3 kg	3000 kg	10000 kg

Step 5: Calculation of Total Contribution

Product	Units	Contribution Per Unit	Contribution
A	3500 units	55	₹ 192500
B	1000 units	69	₹ 69000
			₹ 261500

PROBLEM – 23A: **(PYP SEP 24)**

ABC Ltd. is a well-known company for producing baby care products.

The company produces and sells two variants of organic shampoo for children: "Baby Rose" and "Baby Lily". The sales and cost data for both products are provided below:

Particulars	Baby Rose	Baby Lily
Current demand and Sales (Number of bottles)	4,000	3,000
Production Capacity (Number of bottles)	7,500	6,000
Selling Price per bottle (₹)	600	750
Variable Costs per bottle:		
- Direct Materials (₹ 20 Per litre)	160	200
- Other Variable Costs	270	350

The fixed costs amount to ₹ 5,00,000 and ₹ 4,50,000 for Baby Rose and Baby Lily respectively. The Production Manager has informed that 1,00,000 litres of material is available for production. A dealer has approached the company and proposed to purchase both products at the existing selling prices, which are to be produced by utilizing the remaining unused material. However, he has insisted that all the bottles must be packed with eco-friendly packaging, which will result in an additional cost of ₹ 10 per bottle for the company. Presently, the company is not using eco-friendly material for packing of bottles.

Required:

Prepare a detailed statement showing the overall contribution and profit of the company after acceptance of the dealer's proposal.

SOLUTION:

Statement showing the Overall contribution and profit of the company

Particulars	Baby Rose	Baby Lily	Total
	(₹)	(₹)	(₹)
Selling price per bottle	600	750	-
Less: Direct Materials	160	200	-
Other variable costs	270	350	-
Additional packaging	10	10	
Contribution per bottle	**160**	**190**	-
Material required per bottle	8 litres	10	
Contribution per litre of material	**20**	**19**	

Ranking on the basis of Contribution per litre of material	I	II	
	Baby Rose (4,000 + 3,500 bottles)	Baby Lily (3,000 +1,000 bottles)	
Selling price per bottle	600	750	-
Sales Value	45,00,000	30,00,000	
Variable Cost			
Direct Materials	7,500 units x ₹ 160 = 12,00,000	4,000 units x ₹ 200 = 8,00,000	
Other Variable Costs	7,500 units x ₹ 270 = 20,25,000	4,000 units x ₹ 350 = 14,00,000	
Eco-friendly pack cost	3,500 units x ₹ 10 = 35,000	1,000 units x ₹ 10 = 10,000	
Total Variable Costs	32,60,000	22,10,000	
Contribution	4,000 units x 170 3,500 units x 160 = 12,40,000	3,000 units x 200 1,000 units x 190 = 7,90,000	20,30,000
Less: Fixed Cost	5,00,000	4,50,000	9,50,000
Profit	**7,40,000**	**3,40,000**	**10,80,000**

WN1

	Baby Rose	**Baby Lily**
Raw Material used per unit of bottle **(a)**	8 litres (₹ 160 ÷ ₹ 20)	10 litres (₹ 200 ÷ ₹ 20)
Current Demand and Sales **(b)**	4,000 bottles	3,000 bottles
Total Raw Material used **(c = a x b)**	32,000 litres	30,000 litres

WN2

Raw Material available after current sales = 1,00,000 litres – 62,000 litres
= 38,000 litres

Since the contribution per unit of Baby Rose is higher than Baby Lily, the company will produce and sale Baby Rose shampoo to the dealer.

Number of units that can be produced in 38,000 litres = 38,000 litres ÷ 8 litres
= 4,750 bottles

However, the Production capacity of Baby Rose is 7,500 bottles, only 3,500 bottles can be produced.

Raw materials used in 3,500 bottles = 8 litres x 3,500 bottles

= 28,000 litres Remaining material = 10,000 litres

Number of Baby Lily that can be produced in 10,000 litres = 10,000 litres ÷ 10 litres

= 1,000 bottles

Alternatively, Solution can also be presented in following way: Statement showing the Overall contribution and profit of the company

Particulars	Baby Rose	Baby Lily	Total
	(₹)	(₹)	(₹)
Selling price per bottle	600	750	-
Less: Direct Materials	160	200	-
Other variable costs	270	350	-
Contribution per bottle Before additional packaging	170	200	-
Contribution per bottle per unit of raw material Before additional packaging	21.25	20	
Ranking on the basis of Contribution per bottle per unit of raw material	I	II	

Particulars	Current Sales (WN2)	Additional Sales of Baby Rose (3,500 bottles)	Additional Sales of Baby Lily (1,000 bottles)	Total
	(₹)	(₹)	(₹)	(₹)
Selling price per bottle	-	600	750	-
Less: Direct Materials	-	160	200	-
Other variable costs	-	270	350	-
Additional packaging	-	10	10	
Contribution per unit	-	160	190	-
Total Contribution	12,80,000	5,60,000	1,90,000	20,30,000
Less: Fixed Cost	9,50,000	-	-	9,50,000
Profit	3,30,000	5,60,000	1,90,000	10,80,000

WN1

	Baby Rose	Baby Lily
Raw Material used per unit of bottle **(a)**	8 litres (₹ 160 ÷ ₹ 20)	10 litres (₹ 200 ÷ ₹ 20)
Current Demand and Sales **(b)**	4,000 bottles	3,000 bottles
Total Raw Material used **(c = a x b)**	32,000 litres	30,000 litres

WN2

Statement showing the current contribution and profit of the company

Particulars	**Baby Rose**	**Baby Lily**	**Total**
	(₹)	**(₹)**	**(₹)**
Selling price per bottle	600	750	-
Less: Direct Materials	160	200	-
Other variable costs	270	350	-
Contribution per bottle Before additional packaging	170	200	-
Contribution per bottle per unit of raw material Before additional packaging	21.25	20	
Total Contribution Before additional packaging	6,80,000	6,00,000	12,80,000
Less: Fixed Cost	5,00,000	4,50,000	9,50,000
Profit	1,80,000	1,50,000	3,30,000

WN3

Raw Material available after current sales = 1,00,000 litres – 62,000 litres

= 38,000 litres

Since the contribution per unit of Baby Rose is higher than Baby Lily, the company will produce and sale Baby Rose shampoo to the dealer.

Number of units that can be produced in 38,000 litres = 38,000 litres/8 litres

= 4,750 bottles

However, the Production capacity of Baby Rose is 7,500 bottles, only 3,500 bottles can be produced.

Raw materials used in 3,500 bottles = 8 litres x 3,500 bottles

= 28,000 litres Remaining material = 10,000 litres

Number of Baby Lily that can be produced in 10,000 litres = 10,000 litres/10 litres

= 1,000 bottles

PROBLEM – 24:

X Ltd. supplies spare parts to an aircraft company Y Ltd. The production capacity of X Ltd. facilitates the 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 h	0.25 h
Machine Time: Machine Q	0.5 h	0.55 h
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:

i. **IDENTIFY the spare part which will optimize contribution at the offered price.**

ii. **If Y Ltd. reduces the target price by 10% and offers ₹ 60 per hour of unutilized machine hour, CALCULATE the total contribution from the spare part identified above?**

SOLUTION:

(i)

	Part A	Part B
Machine "P" (4,000 Hours)	6,666	16,000
Machine "Q" (4,500 Hours)	9,000	8,181
Alloy Available (13,000 kg)	8,125	8,125
Maximum Number of Parts to be manufactured (Minimum of the above three)	6,666	8,125

	₹	₹
Material (₹12.5 × 1.6 kg.)	20.00	20.00
Variable Overhead: Machine "P"	48.00	20.00

Variable Overhead: Machine "Q"		50.00	55.00
Total Variable Cost per unit		118.00	95.00
Price Offered		145.00	115.00
Contribution per unit		**27.00**	**20.00**
Total Contribution for units produced	(I)	1,79,982	1,62,500

Spare Part A will optimize the contribution.

(ii)

	Part A
Parts to be manufactured numbers	6,666
Machine P: to be used	4,000
Machine Q: to be used	3,333
Underutilized Machine Hours (4,500 Hours – 3,333 Hours)	1,167
Compensation for unutilized machine hours (1,167 Hours × ₹ 60) (II)	70,020
Reduction in Price by 10%, Causing fall in Contribution of ₹ 14.50 per unit (6,666 units × ₹ 14.5) (III)	96,657
Total Contribution (I + II – III)	**1,53,345**

PROBLEM –25:

A paint manufacturing company manufactures 2,00,000 medium-sized tins of "Spray Lac Paints" per annum when working at normal capacity. It incurs the following costs of manufacturing per unit:.

Particulars	(₹)
Direct Material	7.8
Direct Labour	2.1
Variable overheads	2.5
Fixed overheads	4
Product Cost per unit	16.4

The selling price is ₹ 21 per and variable selling and administrative expenses are 60 paise per tin. During the next quarter, only 10,000 units can be produced and sold. Management plans to shut down the plant estimating that the fixed manufacturing cost can be reduced to ₹ 74,000 for the quarter. When the plant is operating, the fixed overheads are incurred at a uniform rate throughout the year. Additional costs of plant shutdown for the quarter are estimated at ₹ 14,000.

REQUIRED:

a. **Express your opinion, as to whether the plant should be shut down during the quarter, and**

b. **Calculate the shutdown point for the quarter in terms of number of tins.**

SOLUTION:

Step 1: Calculation of Contribution Per Unit

Particulars	**(₹)**
Selling price	21
Less: Variable Cost	
Direct Material	7.8
Direct Labour	2.1
Variable Overheads	2.5
Variable selling Overheads	0.6
Contribution Per Unit	**8**

Step 2: Calculation of Avoidable Fixed Cost (FC)

Total Annual Fixed Cost (200000 x ₹ 4) = ₹ 800000

Total Fixed Cost per Quarter = ₹ 800000 ÷ 4 = ₹ 200000

Unavoidable Fixed Cost (Given) = ₹ 74000

Avoidable (₹ 200000 - ₹ 74000) = ₹ 126000

Step 3: Shut Down Point

$$\text{Shutdown point} = \frac{\text{Avoidable Fixed Cost - Shutdown cost}}{\text{Contribution Per Unit}}$$

= ₹ 126000 – ₹ 14000 ÷ ₹ 8 = 14000 Units

Estimated Shut Down point

Sales	**Decision**
< 14000 Units	Shut down
= 14000 Units	Indifference
> 14000 Units	Continue

PROBLEM – 26:

Mr. X has ₹ 2,00,000 investments in his business firm. He wants a 15 per cent return on his money. From an analysis of recent cost figures, he finds that his variable cost of operating is 60 per cent of sales, his fixed costs are ₹ 80,000 per year.

Show COMPUTATIONS to answer the following questions:

i. **What sales volume must be obtained to break even?**

ii. What sales volume must be obtained to get 15 per cent return on investment?

iii. Mr. X estimates that even if he closed the doors of his business, he would incur ₹ 25,000 as expenses per year. At what sales would he be better off by locking his business up?

SOLUTION:

Particulars		**₹**
Suppose sales		100
Variable cost		60
Contribution		40
P/V ratio		40%
Fixed cost		= ₹ 80,000
(i)	Break-even point = Fixed Cost ÷ P/V ratio = 80,000 ÷ 40% or ₹ 2,00,000	
(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% or ₹ 1,37,500	

Mr. X will be better off by locking his business up, if the sale is less than ₹ 1,37,500

PROBLEM –27:

From the following data compute the profit under a. Marginal costing, and b. Absorption costing and reconcile the difference in profit.

	₹ Per unit
Selling price	**₹ 8**
Variable cost	**₹ 4**
Fixed cost	**₹ 2**

The normal volume of production is 26,000 units per quarter.

The opening and closing stocks consisting of both finished goods and equivalent units of work-in-progress are as follows:-

Particulars	**Qr. I**	**Qr. II**	**Qr. III**	**Qr. IV**	**Total**
Op. stock	**-**	**-**	**6,000**	**2,000**	**-**
Production	**26,000**	**30,000**	**24,000**	**30,000**	**1,10,000**
Sales	**26,000**	**24,000**	**28,000**	**32,000**	**1,10,000**

Closing stock	-	6,000	2,000	-	-

SOLUTION:

Part I: Calculation of Profit Under Marginal Costing System:

Particulars	Q1 (₹)	Q2 (₹)	Q3 (₹)	Q4 (₹)
A. Sales	208000	192000	224000	256000
Opening stock	0	-	24000	8000
Add: Variable cost of production	104000	120000	96000	120000
Less: Closing stock	0	(24000)	(8000)	0
B. Variable COGS	104000	96000	112000	128000
C. Gross contribution (A – B)	**104000**	**96000**	**112000**	**128000**
D. Variable & selling	-	-	-	-
E Contribution	104000	96000	112000	128000
F. Fixed cost	(52000)	(52000)	(52000)	(52000)
Profit	**52000**	**44000**	**60000**	**76000**

Part II: Calculation of Profit Under Absorption Costing System

Particulars	Q1 (₹)	Q2 (₹)	Q3 (₹)	Q4 (₹)
A. Sales	208000	192000	224000	256000
B. Opening stock	0		36000	12000
Add: COP @ ₹ 6	156000	180000	144000	180000
Less: Closing stock	0	(36000)	(12000)	-
	156000	**144000**	**168000**	**192000**
C. Gross Profit (A – B)	52000	48000	56000	64000
D. Selling & Administrative	-	-	-	-
E Under / over absorption	-	8000	(4000)	+ 8000
F. Profit (C – D ± E)	**(52000)**	**56000**	**52000**	**72000**

W.N.1: Calculation of under / over absorption:

Particulars	Q1 (₹)	Q2 (₹)	Q3 (₹)	Q4 (₹)
Actual Overheads	52000	52000	52000	52000
Absorbed Overheads (Actual x pre determined)	52000	60000	48000	60000
Under / over Absorption	-	8000 ↓ Over	4000 ↓ under	8000 ↓ Over

Statement Reconciling Marginal Costing & Absorption Costing Method:

Particulars	Q1 (₹)	Q2 (₹)	Q3 (₹)	Q4 (₹)
Opening stock	-	-	6000	2000
Closing stock	-	6000	2000	-
Net stock	**-**	**6000**	**4000**	**2000**
Fixed cost in net stock	-	12000	(8000)	(4000)
Marginal costing profit	52000	44000	60000	76000
Absorption costing profit	52000	56000	52000	72000

PROBLEM – 27A:

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 31st March, the production was 1,60,000 units and sales were 1,50,000 units. The closing inventory on 31st March was 20,000 units. The actual variable production costs for the year were ₹ 35,000 higher than the standard.

i. CALCULATE the profit for the year

a. by absorption costing method and

b. by marginal costing method.

ii. EXPLAIN the difference in the profits.

SOLUTION:

Income Statement (Absorption Costing) for the year ending 31st March

	₹	₹
Sales (1,50,000 units @ ₹ 20)		30,00,000
Production Costs:		
Variable (1,60,000 units @ ₹ 11)	17,60,000	
Add: Increase	35,000	17,95,000
Fixed (1,60,000 units @ ₹ 2*)		3,20,000
Cost of Goods Produced		**21,15,000**
Add: Opening stock (10,000 units @ ₹ 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).

Income Statement (Marginal Costing) for the year ended 31st March

	₹	₹
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**

Reasons for Difference in Profit:	₹
Profit as per absorption costing	2,59,375
Add: Opening stock under –valued in marginal costing (₹ 1,30,000 – 1,10,000)	20,000
	2,79,375
Less: Closing Stock under –valued in marginal closing (₹ 2,64,375 – 2,24,375)	40,000
Profit as per marginal costing	**2,39,375**

PROBLEM – 27B: **(MTP 1 MAY 24)**

AB Ltd produces a single product V2 and sells it at a fixed price of ₹ 2,050 per unit. The production and sales data for first quarter of the year 2023-24 are as follows:

	April	May	June
Sales in units	4,200	4,500	5,200
Production in units	4,600	4,400	5,500

Actual/budget information for each month was as follows:

Direct materials	4 kilograms at ₹ 120 per kilogram
Direct labour	6 hours at ₹ 60 per hour
Variable production overheads	150% of direct labour
Fixed production overheads	₹ 5,00,000
Fixed selling overheads	₹ 95,000

There was no opening inventory at the start of the quarter. Fixed production overheads are budgeted at ₹ 60,00,000 per annum and are absorbed into products based on a budgeted normal output of 60,000 units per annum.

Required:

(i) Prepare a profit statement for each of the three months using absorption costing principles.

(ii) Prepare a profit statement for each of the three months using marginal costing principles.

(iii) Present a reconciliation of the profit or loss figures given in your answer to (i) and (ii).

SOLUTION:

(i) Statement of Profit under Absorption Costing

Particulars	April (₹)	May (₹)	June (₹)
Sales (units)	4,200	4,500	5,200
Selling price per unit	2,050	2,050	2,050
Sales value (A)	**86,10,000**	**92,25,000**	**1,06,60,000**
Cost of Goods Sold:			
Opening Stock @ ₹ 1,480	0	5,92,000	4,44,000
Production cost @ ₹ 1,480	68,08,000	65,12,000	81,40,000
Closing Stock @ ₹ 1,480	(5,92,000)	(4,44,000)	(8,88,000)
Under/ (Over) absorption	40,000	60,000	(50,000)

Add: Fixed Selling Overheads	95,000	95,000	95,000
Cost of Sales (B)	**63,51,000**	**68,15,000**	**77,41,000**
Profit (A – B)	**22,59,000**	**24,10,000**	**29,19,000**

Workings:

1. Calculation of Full Production Cost

	(₹)
Direct Materials (4 kg. × ₹ 120)	480
Direct labour (6 hours × ₹ 60)	360
Variable production Overhead (150% of ₹ 360)	540
Total Variable cost	1,380
Fixed production overhead $\left(\frac{₹\,60,00,000}{60,000\ units}\right)$	100
	1,480

2. Calculation of Opening and Closing stock

	April	May	June
Opening Stock	0	400	300
Add: Production	4,600	4,400	5,500
Less: Sales	4,200	4,500	5,200
Closing Stock	**400**	**300**	**600**

3. Calculation of Under/Over absorption of fixed production overhead

	April (₹)	May (₹)	June (₹)
Actual Overhead	5,00,000	5,00,000	5,00,000
Overhead absorbed	4,60,000 (4,600 units × ₹ 100)	4,40,000 (4,400 units × ₹ 100)	5,50,000 (5,500 units × ₹ 100)
Under/(Over) absorption	**40,000**	**60,000**	**(50,000)**

(ii) Statement of Profit under Marginal Costing

Particulars	April (₹)	May (₹)	June (₹)
Sales (units)	4,200	4,500	5,200
Selling price per unit	2,050	2,050	2,050
Sales value	86,10,000	92,25,000	1,06,60,000
Less: Variable production cost @ ₹ 1,380	57,96,000	62,10,000	71,76,000

Contribution	**28,14,000**	**30,15,000**	**34,84,000**
Less: Fixed Production Overheads	5,00,000	5,00,000	5,00,000
Less: Fixed Selling Overheads	95,000	95,000	95,000
Profit	**22,19,000**	**24,20,000**	**28,89,000**

(iii) Reconciliation of profit under Absorption costing to Marginal Costing

Particulars	April (₹)	May (₹)	June (₹)
Profit under Absorption Costing	22,59,000	24,10,000	29,19,000
Add: Opening Stock	0	40,000 (400 × ₹ 100)	30,000 (300 × ₹ 100)
Less: Closing Stock	40,000 (400 × ₹ 100)	30,000 (300 × ₹ 100)	60,000 (600 × ₹ 100)
Profit under Marginal Costing	**22,19,000**	**24,20,000**	**28,89,000**

PROBLEM – 28:

Wonder Ltd, manufactures a single product, ZEST. The following figures relate to ZEST for a one-year period:

Activity Level	50%	100%
Sales and production (units)	400	800
Sales	₹ 8,00,000	₹16,00,000
Production costs:		
Variable	₹ 3,20,000	₹ 6,40,000
Fixed	₹ 1,60,000	₹ 1,60,000
Selling and distribution costs:		
Variable	₹ 1,60,000	₹ 3,20,000
Fixed	₹ 2,40,000	₹ 2,40,000

The normal level of activity for the year is 800 units. Fixed costs are incurred evenly throughout the year, and actual fixed costs are the same as budgeted. There were no stocks of ZEST at the beginning of the year. In the first quarter, 220 units were produced and 160 units were sold.

Required:

a. **COMPUTE the fixed production costs absorbed by ZEST if absorption costing is used.**
b. **CALCULATE the under/over-recovery of overheads during the period.**
c. **CALCULATE the profit using absorption costing.**
d. **CALCULATE the profit using marginal costing.**

SOLUTION:

(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 (1/4 of ₹ 1,60,000)	40,000
Absorbed fixed production overhead	44,000
Over-recovery of overheads	4,000

(c) Profit for the Quarter (Absorption Costing)

	₹	₹
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)
Add: Selling & Distribution Overheads:		
- Variable (160 units × ₹ 400)	64,000	
- Fixed (1/4th of ₹ 2,40,000)	60,000	1,24,000
Cost of Sales (B)		**2,80,000**
Profit {(A) – (B)}		**40,000**

(d) Profit for the Quarter (Marginal Costing)

	₹	₹
Sales revenue (160 units × ₹ 2,000): (A)		3,20,000
Less: Production costs:		1,76,000
- Variable cost (220 units × ₹ 800)		--
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:		64,000
- Variable (160 units × ₹400)		1,92,000
Cost of Sales (B)		
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**

PROBLEM – 29:

A dairy product company manufacturing baby food with a shelf life of one year furnishes the following information:

i. **On 1st April, 20x3, the company has an opening stock of 20,000 packets whose variable cost is ₹180 per packet.**

ii. **In 20x2-20x3, production was ₹ 1,20,000 packets and the expected production in 20x3-20x4 is 1,50,000 packets. Expected sales for 20x3-20x4 is 1,60,000 packets**

iii. **In 20x2-20x3, fixed cost per unit was ₹ 60 and it is expected to increase by 10% in 20x3-20x4. The variable cost is expected to increase by 25%. Selling price for 20x3-20x4 has been fixed at ₹ 300 per packet.**

You are required to calculate the Break-even volume in units for 20x3-20x4.

SOLUTION:

Working Notes:

Particulars	2022-23 (₹)	2023-24 (₹)
Fixed Cost	72,00,000 (₹ 60 x 1,20,000 units)	79,20,000 (110% of ₹ 72,00,000)
Variable Cost	180	225 (125% of ₹ 180)

Calculation of Break-even Point (in units):

Since, shelf life of the product is one year only, hence, opening stock is to be sold first.

	₹
Total Contribution required to recover total fixed cost in 2023 - 24 and to reach break-even volume.	79,20,000
Less: Contribution from opening stock {20,000 units x (₹ 300 — ₹ 180)}	24,00,000
Balance Contribution to be recovered	55,20,000

Units to be produced to get balance contribution

= ₹ 55,20,000 ÷ ₹ 300 – ₹ 225 = 73,600 packets.

Break-even volume in units for 2023-24

	Packets
From 2023-24 production	73,600
Add: Opening stock from 2022-23	20,000
	93,600

PROBLEM – 30:

An Indian soft drink company is planning to establish a subsidiary company in Bhutan to produce mineral water. Based on the estimated annual sales of 40,000 bottles of the mineral water, cost studies produced the following estimates for the Bhutanese subsidiary:

	Total annual costs	Percent of Total Annual Cost which is variable
Material	**2,10,000**	**100%**
Labour	**1,50,000**	**80%**
Factory Overheads	**92,000**	**60%**
Administration Expenses	**40,000**	**35%**

The Bhutanese production will be sold by manufacturer's representatives who will receive a commission of 8% of the sale price. No portion of the Indian office expenses is to be allocated to the Bhutanese subsidiary. You are required to

i. **COMPUTE the sale price per bottle to enable the management to realize an estimated 10% profit on sale proceeds in Bhutan.**

ii. **CALCULATE the break-even point in rupees sales as also in number of bottles for the Bhutanese subsidiary on the assumption that the sale price is ₹ 14 per bottle.**

SOLUTION:

(i) 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 $\left(\frac{₹\,6,00,000}{40,000\ bottles}\right)$	**15**

(ii) Calculation of Break-even Point

Sales Price per Bottle = ₹ 14

Variable Cost per Bottle = $\frac{₹\,4,44,000\ (W.N)}{40,000\ Bottles}$ = ₹ 11.10

Contribution per Bottle = ₹ 14 – ₹ 11.10 = ₹ 2.90

Break -even Point:

(in number of Bottles) = $\frac{Fixed\ costs}{Contribution\ on\ per\ bottle}$

= $\frac{₹\,92,800}{₹\,2.90}$ = 32,000 bottles

(in Sales Value) = 32,000 Bottles × ₹ 14

= ₹ 4,48,000

Working Note

W.N.-1

Let the Sales Price be 'x'

Commission = $\frac{8x}{100}$

$$\text{Profit} = \frac{10x}{100}$$

$$x = 4,92,000 + \frac{8x}{100} + \frac{10x}{100}$$

$$100x - 8x - 10x = 4,92,00,000$$

$$x = 4,92,00,000 \div 82 = ₹\ 6,00,000$$

W.N.-2

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

PROBLEM – 31: **(PYP SEP 24)**

JC Ltd. has a production capacity of 80,000 units per year. Presently a company produces 60,000 units. Its cost structure is as under:

Material Cost **₹ 6 per unit**

Labour Cost **₹ 4 per unit**

Variable overheads **₹ 2 per unit**

Total fixed cost ₹ 3,00,000 per annum. Present selling price ₹ 20 per unit in the month of January, 2024 company received an offer from a Japanese client to supply 20,000 units at a price of ₹ 14 per unit with the additional shipping cost of ₹ 8,000.

Required:

(i) On the basis of changes in the profit, advice to the company, whether the offer should be accepted or not?

(ii) Will your advice be different, if the customer is local one?

(iii) If Japanese client offer for supply of 30,000 units to a price of ₹ 14 (part supply of order not accepted) and shipping cost treated as variable cost, analyze the impact on the profit of JC Ltd., if order accepted.

SOLUTION:

(i) Statement Showing "Cost and Profit under Both Situation"

Particulars	Existing Production (60,000 units)	After Offer (80,000 units)
	(₹)	(₹)
Sales		
Existing (60,000 x ₹ 20)	12,00,000	12,00,000
Offer (20,000 x ₹ 14)	-	2,80,000
Total Sales	**12,00,000**	**14,80,000**
Less: Direct Materials @ ₹ 6	3,60,000	4,80,000
Direct Labour @ ₹ 4	2,40,000	3,20,000
Variable Overheads @ ₹ 2	1,20,000	1,60,000
Contribution	**4,80,000**	**5,20,000**
Less: Additional Shipping cost	-	8,000
Less: Fixed Cost	3,00,000	3,00,000
Profit	**1,80,000**	**2,12,000**

Since the Profit has increased by ₹ 32,000, the proposal of the Japanese client should be accepted

(ii) Yes, the advice will be different, if the customer is local one since the company is currently selling at ₹ 20 in local market and therefore, selling at discounted price of ₹ 14 may impact its local market.

(iii) Statement Showing "Cost and Profit"

Particulars	After Offer (80,000 units) (₹)
Sales	
Existing (50,000 x ₹ 20)	10,00,000
Offer (30,000 x ₹ 14)	4,20,000
Total Sales	**14,20,000**
Less: Direct Materials @ ₹ 6	4,80,000
Direct Labour @ ₹ 4	3,20,000
Variable Overheads @ ₹ 2	1,60,000

Additional Shipping cost (₹ 8,000/20,000 units) x 30,000 units	12,000
Contribution	**4,48,000**
Less: Fixed Cost	3,00,000
Profit	**1,48,000**

If offer of Japanese client to supply 30,000 units at a price of ₹ 14 is accepted, **the Profit will decrease by ₹ 32,000 from the current level.**

PROBLEM – 32: (RTP JAN 25)

XYZ Ltd. is a company involved in production and construction specialised equipment and machines on the demand of customers The company received an order for construction of a specialised machine, it had nearly completed this job relating to construction of a specialised machine, when it discovered that the customer had gone out of business. At this stage, the position of the job was as under:

	(₹)
Original cost estimate	27,50,000
Costs incurred so far	24,80,000
Costs to be incurred	3,70,000
Progress payment received from original customer	15,50,000

After searches, a new customer for the machine has been found. He is interested to take the machine, if certain modifications are carried out. The new customer wanted the machine in its original condition, but without its AI device and with certain other modifications. The costs of these additions and modifications are estimated as under:

Direct Materials (at cost)	₹ 1,05,000
Direct Wages Dept.: X	35 men days
Dept.: Y	55 men days
Variable Overheads	30% of Direct Wages in each Dept.
Delivery Costs	₹ 15,500

Fixed overheads will be absorbed at 50% of direct wages in each department.

The following additional information is available:

(1) The direct materials required for the modification are in stock and if not used for modification of this order, they will be used in another job in place of materials that will now cost ₹ 1,50,000.

(2) Department X is working normally and hence any engagement of labour will have to be paid at the direct wage rate of ₹ 1,000 per man day.

(3) Department Y is extremely busy. Its direct wages rate is ₹ 1,200 per man day and it is currently yielding a contribution of ₹ 3 per rupee of direct wages.

(4) Additional supervisory required for the modification cost ₹ 80,000.

(5) The cost of the AI device that the new customer does not require is ₹ 1,35,000. If it is taken out, it can be used in another job in place of a different mechanism. The latter mechanism has otherwise to be bought for ₹ 1,05,000. The dismantling and removal of the control mechanism will take 5 man day in department X.

(6) If the conversion is not carried out, some of the materials in the original machine can be used in another contract in place of materials that would have cost ₹ 2,00,000. It would have taken 5 men days of work in department X to make them suitable for this purpose. The remaining materials will realize ₹ 1,50,000 as scrap. The drawings, which are included as part for the job can he sold for ₹ 45,000.

You are required to CALCULATE the minimum price, which the company can afford to quote for the new customer as staled above.

SOLUTION:

Statement of Minimum Price Which the Company Can Afford to Quote for the New Customer

	(₹)	(₹)
Cost to be incurred to bring the machine in its original condition		3,70,000
Direct Material (Replacement Value)		1,50,000
Direct Wages		
Dept. X: (35 men days × ₹ 1,000)	35,000	
Dept. Y: (55 men days × ₹ 1,200)	66,000	
Opportunity Cost of Contribution Lost by Dept. Y (₹ 66,000 × ₹ 3)	1,98,000	2,99,000
Variable Overheads [30% × (₹ 35,000 + ₹ 66,000)]		30,300
Delivery Costs		15,500
Additional Supervisory required for modification		80,000
Saving Due to Alternative Use of AI Device		
Bought Out Price	1,05,000	
Less: Dismantling & Removal Cost (5 men day × ₹ 1,000)	5,000	
Less: Variable Cost (30% × ₹ 5,000)	1,500	(98,500)

Net Loss on Material Cost Savings (W.N.)		1,93,500
Opportunity Cost of Remaining Materials which can be sold as scrap		1,50,000
Opportunity Cost of Sale of Drawings		45,000
Total Minimum Price which may be quoted		**12,34,800**

Working Note

	(₹)
Loss on Material Cost Saving of Machine	2,00,000
Less: Conversion Cost (5 men days × ₹ 1,000)	5,000
Less: Variable Cost (30% × ₹ 5,000)	1,500
Net Loss on Material Cost Saving of Machine	**1,93,500**

CHAPTER 14: STANDARD COSTING

PROBLEM – 1:

Manufacturing Concern furnishes the following information:

Standard:	
Material for 70 kg finished products	**100 kg**
Price of material	**₹ 1 per kg**
Actual:	
Output	**2,10,000 kg**
Material used	**2,80,000 kg**
Cost of Materials	**₹ 2,52,000**

CALCULATE:

a. Material usage variance

b. Material price variance

c. Material cost variance.

SOLUTION:

Standard Quantity of input for actual output (SQ) = 2,10,000 kg × $\frac{100\ Kg}{70\ Kg}$ = 3,00,000 kg

Standard Price = ₹ 1

Actual Quantity = 280000 (Given)

Actual Price (AP) = (₹ 2,52,000 ÷ 2,80,000 kg) = ₹ 0.90 per kg.

(a) Material Usage Variance = (SQ – AQ) × SP

= (3,00,000 – 2,80,000) × 1= ₹ 20,000 (F)

(b) Material Price Variance = (SP – AP) × AQ

= (1 – 0.90) × 2,80,000 = ₹ 28, 000 (F)

(c) Material Cost Variance = (SQ × SP) – (AQ × AP)

= (3,00,000 × ₹ 1) – (2,80,000 × ₹ 0.90)

= ₹ 48, 000 (F)

Check MCV = MPV + MUV

₹ 48, 000 (F) = ₹ 28, 000 (F) + ₹ 20, 000 (F)

PROBLEM – 2:

The standard cost of a chemical mixture is as follows:

40% material A at ₹ 20 per kg 60% material B at ₹ 30 per kg.

A standard loss of 10% of input is expected in production.

The cost records for a period showed the following usage:

90 kg material A at a cost of ₹ 18 per kg 110 kg material B at a cost of ₹ 34 per kg

The quantity produced was 182 kg of good product.

CALCULATE all material variances.

SOLUTION:

Basic Calculation

Material	Standard for 182 kg output			Actual for 182 kg output		
	SQ	SP (₹)	Amount (₹)	Qty Kg.	Rate (₹)	Amount (₹)
A	80.888	20	1,617.777	90	18	1,620
B	121.333	30	3640	110	34	3,740
Total	202.22		5,257.777	200		5,360
Less: Loss	20	-	-	18	-	-
	182		**5,257.777**	**182**		**5,360**

Calculation of Variances

1. Material Cost Variance = (SQ x SP – AQ x AP)

A = (80.888 x ₹ 20) – (90 x ₹ 18)

B = (121.333 x ₹ 30) – (110 x ₹ 34)

= (5,257.78 – 5,360) = ₹ 102.22 (A)

2. Material Price Variance= (SP – AP) × AQ

Material A = (₹ 20 – ₹ 18) × 90 = ₹ 180.00 (F)

Material B = (₹ 30 – ₹ 34)) × 110 = ₹ 440.00 (A)

MPV = ₹ 260.00 (A)

3. Material Usage Variance = (Std. Quantity for actual output – Actual Quantity) × Std. Price

Material A = $\left(80 \times \frac{182}{180} - 90\right) \times ₹ 20$ = ₹ 182.22 (A)

Material B = $\left(120 \times \frac{182}{180} - 100\right) \times ₹ 30$ = ₹ 340.00 (F)

MUV = ₹ 157.78 (F)

Material Mix Variance	Material Yield Variance
(RAQ – AQ) x SP	(SQ – RAQ) x SP
A = (80 – 90) x ₹ 20 = ₹ 200 (A)	A = (80.88 – 80) x ₹ 20 = ₹ 17.777 (F)
B = (120 – 110) x ₹ 30 = ₹ 300 (F)	B = (121.33 – 120) x ₹ 30 = ₹ 40 (F)

PROBLEM – 2A:

The standard mix to produce one unit of a product is as follows:

Material X	**60 units @ ₹15 per unit**	**900**
Material Y	**80 units @ ₹20 per unit**	**1,600**
Material Z	**100 units @ ₹25 per unit**	**2,500**
	240 units	**5,000**

During the month of April, 10 units were actually produced and consumption was as follows:

Material X	**640 units @ ₹17.50 per unit**	**11,200**
Material Y	**950 units @ ₹18.00 per unit**	**17,100**
Material Z	**870 units @ ₹27.50 per unit**	**23,925**
	2,460 units	**52,225**

CALCULATE all material variances.

SOLUTION:

Material	**Standard for 10 units**			**Actual for 10 units**		
	Qty. Units	**Rate (₹)**	**Amount (₹)**	**Qty. units**	**Rate (₹)**	**Amount (₹)**
X	600	15	9,000	640	17.50	11,200
Y	800	20	16,000	950	18.00	17,100
Z	1,000	25	25,000	870	27.50	23,925
Total	**2,400**		**50,000**	**2,460**		**52,225**

1. Material Cost Variance = (SQ x SP – AQ x AP)

   = ₹ 50,000 – ₹ 52,225 = MCV = ₹ 2,225 (A)

2. Material Price Variance = (Standard Price – Actual Price) × Actual Qty

   Material X = (₹ 15 – ₹ 17.50) × 640 = ₹ 1,600(A)

   Material Y = (₹ 20 – ₹ 18) × 950 = ₹ 1,900 (F)

   Material Z = (₹ 25 – ₹ 27.50) × 870 = ₹ 2,175 (A)

   MPV = ₹ 1,875 (A)

3. Material Usage Variance= (Standard Qty. – Actual Qty.) × Standard Price

   Material X = (600 – 640) × ₹ 15 = ₹ 600 (A)

   Material Y = (800 – 950) × ₹ 20 = ₹ 3,000 (A)

   Material Z = (1,000 – 870) × ₹ 25 = ₹ 3,250 (F)

   MUV = ₹ 350 (A)

   Check MCV = MPV + MUV

₹ 2,225 (A) = ₹ 1,875 (A) + ₹ 350 (A)

4. Material Mix Variance = (Revised Standard Qty. – Actual Qty.) × Standard Price

Material X	= (615 * – 640) × 15	= ₹ 375 (A)
Material Y	= (820 * – 950) × 20	= ₹ 2,600(A)
Material Z	= (1,025 – 870) × 25	= ₹ 3,875 (F)
MMV		= ₹ 900 (F)

*Revised Standard Quantity (RSQ) is calculated as follows:

$$\text{Material X} = \frac{2460}{2400} \times 600 = 615 \text{ units}$$

$$\text{Material Y} = \frac{2460}{2400} \times 800 = 820 \text{ units}$$

$$\text{Material Z} = \frac{2460}{2400} \times 1{,}000 = 1{,}025 \text{ units}$$

5. Material Yield Variance = (Standard Qty - Revised Standard Qty.) × 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)
MYV	= ₹ 1,250 (A)

Check

MUV = MMV + MYV (Or MRUV)

₹ 350 (A) = ₹ 900 (F) + ₹ 1,250 (A)

or

MCV = MPV + MMV + MYV (Or MRUV)

₹ 2,225 (A) = ₹ 1,875 (A) + ₹ 900 (F) + ₹ 1,250 (A)

PROBLEM – 2B:

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 the month of April, 60 batches were prepared to produce an output of 5,600 kg. of NXE. The standard and actual particulars for the month of April, are as follows:

Raw Materials	Standard		Actual		Quantity of Raw Materials Purchased
	Mix	Price per kg.	Mix	Price per Kg.	
	(%)	(₹)	(%)	(₹)	(Kg.)
A	50	20	60	21	5,000
B	30	10	20	8	2,000

C	20	5	20	6	1,200

You are required to CALCULATE:

i. Material Price variance

ii. Material Usage Variance

SOLUTION:

Actual material used = 125 kg × 60 = 7,500 kg.

Actual cost of actual material used (AQ × AR)			(₹)
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 (AQ × SR)		**(₹)**
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 (SQ for actual production * SR)

Standard cost of output for 100 kg:		(₹)
A	62.50 kg x ₹ 20	1,250
B	37.50 kg x ₹ 10	375
C	25.00 kg x ₹ 5	125
	125.00	**1,750**

Standard cost for output of 5,600 kg.

$= \frac{1,750}{100}$ kg. x 5,600 kg. = ₹ 98,000

Material Price Variance = Standard cost of actual material used – Actual costof actual material used = ₹ 1,12,500 – ₹ 1,15,500 = ₹ 3,000 (A)

Material Usage Variance = Standard cost of production – Standard cost ofactual material used = ₹ 98,000 – ₹ 1,12,500 = ₹ 14,500 (A)

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 purchased

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)

PROBLEM – 2C: **(RTP MAY 24)**

EML operates in coal mining through open cast mining method. Explosives and detonators are used for excavation of coal from the mines. The following are the details of standard quantity of explosives materials used for mining:

Particulars	Rate (₹)	Standard Qty. for Iron ore	Standard Qty. for Overburden (OB)
SME	40.00 per kg.	2.4 kg per tonne	1.9 kg per cubic- meter
Detonators	20.00 per piece	2 pcs per tonne	2 pcs per cubic- meter

The standard stripping ratio is 3:1 (means 3 cubic- meter of overburden soil to be removed to get one tonne of coal).

During the month of December 2023, the company produces 20,000 tonnes of coal and 58,000 cubic- meter of OB. The quantity of explosive materials used and paid for the month is as below:

Material	Quantity	Amount (₹)
SME	1,67,200 kg.	63,53,600
Detonators	1,18,400 pcs	24,27,200

Explosive suppliers are paid for the explosive materials on the basis of performance of the explosives which is termed as powder factor. One of the suppliers has presented

their bill for explosive supplied for the month of December 2023. You being a bill passing officer of EML is required to COMPUTE the material price variance, material quantity variance and material cost variance.

SOLUTION:

Workings:

1. **Calculation of Standard Qty of Explosives and Detonators for actual output:**

	Particulars	Coal	Overburden (OB)	Total
SME:				
A	Actual Output	20,000 tonne	58,000 M^3	
B	Standard Qty per unit	2.4 kg Per tonne	1.9 kg Per M^3	
C	**Standard Qty for actual production [A × B]**	**48,000 kg**	**1,10,200 kg**	**1,58,200 kg**
Detonators:				
D	Standard Qty per unit	2 pcs/ tonne	2 pcs/ M^3	
E	**Standard Qty for actual production [A × D]**	**40,000 pcs**	**1,16,000 pcs**	**1,56,000 pcs**

2. **Calculation of Actual Price per unit of materials:**

Material	Quantity [A]	Amount (₹) [B]	Rate (₹) [C = B÷A]
SME	1,67,200 kg	63,53,600	38.00
Detonators	1,18,400 pcs	24,27,200	20.50

Computation of material price variance:

Material Price Variance = Actual Qty × (Standard Price - Actual Price)

SME = 1,67,200 kg. × (₹ 40 – ₹ 38) = ₹ 3,34,400 (F)

Detonators = 1,18,400 pcs × (₹ 20 – ₹ 20.5) = ₹ 59,200 (A)

Total = ₹ 2,75,200 (F)

Computation of material quantity variance:

Material Qty. Variance = Standard Price × (Standard Qty for actual output – Actual Qty.)

SME = ₹ 40 × (1,58,200 kg. - 1,67,200 kg.) = ₹ 3,60,000 (A)

Detonators = ₹ 20 × (1,56,000 pcs -1,18,400 pcs) = ₹ 7,52,000 (F)

Total = ₹ 3,92,000 (F)

Computation of material cost variance:

Material cost variance = Standard cost – Actual Cost

Or, (Standard Price × Standard Qty) – (Actual Price × Actual Qty.)

SME = (₹ 40 × 1,58,200 kg) – (₹ 38 × 1,67,200 kg.)

= ₹ 63,28,000 – ₹ 63,53,600 = ₹ 25,600 (A)

Detonators = (₹ 20 × 1,56,000 pcs) – (₹ 20.50 × 1,18,400 pcs)

= ₹ 31,20,000 – ₹ 24,27,200 = 6,92,800 (F)

Total = ₹ 6,67,200 (F)

PROBLEM – 2D: (RTP JAN 25)

Banku manufacturing Ltd. is engaged in producing a item named 'ABC'. It produces 'ABC' in a batch of 100 kgs. Standard material inputs required for 100 kgs. of 'ABC' are as below:

Material	Quantity (in kgs.)	Rate per kg. (in ₹)
A	50	110
B	30	320
C	30	460

During the month of April, 2024, actual production was 50,000 kgs. of 'ABC' for which the actual quantities of material used for a batch and the prices paid thereof are as under:

Material	Quantity (in kgs.)	Rate per kg. (in ₹)
A	60	115
B	25	330
C	20	405

You are required to CALCULATE the following variances based on the above given information for the month of April, 2024 for Banku manufacturing Ltd.:

(i) Material Cost Variance;

(ii) Material Price Variance;

(iii)Material Usage Variance;

(iv)Material Mix Variance;

(v) Material Yield Variance.

SOLUTION:

Material	SQ * × SP (₹)	AQ ** × SP (₹)	AQ ** × AP (₹)	RSQ *** × SP (₹)
A	27,50,000	33,00,000	34,50,000	26,24,600
	(25,000 kg. × ₹ 110)	(30,000 kg. × ₹ 110)	(30,000 kg. × ₹ 115)	(23,860 kg. × ₹ 110)
B	48,00,000	40,00,000	41,25,000	45,82,400
	(15,000 kg. × ₹ 320)	(12,500 kg. × ₹ 320)	(12,500 kg. × ₹ 320)	(14,320 kg. × ₹ 320)
C	69,00,000	46,00,000	40,50,000	65,87,200
	(15,000 kg. × ₹ 460)	(10,000 kg. × ₹ 460)	(10,000 kg. × ₹ 405)	(14,320 kg. × ₹ 460)
Total	**1,44,50,000**	**1,19,00,000**	**1,16,25,000**	**1,37,94,200**

* Standard Quantity of materials for actual output:

A	$= \frac{50\ kgs}{100\ kgs} \times 50{,}000\ kgs = 25{,}000\ kgs$
B	$= \frac{30\ kgs}{100\ kgs} \times 50{,}000\ kgs = 15{,}000\ kgs$
C	$= \frac{30\ kgs}{100\ kgs} \times 50{,}000\ kgs = 15{,}000\ kgs$

** Actual Quantity of Material used for actual output:

A	$= \frac{60\ kgs}{100\ kgs} \times 50{,}000\ kgs = 30{,}000\ kgs$
B	$= \frac{25\ kgs}{100\ kgs} \times 50{,}000\ kgs = 12{,}500\ kgs$
C	$= \frac{20\ kgs}{100\ kgs} \times 50{,}000\ kgs = 10{,}000\ kgs$

***Revised Standard Quantity (RSQ):

A	$= \frac{50\ kgs}{110\ kgs} \times 52{,}500\ kgs = 23{,}860\ kgs$
B	$= \frac{30\ kgs}{110\ kgs} \times 52{,}500\ kgs = 14{,}320\ kgs$
C	$= \frac{30\ kgs}{110\ kgs} \times 52{,}500\ kgs = 14{,}320\ kgs$

(i) Material Cost Variance = (SQ × SP) – (AQ × AP)

A	= ₹ 27,50,000 - ₹ 34,50,000	= ₹ 7,00,000 (A)
B	= ₹ 48,00,000 - ₹ 41,25,000	= ₹ 6,75,000 (F)
C	= ₹ 69,00,000 - ₹ 40,50,000	= ₹ 28,50,000 (F)
		= ₹ 28,25,000 (F)

(ii) Material Price Variance = Actual Quantity (Standard Price – Actual Price)

= (AQ × SP) – (AQ × AP)

A	= ₹ 33,00,000 - ₹ 34,50,000	= ₹ 1,50,000 (A)
B	= ₹ 40,00,000 - ₹ 41,25,000	= ₹ 1,25,000 (A)
C	= ₹ 46,00,000 - ₹ 40,50,000	= ₹ 5,50,000 (F)
		= ₹ 2,75,000 (F)

(iii) Material Usage Variance = Standard Price (Standard Qty. – Actual Qty.)

Or = (SQ × SP) – (AQ × SP)

A	= ₹ 27,50,000 - ₹ 33,00,000	= ₹ 5,50,000 (A)
B	= ₹ 48,00,000 - ₹ 40,00,000	= ₹ 8,00,000 (F)
C	= ₹ 69,00,000 - ₹ 46,00,000	= ₹ 23,00,000 (F)
		= ₹ 25,50,000 (F)

(iv) Material Mix Variance = Standard Price (Revised Standard Qty. – Actual Qty.)

Or = (RSQ × SP) – (AQ × SP)

A	= ₹ 26,24,600 - ₹ 33,00,000	= ₹ 6,75,400 (A)
B	= ₹ 45,82,400 - ₹ 40,00,000	= ₹ 5,82,400 (F)
C	= ₹ 65,87,200 - ₹ 46,00,000	= ₹ 19,87,200 (F)
		= ₹ 18,94,200 (F)

(v) Material Yield Variance = Standard Price (Standard Qty. – Revised Standard Qty.)

Or = (SQ × SP) – (RSQ × SP)

A	= ₹ 27,50,000 - ₹ 26,24,600	= ₹ 1,25,400 (F)
B	= ₹ 48,00,000 - ₹ 45,82,400	= ₹ 2,17,600 (F)
C	= ₹ 69,00,000 - ₹ 65,87,200	= ₹ 3,12,800 (F)
		= ₹ 6,55,800 (F)

PROBLEM – 3:

ABC Ltd. produces an article by lending two basic raw materials. It operates a standard costing system and the following standards have been set for raw materials:

Material	Standard mix	Standard price (₹ per kg)
A	40%	4
B	60%	3

The standard loss in processing is 15%. During April, the company produced 1,700 kgs. of finished output. The position of stock and purchases for the month of April are as under:

Material	Stock on 01.04.20x1	Stock on 30.04.20x1	Purchased during April 2021	
	(Kg.)	(Kg.)	(Kg.)	(₹)
A	35	5	800	3,400
B	40	50	1,200	3,000

Opening stock of material is valued at standard price. CALCULATE the following variances:

i. Material price variance

ii. Material usage variance

iii. Material yield variance Material mix variance

iv. Total Material cost variance

SOLUTION:

Types of material	Standard			Actual		
	Qty. (Kg.)	Rate (₹)	Amount (₹)	Qty. (Kg.)	Rate (₹)	Amount (₹)
A @ 40%	800	4	3,200	35	4	140.00
				795	4.25	3,378.75
B @ 60%	1200	3	3,600	40	3	120.00
				1,150	2.50	2,875.00
Input	**2,000**		**6,800**	**2,020**		**6,513.75**
Loss @ 15%	(300)			(320)		
Output	**1700**		**6800**	**1700**		**6513.75**

(i) Material Cost Variance

= (SQ × SP) – (AQ × AP) = ₹ 6,800 – ₹ 6,513.75 = 286.25 (F)

(ii) Material price variance

= (SP – AP) x AQ

Material A: = (₹ 4 – ₹ 4.25) x 795 kg = ₹ 198.75 (A)

Material B: = (₹ 3 – ₹ 2.50) x 1,150 kg. = ₹ 575 (F)

Total = ₹ 198.75 (A) + ₹ 575 (F) = ₹ 376.25(F)

(iii)Material usage variance

= (SQ – AQ) x SP

Material A	= (800 – 830) × ₹ 4	= ₹ 120 (A)
Material B	= (1,200 – 1,190) × ₹ 3	= ₹ 30 (F)
		₹ 90 (A)

(iv)Material mix variance

= (RAQ – AQ) x SP

Material A = (808 – 830) × ₹ 4 = 88 (A)

Material B = (1,212 – 1,190) × ₹ 3 = 66 (F)

₹ 22 (A)

(v) Material yield variance

= (SQ – RAQ) x SP

Material A = (800 – 808) × ₹ 4 = ₹ 32 (A)

Material B = (1,200 – 1,212) × ₹ 3 = ₹ 36 (A)

₹ 68 (A)

PROBLEM – 4

The standard and actual figures of a firm are as under:

Standard time for the job	**1,000 hours**
Standard rate per hour	**₹ 50**
Actual time taken	**900 hours**
Actual wages paid	**₹ 36,000**

CALCULATE variances.

SOLUTION:

SH = 1000 Hours

SR = ₹ 50

AH = 900 Hours

AR = ₹ 36,000 ÷ 900 hours = ₹ 40

Variances

(i) Total labour cost variance = (SH x SR) – (AH X AR) = {(₹ 50 × 1,000 hours) – ₹ 36,000}

= (₹ 50,000 – ₹ 36,000) = ₹ 14,000 (F)

(ii) Labour Rate variance = (SR – AR) x AH = 900 hours (₹ 50 – ₹ 40) = ₹ 9,000 (F)

(iii) Efficiency variance = (SH – AH) x SR

= ₹ 50 (1,000 Hours – 900 Hours) = ₹ 5,000 (F)

PROBLEM – 5:

The standard output of product 'EXE' is 25 units per hour in manufacturing department of a company employing 100 workers. The standard wage rate per labour hour is ₹6. In a 42 hours week, the department produced 1,040 units of 'EXE' despite 5% of the time paid being lost due to an abnormal reason. The hourly wages actually paid were ₹6.20, ₹6 and ₹5.70 respectively to 10, 30 and 60 of the workers.

CALCULATE relevant labour variances.

SOLUTION:

Working Notes:

1. **Calculation of standard man hours**

When 100 worker works for 1 Hour, then the std. output is 25 units.

Standard man hour per unit = $\frac{100 \text{ Hour}}{25 \text{ units}}$ = 4 Hours

2. **Calculation of standard man hours for actual output**

Total standard man hours = 1,040 units × 4 hours = 4,160 hours

Standard for actual			Actual					
Hours	Rate (₹)	Amount (₹)	No. of workers	Actual hours paid	Idle time hours	Actual Hours Worked	Rate (₹)	Amount paid (₹)
4,160	6	24,960	10	420	21	399	6.20	2,604
			30	1,260	63	1,197	6.00	7,560
			60	2,520	126	2,394	5.70	14,364
4,160	**6**	**24,960**	**100**	**4,200**	**210**	**3,990**		**24,528**

1. **Labour cost variance**

(SH x SR) – (AH X AR) = ₹ 24,960 – ₹ 24,528 = ₹ 432 (F)

2. **Labour rate variance**

= (SR – AR) × AH Paid

= (₹ 6 – ₹ 6.20) × 420 = 84 (A)

= (₹ 6 - ₹ 6) × 1260 = NIL

= (₹ 6 - ₹ 5.70) × 2,520 = 756 (F)

= 672 (F)

3. Labour efficiency variance

= (SH – AH) × SR

= (4,160 – 3,990) × ₹ 6 = 1,020 (F)

4. Labour Idle time variance

= Idle Hours × SR

= 210 × ₹ 6 = 1,260 (A)

PROBLEM – 6:

Labour type	Std hrs per unit	Std rate	Act hrs	Act rate
Un Skilled	2 hrs	₹ 10	22,000 hrs	₹ 11
Skilled	1 hr	₹ 20	8,000 hrs	₹ 22

Workers produced 11000 units. Find out Labour variances.

SOLUTION:

	SH	SR	AH	AR
Unskilled A	22000 Hours (11000 x 2)	₹ 10	22000 Hours	₹ 11
Skilled B	11000 Hours (11000 x 1)	₹ 20	8000 Hours	₹ 22

Labour cost variance

= (SH x SR) – (AH – AR)

Unskilled = 22000 x ₹ 10 – 22000 x ₹ 11

= ₹ 22000 – ₹ 242000 = ₹ 22000 (A)

Skilled = (11000 H x ₹ 20) – (8000 H x ₹ 22)

= ₹ 220000 – ₹ 176000 = ₹ 44000 (F)

Total = ₹ 22000 (F)

Labour rate variance

(SR – AR) x Actual Hours

Un Skilled = (₹ 10 – ₹ 11) x 22000 Hours

= ₹ 22000 (A)

Labour efficiency Variance

(SH – AH) x Standard rate

Un Skilled = (22000 H – 22000 H) x ₹ 10

= 0

skilled = (20 – 22) x 8000 Hours
= ₹ 16000 (A)

skilled = (11000 H – 8000 H) x ₹ 20
= (3000 H x ₹ 20)
= ₹ 60000 (F)

Labour Gang variance
(RAH – AH) x Standard Rate
Un Skilled = (20000 – 22000) x ₹ 10
= ₹ 20000 (A)

skilled = (10000 – 8000) x ₹ 20
= ₹ 40000 (F)
Total ₹ 20000 (F)

Labour yield Variance
(SH – RAH) x Standard rate
Un Skilled = (22000 H – 20000 H) x ₹ 10
= 20000 (F)
skilled = (11000 H – 10000 H) x ₹ 20
= 20000 (F)
Total ₹ 40000 (F)

PROBLEM – 6A:

The standard labour employment and the actual labour engaged in a week for a job are as under:

	Skilled workers	Semi-skilled workers	Unskilled workers
Standard no. of workers in the gang	32	12	6
Actual no. of workers employed	28	18	4
Standard wage rate per hour	3	2	1
Actual wage rate per hour	4	3	2

During the 40 hours working week, the gang produced 1,800 standard labour hours of work. CALCULATE:

i. Labour Cost Variance

ii. Labour Rate Variance

iii. Labour Mix Variance

iv. Labour Efficiency Variance

v. Labour Yield Variance

SOLUTION:

Workings:

1. Standard hours (SH) for actual hours produced are calculated as below:

Skilled = $\frac{1,800}{2,000}$ x 1,280 = 1,152 Hours

Semi-Skilled = $\frac{1,800}{2,000}$ x 480 = 4322 Hours

Unskilled = $\frac{1,800}{2,000}$ x 240 = 216 Hours

2. Actual hours (AH) paid are calculated as below:

Category	No. of Worker	Hours in a week	Total Hours
Skilled	28	40	1,120
Semi-skilled	18	40	720
Unskilled	4	40	160
			2,000

3. For 40 hours week total Revised standard hours (RSH) will be calculated asbelow:

Category	No. of Worker	Hours in a week	Total Hours
Skilled	32	40	1,280
Semi-skilled	12	40	480
Unskilled	6	40	240
			2,000

Calculations

Category of workers	SH × SR	AH × SR	AH × AR	RSH × SR
Skilled	1,152 × 3 = 3,456	1,120 × 3 = 3,360	1,120 × 4 = 4,480	1,280 × 3 = 3,840
Semi-skilled	432 × 2 = 864	720 × 2 = 1,440	720 × 3 = 2,160	480 × 2 = 960
Unskilled	216 × 1 = 216	160 × 1 = 160	160 × 2 = 320	240 × 1 = 240
Total	**₹ 4,536**	**₹ 4,960**	**₹ 6,960**	**₹ 5,040**

(i) Labour Cost Variance = Standard Cost for hours worked – Actual cost paid

= (SH × SR) – (AH × AR)

= ₹ 4,536 – ₹ 6,960 = ₹ 2,424 (A)

(ii) Labour Rate Variance = AH (SR – AR) or (AH × SR) – (AH × AR)

Skilled = ₹ 3,360 – ₹ 4,480 = ₹ 1,120 (A)

Semi-skilled = ₹ 1,440 – ₹ 2,160 = ₹ 720 (A)

Unskilled = 160 - 320 = ₹ 160 (A)

2,000 (A)

(iii) Labour Efficiency Variance = SR (SH – AH) or (SR × SH) – (SR × AH)

Skilled = ₹ 3,456 – ₹ 3,360 = ₹ 96 (F)

Semi-skilled = ₹ 864 – ₹ 1,440 = ₹ 576 (A)

Unskilled = ₹ 216 – ₹ 160 = ₹ 56 (F)

₹ 424 (A)

(iv) Labour Mix Variance = SR (RSH – AH) or (SR × RSH) – (SR × AH)

Skilled = ₹ 3,840 – ₹ 3,360 = ₹ 480 (F)

Semi-skilled = ₹ 960 – ₹ 1,440 = ₹ 480 (A)

Unskilled = ₹ 240 – ₹ 160 = ₹ 80 (F)

= **₹ 80 (F)**

(v) Labour Yield Variance = SR (SH – RSH) or (SR × SH – SR × RSH)

Skilled = ₹ 3,456 - ₹ 3,840 = ₹ 384 (A)

Semi-skilled = ₹ 864 – ₹ 960 = ₹ 96 (A)

Unskilled = ₹ 216 – ₹ 240 = ₹ 24 (A) **₹ 504 (A)**

Check

(i) LCV = LRV + LEV

₹ 2,424 (A) = ₹ 2,000 (A) + ₹ 424 (A)

(ii) LEV = LMV + LYV

₹ 424 (A) = ₹ 80 (F) + ₹ 504 (A)

PROBLEM – 7:

NPX Ltd. uses standard costing system for the manufacturing of its product X. The following is the budget data given in relation to labour hours for the 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, a total of 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:

1. **Labour Variances.**
2. **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.**

SOLUTION:

Working Notes:

	Standard for actual			Actual		
	Hours	**Rate (₹)**	**Amount (₹)**	**Hours Paid**	**Rate (₹)**	**Amount (₹)**
Skilled	20,000	6	1,20,000	18,000	7	1,26,000
Semi-skilled	30,000	4	1,20,000	33,000	3.5	1,15,500
Unskilled	50,000	3	1,50,000	58,000	4	2,32,000
	1,00,000		**3,90,000**	**1,09,000**		**4,73,500**

	Idle Hours	**Hours worked**
Skilled	500	17,500
Semi-skilled	700	32,300
Unskilled	800	57,200
	2,000	**1,07,000**

(a) (i) Labour Cost Variance= (SH × SR – AH × AR)

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 = (SR – AR) × AHPaid

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 = (SH – AH) × SR

Skilled	(20,000 H – 17,500 H) × ₹ 6	=	₹ 15,000 (F)
Semi- Skilled	(30,000 H – 32,300 H) × ₹ 4	=	₹ 9,200 (A)
Unskilled	(50,000 H – 57,200 H) × ₹ 3	=	₹ 21,600 (A)
Total			**₹ 15,800 (A)**

Labour Idle Time Variance = (Idle Hours × SR)

Skilled	500 H × ₹ 6	=	₹ 3,000 (A)
Semi- Skilled	700 H × ₹ 4	=	₹ 2,800 (A)
Unskilled	800 H × ₹ 3	=	₹ 2,400 (A)
Total			**₹ 8,200 (A)**

(iv) Labour Mix Variance = (RAH – AH $_{Worked}$) × SR

$$\text{Revised Actual Hours (RAH)} = \frac{\text{Standard Hours}}{\text{Total Standard Hours}} \times \text{Total Actual Hours}$$

Skilled $\left(\frac{20,000\text{ H}}{1,00,000\text{ H}} \times 1,07,000\text{ H} - 17,500\text{ H}\right) \times ₹\ 6$ = ₹ 23,400 (F)

Semi-Skilled $\left(\frac{30,000\text{ H}}{1,00,000\text{ H}} \times 1,07,000\text{ H} - 32,300\text{ H}\right) \times ₹\ 4$ = ₹ 800 (A)

Un Skilled $\left(\frac{50,000\text{ H}}{1,00,000\text{ H}} \times 1,07,000\text{ H} - 57,200\text{ H}\right) \times ₹\ 3$ = ₹ 11,100 (A)

Total **₹ 11,500 (F)**

(v) Labour Yield Variance = (SH – RAH) × SR

Skilled	$\left(20,000\text{ H} - \frac{20,000\text{ H}}{1,00,000\text{ H}} \times 1,07,000\text{ H}\right) \times ₹\ 6$	=	₹ 8,400 (A)
Semi-Skilled	$\left(30,000\text{ H} - \frac{30,000\text{ H}}{1,00,000\text{ H}} \times 1,07,000\text{ H}\right) \times ₹\ 4$	=	₹ 8,400 (A)
Un Skilled	$\left(50,000\text{ H} - \frac{50,000\text{ H}}{1,00,000\text{ H}} \times 1,07,000\text{ H}\right) \times ₹\ 3$	=	₹ 10,500 (A)
Total			**₹ 27,300 (A)**

(b) Labour Rate Variance = (SR – AR) × AHPaid

Skilled	(₹ 6 – ₹ 5.5) × 5,000 H	₹ 2500 (F)
	(₹ 6 – ₹ 7) × 13,000 H	₹ 13000 (A)
		₹ 10,500 (A)
Semi- Skilled	(₹ 4 – ₹ 3.5) × 33,000 H	₹ 16,500 (F)
Unskilled	(₹ 3 – ₹ 4) × 58,000 H	₹ 58,000 (A)
Total		**₹ 52,000 (A)**

PROBLEM – 8: **(PYP SEP 24)**

BG company produces a standard product and sold in a packet of 10 kg. The standard cost card per pack is as follows:

Direct Material:

A - 4 kg @ ₹ 50 per kg

B - 8 kg @ ₹ 40 per kg Direct Labour:

6 hours @ ₹ 20 per hour

The company manufactured and sold 1,600 packets during the month. Actual data for material and labour recorded as under.

Direct Material:

A - 7,000 kg @ ₹ 40

B - 12,500 kg @ ₹ 45

Labour hours paid for two different categories of workers:

Skilled 6,000 hours @ ₹ 25

Semi-skilled 4,000 hours @ ₹ 20

5% of the time paid was lost due to an abnormal reason.

Calculate the following variances indicating their nature (Favourable or Adverse):

(i) Material cost variances

(ii) Material price variances

(iii) Material usage variances

(iv) Material mix variances

(v) Material yield variances

(vi) Labour cost variances

(vii) Labour rate variances

(viii) Labour efficiency variances

(ix)Labour Idle time variances

SOLUTION:

	standard			Actual		
	Qty (Kg) [SQ]	Price (₹) [SP]	Amount (₹) [SQ x SP]	Qty (Kg) [AQ]	Price (₹) [AP]	Amount (₹) [AQ x AP]
A	6,400	50	3,20,000	7,000	40	2,80,000
B	12,800	40	5,12,000	12,500	45	5,62,500
	19,200		**8,32,000**	**19,500**		**8,42,500**

Material Cost Variance = (SQ x SP – AQ x AP)

= ₹ 8,32,000 – ₹ 8,42,500 = **₹ 10,500 (A)**

Material Price Variance	=	(SP – AP) x AQ
A (₹ 50 – ₹ 40) × 7,000 Kg	=	₹ 70,000 (F)
B (₹ 40 – ₹ 45) × 12,500 Kg	=	₹ 62,500 (A)
		₹ 7,500 (F)

Material Usage Variance	=	SP x (SQ – AQ)
A ₹ 50 × (6,400 Kg – 7000 Kg)	=	₹ 30,000 (A)
B ₹ 40 × (12,800 Kg – 12,500 Kg)	=	₹ 12,000 (F)
		₹ 18,000 (A)

Material Mix Variance = (RSQ - AQ) x SP

A = (6,500 Kg – 7,000 Kg) x ₹ 50	=	₹ 25,000 (A)
B = (13,000 Kg – 12,500 Kg) x ₹ 40	=	₹ 20,000 (F)
		₹ 5,000 (A)

Material Yield Variance= (SQ – RSQ) x SP

A = (6,400 Kg – 6,500 Kg) x ₹ 50	=	₹ 5,000 (A)
B = (12,800 Kg – 13,000 Kg) x ₹ 40	=	₹ 8,000 (A)
		₹ 13,000 (A)

Labour

Standard Hours for actual Production = 6 Hours x 1,600 Units = 9,600 Hours

Labour Cost Variance	=	(SH x SR – AH x AR)
	=	9,600 Hours x ₹ 20 – {(6,000 Hours x ₹ 25) + (4,000 Hours x ₹ 20)}
	=	₹ 1,92,000 – ₹ 2,30,000 = ₹ 38,000 (A)
Labour Rate Variance	=	(SR – AR) x AH
	=	(₹ 20 - ₹ 25) x 6,000 Hours = ₹ 30,000 (A)
Efficiency Variance	=	(SH – AH worked) x SR
	=	(9,600 hrs – 9,500 hrs) x ₹ 20 = ₹ 2,000 (F)
Idle time Variance	=	Idle Hours X SR
	=	(AH – AH#) × SR
		= (10,000 hours – 9,500 hours) x ₹ 20 = ₹ 10,000 (A)

AH# refers to Actual Hours Worked

PROBLEM – 8A:

The following standards have been set to manufacture a product:

Direct Material:	
2 units of A @ ₹ 4 per unit	**8.00**
3 units of B @ ₹ 3 per unit	**9.00**
15 units of C @ ₹ 1 per unit	**15.00**
	32.00
Direct Labour: 3 hours @ ₹ 8 per hour	**24.00**
Total standard prime cost	**56.00**

The company manufactured and sold 6,000 units of the product during the year. Direct material costs were as follows:

12,500 units of A at ₹ 4.40 per unit 18,000 units of B at ₹ 2.80 per unit 88,500 units of C at ₹ 1.20 per unit.

The company worked 17,500 direct labour hours during the year. For 2,500 of these hours, the company paid at ₹ 12 per hour while for the remaining, the wages were paid at standard rate.

CALCULATE

i. Materials price variance & Usage variance

ii. Labour rate &Efficiency variances.

SOLUTION:

For Material Cost Variances

	SQ × SP	**AQ × AP**	**AQ × SP**
A	12,000 × 4 = ₹ 48,000	12,500 × 4.40 = ₹ 55,000	12,500 × 4 = ₹ 50,000
B	18,000 × 3 = ₹ 54,000	18,000 × 2.80 = ₹ 50,400	18,000 × 3 = ₹ 54,000
C	90,000 × 1 = ₹ 90,000	88,500 × 1.20 = ₹ 1,06,200	88,500 × 1 = ₹ 88,500
Total	**₹ 1,92,000**	**₹ 2,11,600**	**₹ 1,92,500**

Variances:

Material Price Variance = Actual quantity (Standard price – Actual price)

Or, = (AQ × SP) – (AQ × AP)

Or, = ₹ 1,92,500 – ₹ 2,11,600

= **₹ 19,100 (A)**

Material Usage Variance = Standard Price (Standard Quantity – Actual Quantity)

Or, = (SP × SQ) – (SP × AQ)

Or, = ₹ 1,92,000 – ₹ 1,92,500 = **₹ 500 (A)**

For Labour Cost Variance :

	SH × SR	**AH × AR**	**AH × SR**
Labour	(6,000 H × 3) × ₹ 8 = 1,44,000	2,500 H × ₹ 12 = ₹ 30,000 15,000 H × ₹ 8 = ₹ 1,20,000	17,500 H × ₹ 8 = ₹ 1,40,000
Total	**₹ 1,44,000**	**₹ 1,50,000**	**₹ 1,40,000**

Variances:

Labour Rate Variance: Actual Hours (Standard Rate – Actual Rate)

Or, = (AH × SR) – (AH × AR)

Or, = ₹ 1,40,000 – ₹ 1,50,000

= ₹ 10,000 (A)

Labour Efficiency Variance: Standard Rate (Standard Hours – Actual Hours)

Or, = (SR × SH) – (SR × AH)

Or, = ₹ 1,44,000 – ₹ 1,40,000

= ₹ 4,000 (F)

PROBLEM – 8B:

The following information is available from the cost records of Novell & Co. for the month of March 20x1:

Materials purchased	**20,000 units @ ₹88,000**
Materials consumed	**19,000 units**
Actual wages paid for 4,950 Hours	**₹ 24,750**
Units produced	**1,800 units**
Standard rates and pieces are:	
Direct material	**₹ 4 per unit**
Standard output	**10 number for one unit**
Direct labour rate	**₹ 4.00 per hour**
Standard requirement	**2.5 hours per unit**

You are required to CALCULATE relevant material and labour variance for the month.

SOLUTION:

Material variances

1. Material cost variance

= (Standard qty for actual output* × Standard price) – (Actual qty. × Actual price)

= (18,000 H × ₹ 4) – (19,000 H × ₹ 4.40)

= ₹ 72,000 – ₹ 83,600 = ₹ 11,600 (A)

* Standard qty for actual output = 1,800 × 10 = 18,000 units

2. Material price variance

= (Standard price – Actual price) × Actual qty.

= (₹ 4 - ₹ 4.40) × 19,000 H = 0.40 × 19,000 H = ₹ 7,600 (A)

3. Material usage variance

= (Standard qty. – Actual qty.) × Standard price

= (18,000 H – 19,000 H) × 4 = 1,000 × 4 = ₹ 4,000 (A)

Labour variances

1. Labour cost variance

= (Standard Hours for actual output* × Std. price) – Actual cost

= (4,500 H × ₹ 4) – ₹ 24,750

= ₹ 18,000 – ₹ 24,750 = ₹ 6,750 (A)

*Standard Hours for actual output = 1,800 × 2.5 = 4,500 Hours

2. Labour rate variance

= (Standard rate – Actual rate) × Actual Hours

= (₹ 4 – ₹ 5) × 4,950 Hours

= ₹ 4,950 (A)

3. Labour efficiency variance

= (Standard Hours for actual output – Actual Hours) × Standard rate

= (4,500 H – 4,950 H) × ₹ 4 = ₹ 1,800 (A)

PROBLEM – 9:

From the following information of G Ltd.,

CALCULATE

i. Variable Overhead Cost Variance;

ii. Variable Overhead Expenditure Variance and

iii. Variable Overhead Efficiency Variance:

Budgeted production	**6,000 units**
Budgeted variable overhead	**₹ 1,20,000**
Standard time for one unit of output	**2 hours**
Actual production	**5,900 units**
Actual overhead incurred	**₹ 1,22,000**
Actual hours worked	**11,600 hours**

SOLUTION:

SH = 11800 Hours (5900 Units x 2 Hours)

SR = ₹ 10 Per Hour (₹ 120000 ÷ 6000 Units x 2 Hour)

AH = 11600 Hours

AR = ₹ 10.5172 (₹ 122000 ÷ 11600 Hours)

Variable Overhead Cost Variance:

= (SH x SR) – (AH x SR)

= (11800 Hours x ₹ 10) – (11600 Hours x ₹ 10.5172)

= ₹ 118000 - ₹ 122000 = ₹ 4000 (A)

Variable Overhead Expenditure Variance:

= (SR – AR) x AH

= (₹ 10 - ₹ 10.5172) x 11600 Hours = ₹ 6000 (A)

Variable Overhead Efficiency Variance:

= (SH – AH) x SR

= (11800 Hours - 11600 Hours) x ₹ 10 = ₹ 2000 (F)

PROBLEM – 9A:

The following data for Pijee Ltd. is given:

	Budget	Actual
Production (in units)	**400**	**360**
Man hours to produce above	**8,000**	**7,000**
Variable overheads (in ₹)	**10,000**	**9,150**

CALCULATE relevant Variable overhead variances.

SOLUTION:

Working Notes:

Calculation of standard variable overhead per unit

$$= \frac{\text{Budgeted Variable overhead}}{\text{Budgeted production}} = \frac{10,000}{400} = ₹\,25 \text{ per unit}$$

Calculation of standard variable overhead per hour

$$= \frac{\text{Budgeted Variable overhead}}{\text{Budgeted man hours}} = \frac{10,000}{8,000} = ₹\,1.25 \text{ per unit}$$

Calculation of standard variable overhead for actual output

= Actual output × Standard variable overhead per unit

= 360 units × ₹ 25 = ₹ 9,000

Calculation of Budgeted variable overhead based on actual hours worked

= Actual hours worked × Standard variable overhead per hour

= 7,000 × 1.25 = ₹ 8,750

Calculation of standard hours for actual output

= Actual output × Standard hours per unit

= 360 units × 20 hours = 7,200 hours

Variable overhead cost variance

= (SH x SR) – (AH x SR)

= ₹ 9,000 – ₹ 9,150 = ₹ 150 (A)

Variable overhead expenditure variance

= (SR – AR) x AH

= ₹ 8,750 – ₹ 9,150 = ₹ 400 (A)

Variable overhead efficiency variance

= (SH – AH) x SR

= (7,200 – 7,000) × 1.25 = ₹ 250 (F)

PROBLEM – 10:

The cost detail of J&G Ltd. for the month of September, 20x1 is as follows:

Particulars	Budgeted	Actual
Fixed overhead	₹ 15,00,000	₹ 15,60,000
Units of production	7,500	7,800
Standard time for one unit	2 hours	-
Actual hours worked	-	16,000 hours

Required:

CALCULATE

i. Fixed Overhead Cost Variance

ii. Fixed Overhead Expenditure Variance

iii. Fixed Overhead Volume Variance

iv. Fixed Overhead Efficiency Variance and

v. Fixed Overhead Capacity Variance.

SOLUTION:

SH = 15600 Hours (7800 units x 2 Hours)

SR = (₹ 1500000 ÷ 7500 units x 2 Hours) = ₹ 100 Per Hour

Actual Fixed Overheads = ₹ 1560000 (Given)

Budgeted Fixed Overheads = ₹ 1500000 (Given)

Actual Hours = 16000 Hours (Given)

(i) Fixed Overhead Cost Variance:

= Overhead absorbed for actual production – Actual overhead incurred

= [15600 Hours x ₹ 100] - ₹ 15,60,000 = 0

(ii) Fixed Overhead Expenditure Variance:

= Budgeted overhead – Actual overhead

= ₹ 15,00,000 - ₹ 15,60,000 = ₹ 60,000 (A)

(iii) Fixed Overhead Volume Variance:

= Absorbed overhead – Budgeted overhead

= [15600 Hours x ₹ 100] - ₹ 15,00,000 = ₹ 60000 (F)

(iv) Fixed Overhead Efficiency Variance:

= Absorbed overhead – (AH x SR)

= [15600 Hours x ₹ 100] - [16000 Hours x ₹ 100]= ₹ 40000 (A)

(v) Fixed Overhead Capacity Variance:

= (AH x SR) – Budgeted Fixed Overheads

= [16000 Hours x ₹ 100] - ₹ 1500000 = ₹ 100000 (F)

PROBLEM -10A:

S.V. Ltd. has furnished the following data:

	Budget	Actual (for the month of July)
No. of working days	25	27
Production in units	20,000	22,000
Fixed overheads	₹30,000	₹31,000

Budgeted fixed overhead rate is ₹1.00 per hour. In July, the actual hours worked were 31,500.

CALCULATE the following variances:

i. Expenditure variance.

ii. Volume variance.

iii. Total overhead variance.

SOLUTION:

For Fixed Overhead Variances

Actual fixed overhead incurred	₹ 31,000
Budgeted fixed overhead for the period	₹ 30,000
Standard fixed overhead for production (₹ 30,000 ÷ 20,000 units) × 22,000 units	₹ 33,000

Computation of Variances

(i) Fixed overhead expenditure variance:

= Budgeted fixed overhead – Actual fixed overhead

= ₹ 30,000 – ₹ 31,000 = ₹ 1,000 (A)

(ii) Fixed overhead volume variance:

= Standard fixed overhead – Budgeted fixedoverhead

= ₹ 33,000 – ₹ 30,000 = ₹ 3,000 (F)

(iii) Fixed overhead variance:

= Standard fixed overhead – Actual fixed overhead

= ₹ 33,000 – ₹ 31,000 = ₹ 2,000 (F)

PROBLEM – 11:

A company has a normal capacity of 120 machines, working 8 hours per day of 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 2021, 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.

COMPUTE the following Fixed Overhead variance:

1. **Efficiency variance**
2. **Capacity variance**
3. **Calendar variance**
4. **Expenditure variance**
5. **Volume variance**
6. **Total Fixed overhead variance**

SOLUTION:

Working Notes:

SH = 21220 Hours

SR = ₹ 6 Per Hour

Actual Fixed overhead = ₹ 142000 (Given)

Budgeted Fixed Overhead = ₹ 144000 (Given)

AH = 20160 Hours (840 machines hours × 24 days)

Revised Budgeted Fixed Overhead = ₹ 138240 (₹ 144000 x 24 Days ÷ 25 days)

1. **Total fixed overhead Variance**

   = Absorbed overhead – Actual overhead incurred

   = (SH x SR) - Actual overhead incurred

   = (21200 x ₹ 6) – ₹ 1,42,000 = ₹ 14,680 (A)

2. **Expenditure variance**

   = Budgeted overhead – Actual overhead

   = ₹ 1,44,000 – ₹ 1,42,000 = ₹ 2,000 (F)

3. **Volume variance**

   = Absorbed overhead – Budgeted overhead

   = ₹ 127320 – ₹ 1,44,000 = ₹ 16,680 (A)

4. **Efficiency variance**

   = Absorbed overhead – (AH x SR)

   = ₹ 127320 – (20160 Hours x ₹ 6) = ₹ 6360 (F)

5. **Capacity variance**

   = (AH x SR) - Revised Budgeted Fixed Overhead

   = (20160 Hours x ₹ 6) - ₹ 138240 = ₹ 17,280 (A)

6. **Calendar variance**

   = Revised Budgeted Fixed Overhead - Budgeted overhead

   = ₹ 138240 - ₹ 1,44,000 = ₹ 5,760 (A)

PROBLEM – 11A:

The following data has been collected from the cost records of a unit for computing the various fixed overhead variances for a period:

Number of budgeted working days	**25**
Budgeted man-hours per day	**6,000**
Output (budgeted) per man-hour (in units)	**1**

Fixed overhead cost as budgeted	**₹ 1,50,000**
Actual number of working days	**27**
Actual man-hours per day	**6,300**
Actual output per man-hour (in-units)	**0.9**
Actual fixed overhead incurred	**₹ 1,56,000**

CALCULATE fixed overhead variances:

i. Expenditure Variance

ii. Volume Variance,

iii. Fixed Cost Variance.

SOLUTION:

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 Hours × 27 days × 0.9) × (₹ 1,50,000 ÷ 1,50,000 units) = ₹ 1,53,090

(a) Fixed OverheadExpenditure Variance

= Budgeted fixed overhead – Actual fixed overhead

= ₹ 1,50,000 – ₹ 1,56,000 = ₹ 6,000 (A)

(b) Fixed OverheadVolume Variance

= Standard fixed overhead – Budgeted fixed overhead

= ₹ 1,53,090 – ₹ 1,50,000 = ₹ 3,090 (F)

(c) Fixed OverheadVariance

= Standard fixed overhead –Actual fixed overhead

= ₹ 1,53,090 – ₹ 1,56,000 = ₹ 2,910 (A)

PROBLEM – 12:

The following information was obtained from the records of a manufacturing unit using standard costing system.

Particulars	Standard	Actual
Production	**4,000 units**	**3,800 units**
Working days	**20**	**21**
Machine hours	**8,000 hours**	**7,800 hours**
Fixed Overhead	**₹ 4,00,000**	**₹ 3,90,000**

Variable Overhead	₹ 1,20,000	₹ 1,20,000

You are required to CALCULATE the following overhead variances:

a) Variable overhead variances

b) Fixed overhead variances

SOLUTION:

(a) Variable Overhead Variances

SH = 7600 Hours (8000 Hours x 3800 Units ÷ 4000 Units)

SR = ₹ 15 Per Hour (₹ 120000 ÷ 8000 Hours)

AH = 7800 Hours (Given)

AR = ₹ 15.3846 Per Hour (₹ 120000 ÷ 7800 Hours)

Variable overhead cost variance

= (SH x SR) – (AH x SR)

= (7600 Hours x ₹ 15) – (7800 Hours x ₹ 15.3846)

= ₹ 114000 – ₹ 120000 = ₹ 6000 (A)

Variable overhead expenditure variance

= (SR – AR) x AH

= (₹ 15 – ₹ 15.3846) x 7800 Hours = ₹ 3000 (A)

Variable overhead efficiency variance

= (SH – AH) x SR

= (7600 – 7800) × ₹ 15 = ₹ 3000 (A)

(b) Fixed Overhead Variance:

SH = 7600 Hours (8000 Hours x 3800 Units ÷ 4000 Units)

SR = ₹ 50 Per Hour (₹ 400000 ÷ 8000 Hours)

Actual Fixed Overheads = ₹ 390000

Budgeted Fixed Overheads = ₹ 400000

AH = 7800 Hours (Given)

Revised Budgeted Fixed Overhead = ₹ 420000 (₹ 400000 x 21 Days ÷ 20 days)

(i) Fixed Overhead Variance:

= Absorbed overhead – Actual overhead

= (7600 Hours x ₹ 50) - ₹ 3,90,000

= ₹ 3,80,000 - ₹ 3,90,000 = ₹ 10,000 (A)

(ii) Fixed Overhead Expenditure Variance:

= Budgeted Overhead – Actual Overhead

= ₹ 4,00,000 - ₹ 3,90,000 = ₹ 10,000 (F)

(iii) Fixed Overhead Volume Variance:

= Absorbed overhead – Budgeted Overhead

= ₹ 3,80,000 - ₹ 4,00,000 = ₹ 20,000 (A)

(iv) Fixed Overhead Efficiency Variance:

= Absorbed overhead – (AH x SR)

= ₹ 3,80,000 - ₹ 3,90,000 = ₹ 10,000 (A)

(v) Fixed Overhead Capacity Variance:

= (AH x SR) - Revised Budgeted Fixed Overhead

= (7800 Hours x ₹ 50) - ₹ 420000 = ₹ 30000 (A)

(vi) Fixed Overhead Calendar Variance:

= Revised Budgeted Fixed Overhead - Budgeted overhead

= ₹ 420000 - ₹ 400000 = ₹ 20000 (F)

PROBLEM – 13:

The overhead expense budget for a factory producing to a capacity of 200 units per month is as follows:

Description of overhead	Fixed cost per unit in ₹	Variable cost per unit in ₹	Total cost per unit in ₹
Power and fuel	1,000	500	1,500
Repair and maintenance	500	250	750
Printing and stationary	500	250	750
Other overheads	1,000	500	1,500
	₹3,000	₹1,500	4,500

The factory has actually produced only 100 units in a particular month. Details of overheads actually incurred have been provided by the accounts department and are as follows:

Description of overhead	Actual cost
Power and fuel	₹ 4,00,000
Repair and maintenance	₹ 2,00,000
Printing and stationary	₹ 1,75,000
Other overheads	₹ 3,75,000

You are required to CALCULATE the Overhead volume variance and the overhead expense variances.

SOLUTION:

Overheads volume variance (in case of fixed overhead):

= Absorbed overhead – Budgeted Overhead

= (₹ 3,000 × 100 units) – (₹ 3,000 × 200 units)

= ₹ 3,00,000 - ₹ 6,00,000 = ₹ 3,00,000 (Adverse)

Overhead expense variances

= 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)

Note: It is assumed that the actual Variable Overhead Per Unit is also ₹ 1500 Per unit.

PROBLEM – 13A:

XYZ Company has established the following standards for factory overheads.

Variable overhead per unit:	**₹ 10/-**
Fixed overheads per month	**₹ 1,00,000**

Capacity of the plant 20,000 units per month. The actual data for the month are as follows:

Actual overheads incurred	**₹ 3,00,000**
Actual output (units)	**15,000 units**

Required:

CALCULATE overhead variances viz:

i. Production volume variance

ii. Overhead expense variance

SOLUTION:

Production/ Overhead volume variance (only for fixed overhead)

Fixed Overhead Volume Variance:

= Absorbed overhead – Budgeted Overhead

= (₹ 5 × 15,000 units) – (₹ 5 × 20,000 units)

= ₹ 75,000 - ₹ 1,00,000 = ₹ 25,000 (Adverse)

Overhead expense variances

= 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)

PROBLEM – 14:

GAP Limited operates a system of standard costing in respect of one of its products which is manufactured within a single cost centre. Following are the details.

Budgeted data:

Material	Qty	Price	(₹)	Amount (₹)
A	60	20		1200
B	40	30		1200
Inputs	100			2400
Normal loss	20			
Output	80			2400
Actual data:				
Actual output	80 units.			
Material	Qty	Price	(₹)	Amount (₹)
A	70	?		?
B	?	30		?

Material Price Variance a. ₹105 A Material cost variance ₹275A

You are required to CALCULATE:

i. Actual Price of material A

ii. Actual Quantity of material B

iii. Material Price Variance

iv. Material Usage Variance

v. Material Mix Variance

vi. Material Sub Usage Variance

SOLUTION:

(i) Actual Price of Material A

Let Actual Price of Material A be 'X'

Material Price Variance (A) = ₹ 105 (A)

Material Price Variance = (SP – AP) × AQ

(20 – X) × 70 = 105 (A)

1,400 – 70X = - 105

X = 1,505 ÷ 70 = 21.5

Therefore X (Actual Price) = ₹21.5

(ii) Actual Quantity of Material B

Let Actual Quantity of Material B be 'X '

Material Cost Variance = (SQ × SP) – (AQ × AP)

Material Cost Variance = 275 (A)

{(60 × 20) – (70 × 21.5)} + {(40 × 30) – ('X' × 30)} = 275 (A)

{(1,200 – 1,505) + (1,200 – 30X)} = -275

(895 – 30X) = -275

X = 1,170 ÷ 30 = 39 units

(iii) Material Price Variance = (SP – AP) × AQ

Material A = (20 – 21.5) × 70 = ₹ 105 (A)

Material B = (30 – 30) × 39 = ₹ 0

Total = ₹ 105 (A)

(iv) Material Usage Variance = (SQ – AQ) × SP

Material A = (60 – 70) × 20 = ₹ 200 (A)

Material B = (40 – 39) × 30 = ₹ 30 (F)

Total = ₹ 170 (A)

(v) Material Mix Variance = (RAQ– AQ) × SP

Material A = $\left(\frac{109}{100} \times 60 - 70\right) \times 20 = ₹\,92\ (A)$

Material B = $\left(\frac{109}{100} \times 40 - 39\right) \times 30 = ₹\,138\ (F)$

Total = ₹ 46 (F)

(vi) Material Yield Variance = (SQ – RSQ) × SP

Material A = $\left(60 - \frac{109}{100} \times 60\right) \times 20 = ₹\,108\ (A)$

Material B = $\left(40 - \frac{109}{100} \times 40\right) \times 30 = ₹\,108\ (A)$

Total = ₹ 216 (A)

PROBLEM – 14A:

Following data is extracted from the books of XYZ Ltd. for the month of January:

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.

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:

i. Standard Price of Material-A;

ii. Actual Quantity of Material-B;

iii. Actual Price of Material-A;

iv. Revised standard quantity of Material-A and Material-B; and

v. Material Mix Variance.

SOLUTION:

Particulars	SQ	Workings
Raw Material A	940	(1645 ÷ 14 x 8)
Raw Material B	705	(1645 ÷ 14 x 6)
Input 100%	1645	(1480 ÷ 90% x 100%)
Less: Standard Loss 10%	165	(1645 ÷ 100% x 10%)
Output 90%	**1480**	

(i) Material Cost Variance (A + B) = {(SQ × SP) – (AQ × AP)}

₹3,625 = (SQ × SP) – ₹ 59,825

(SQ × SP) = ₹ 63,450

(SQA × SPA) + (SQB × SPB) = ₹ 63,450

(940 kg × SPA) + (705 kg × ₹30) = ₹ 63,450

(940 kg × SPA) + ₹ 21,150 = ₹ 63,450

(940 kg × SPA) = ₹ 42,300

$$SPA = \frac{₹\ 42,300}{940\ kg}$$

Standard Price of Material-A = ₹ 45

(ii) Material Price Variance (A + B) = {(AQ × SP) – (AQ × AP)}

₹ 175 = (AQ × SP) – ₹ 59,825

(AQ × SP) = ₹ 60,000

(AQA × SPA) + (AQB × SPB) = ₹ 60,000

[900 kg × ₹ 45 (from (i) above)] + (AQB × ₹ 30) = ₹60,000

₹ 40,500 + (AQB × ₹ 30) = ₹60,000(AQB × ₹ 30) = ₹ 19,500

$AQB = \frac{19,500}{30}$ = 650 kg

Actual Quantity of Material B = 650 kg.

(iii) (AQ × AP) = ₹ 59,825

(AQA × APA) + (AQB × APB) = ₹ 59,825

(900 kg × APA) + (650 kg (from (ii) above) × ₹ 32.5) = ₹ 59,825

(900 kg × APA) + ₹ 21,125 = ₹ 59,825

(900 kg × APA) = ₹ 38,700

AQ of A = $\frac{38,700}{900}$ = 43

Actual Price of Material-A = ₹ 43

(iv) Total Actual Quantity of Material-A and Material-B

= 940 kg

= 705 kg

= AQA + AQB = 900 kg + 650 kg (from (ii) above)

= 1,550 kg

Now,

Revised $SQ_A = \frac{800 \text{ kg}}{(800 + 600)} \times 1,550\text{kg.} = 886$ kg

Revised $SQ_B = \frac{600 \text{ kg}}{(800 + 600)} \times 1,550\text{kg.} = 664$ kg

(v) Material Mix Variance (A + B) = {(RSQ × SP) – (AQ × SP)}

= {(RSQA × SPA) + (RSQB × SPB) – 60,000}

= (886 kg (from (iv) above) × ₹ 45 (from above)) + (664 kg (from (iv) above) × ₹ 30) - ₹ 60,000

= (39,870 + 19,920) – 60,000 = **₹ 210 (A)**

PROBLEM – 14B:

One kilogram of product K requires two chemicals A and B. The following were the details of product K for the month of June 20x3:

a. **Standard mix for chemical A is 50% and chemical B is 50%.**
b. **Standard price kilogram of chemical A is ₹12 and chemical B is ₹15.**
c. **Actual input of chemical B is 70 kilograms.**
d. **Actual price per kilogram of chemical A is ₹15**
e. **Standard normal loss is 10% of total input**
f. **Total Material cost variance is ₹650 adverse.**
g. **Total Material yield variance is ₹135 adverse.**

You are required to CALCULATE:

i. **Total Material mix variance**
ii. **Total Material usage variance**
iii. **Total Material price variance**
iv. **Actual loss of actual input**
v. **Actual input of chemical A**
vi. **Actual price per kg. of chemical B**

SOLUTION:

Working Notes:

(1) Calculation of standard mix of input (assuming Standard inputas 100 kg)

	Qty. (Kg)	Price (₹)	Amount (₹)
Chemical A	50	12	600
Chemical B	50	15	750
	100	13.50	1,350
Normal Loss (10%)	(10)		
	90		**1,350**

(2) Let the actual input of chemical A be X kg. and the actual price ofchemical B be ₹ Y.

Given,

Material yield variance = (Total standard input – Total Actual input) x Standard cost per unit of input

= [100 – (70 + X)] x 13.5 = 135 (A)

Therefore, X = 40 kg.

Also, Material cost variance = (Standard quantity x Standard price) – (Actual quantity x Actual price)

= 1,350 – {(40 x 15) + (70 x Y)} = 650 (A)

= 1,350 – 600 – 70Y = 650 A

Therefore, Y = ₹ 20

(i) Material mix variance

= (Revised Std. Quantity* – Actual quantity) x Standard Price

Chemical A = (55 – 40) x 12 = 180 (F)

Chemical B = (55 - 70) x 15 = 225 (A)

= ₹ 45 (A)

*Revised Std. Quantity:

Chemical A = (70 + 40) x 50% = 55

Chemical B = (70 + 40) x 50% = 55

(ii) Material usage variance

= (Std. qty. – Actual qty.) × Std. price

Chemical A = (50 – 40) × 12 = 120 (F)

Chemical B = (50 – 70) × 15 = 300 (A)

= ₹ 180 (A)

(iii)Material price variance

= (Std. price – Actual price) × Actual qty.

Chemical A = (12 – 15) × 40 = 120 (A)

Chemical B = (15 – 20) × 70 = 350 (A)

= ₹ 470 (A)

(iv) Actual loss of actual input

Actual total input = 110 kg.

Less: Actual output = 90 kg.

Actual loss = 20 kg.

(v) Actual input of chemical A = 40 kg. [As calculated in Working note (2)].

(vi) Actual price per kg. of chemical B = ₹ 20 [As calculated in Working note (2)].

PROBLEM – 15:

Paras Synthetics uses Standard costing system in the manufacturing of its product 'Star 95 Mask'. The details are as follows;

Particulars	Amt
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:

Direct material consumed 5700 meters @ ₹ 58 per meter

Direct labour Hours? @ ? ₹ 2,24,400

Variable overhead incurred ₹ 1,12,200

Variable overhead efficiency variance is 2,000 A. Variable overheads are based on Direct Labour Hours.

You are required to calculate the missing data and all the relevant Variances.

SOLUTION:

Step 1: Calculation of Actual Hours

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

Step 2: Calculation of Actual Rate of Direct Labour

Actual Direct Labour Cost = AH x AR

Actual Rate = ₹ 2,24,400 ÷ 10,200 hours = ₹ 22

i. Material Variances

	Budget			Standard for actual			Actual		
	Quantity	Price (₹)	Amount (₹)	Quantity	Price (₹)	Amount (₹)	Quantity	Price (₹)	Amount (₹)
Material	0.5	60	30	5,000	60	3,00,000	5,700	58	3,30,600

Material Cost Variance = (SQ × SP – AQ × AP)

= (5000 x ₹ 60) – (5700 x ₹ 58)

= ₹ 3,00,000 – ₹ 3,30,600 = ₹ 30,600(A)

Material Price Variance = (SP – AP) AQ

(₹ 60 - ₹ 58) 5,700 = ₹ 11,400 (F)

Material Usage Variance = (SQ – AQ) SP

(5,000 – 5,700) ₹ 60 = ₹ 42,000 (A)

ii. Labour variances

	Budget			Standard for actual			Actual		
	Hours	Rate (₹)	Amount (₹)	Hours	Rate (₹)	Amount (₹)	Hours	Rate (₹)	Amount (₹)
Labour	1	20	20	10,000	20	2,00,000	10,200	22	2,24,400

Labour Cost Variance = (SH × SR) – (AH × AR)

(10,000 Hours × ₹ 20) – (10,200 Hours × ₹ 22) = ₹ 24,400 (A)

Labour Rate Variance = (SR – AR) × AH

(₹ 20 – ₹ 22) × 10,200 Hours = ₹ 20,400 (A)

Labour Efficiency Variance = (SH – AH) × SR

(10,000 Hours – 10,200 Hours) × ₹ 20 = ₹ 4,000 (A)

iii. Variable overhead cost Variance (SH x SR) – (AH x AR)

(10000 Hours x ₹ 10) - 112200 = ₹ 12,200(A)

Variable overhead Expenditure Variance = (SR – AR) x AH

(10 – 11) x 10200 Hours = ₹ 10,200 (A)

Variable overhead Efficiency Variance = (SH – AH) x SR = (10000 – 10200) x ₹ 10

= ₹ 2000 (A)

PROBLEM – 16: (MTP 1 SEP 24)

Anju Limited produces a product 'Pect' which is sold in a 10 Kg. packet. The standard cost card per packet of 'Pect' are as follows:

	₹
Direct materials 10 kg @ ₹ 45 per kg	450
Direct labour 8 hours @ ₹ 50 per hour	400
Variable Overhead 8 hours @ ₹ 10 per hour	80
Fixed Overhead	200
	1,130

Budgeted output for the third quarter of a year was 10,000 Kg.

Actual output is 9,000 Kg.

Actual cost for this quarter are as follows :

	₹
Direct Materials 8,900 Kg @ ₹ 46 per Kg.	4,09,400
Direct Labour 7,000 hours @ ₹ 52 per hour	3,64,000
Variable Overhead incurred	72,500

Fixed Overhead incurred	**1,92,000**

You are required to CALCULATE:

(i) Material Usage Variance

(ii) Material Price Variance

(iii) Material Cost Variance

(iv) Labour Efficiency Variance

(v) Labour Rate Variance

(vi) Labour Cost Variance

(vii) Variable Overhead Cost Variance

(viii) Fixed Overhead Cost Variance

SOLUTION:

(i) Material Usage Variance = Standard Price (Standard Quantity – Actual Quantity)
= ₹ 45 (9,000 kgs. – 8,900 kgs.)
= ₹ 4,500 (Favourable)

(ii) Material Price Variance = Actual Quantity (Standard Price – Actual Price)
= 8,900 kgs. (₹ 45 – ₹ 46)
= ₹ 8,900 (Adverse)

(iii) Material Cost Variance = Standard Material Cost – Actual Material Cost
= (SQ × SP) – (AQ × AP)
= (9,000 kgs. × ₹ 45) – (8,900 kgs. × ₹ 46)
= ₹ 4,05,000 – ₹ 4,09,400
= ₹ 4,400 (Adverse)

(iv) Labour Efficiency Variance = Standard Rate (Standard Hours – Actual Hours)
= ₹ 50 (9,000 ÷ 10 × 8 Hours – 7,000 Hours)
= ₹ 50 (7,200 Hours – 7,000 Hours)
= ₹ 10,000 (Favourable)

(v) Labour Rate Variance = Actual Hours (Standard Rate – Actual Rate)
= 7,000 Hours (₹ 50 – ₹ 52)
= ₹ 14,000 (Adverse)

(vi) Labour Cost Variance = Standard Labour Cost – Actual Labour Cost
= (SH × SR) – (AH × AR)
= (7,200 Hours × ₹ 50) – (7,000 Hours × ₹ 52)
= ₹ 3,60,000 – ₹ 3,64,000
= ₹ 4,000 (Adverse)

(vii) Variable Overhead Cost Variance = Standard Overhead for Actual Production – Actual Variable Overhead Cost

= (7,200 Hours × ₹ 10) – ₹ 72,500

= ₹ 500 (Adverse)

(viii) Fixed Overhead Cost Variance = Absorbed Fixed Overhead – Actual Fixed Overhead

= ₹ 200 ÷ 10 kgs × 9,000 kgs - ₹ 1,92,000

= ₹ 1,80,000 – ₹ 1,92,000

= ₹ 12,000 (Adverse)

PROBLEM – 16A: (MTP 1 MAY 24)

SARA Ltd. has furnished the following standard cost data per' unit of production:

Material 15 kg @ ₹ 15 per kg.

Labour 6 hours @ ₹ 5 per hour

Variable overhead 6 hours @ ₹ 12 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 2023 are as follows: Material used 65,000 kg at a cost of ₹ 9,85,000.

Labour paid ₹ 1,40,000 for 31,500 hours worked. Variable overheads ₹ 3,60,200

Fixed overheads ₹ 4,70,000 Actual production 4,800 units. CALCULATE:

(i) Material Cost Variance.

(ii) Labour Cost Variance.

(iii) Fixed Overhead Cost Variance.

(iv) Variable Overhead Cost Variance.

SOLUTION:

Budgeted Production 30,000 hours ÷ 6 hours per unit = 5,000 units

Budgeted Fixed Overhead Rate = ₹ 4,50,000 ÷ 5,000 units = ₹ 90 per unit

Or = ₹ 4,50,000 ÷ 30,000 hours = ₹ 15 per hour.

(i) Material Cost Variance = (Standard Qty. × Standard Price) – (Actual Qty. × Actual Price)

= (4,800 units × 15 kg. × ₹15) - ₹ 9,85,000

= ₹ 10,80,000 – ₹ 9,85,000

= ₹ 95,000 (F)

(ii) Labour Cost Variance = (Standard Hours × Standard Rate) – (Actual Hours × Actual rate)

= (4,800 units × 6 hours × ₹ 5) – ₹1,40,000

= ₹ 1,44,000 – ₹ 1,40,000

= ₹ 4,000 (F)

(iii) Fixed Overhead Cost Variance = (Budgeted Rate × Actual Qty) – Actual Overhead

= (₹ 90 x 4,800 units) – ₹ 4,70,000

= ₹ 38,000 (A)

OR

= (Budgeted Rate × Standard Hours) – Actual Overhead

= (₹ 15 x 4,800 units × 6 hours) – ₹ 4,70,000

= ₹ 38,000 (A)

(iv) Variable Overhead Cost Variance = (Standard Rate × Standard Hours) – Actual Overhead

= (4,800 units × 6 hours × ₹ 12) - ₹ 3,60,200

= ₹ 3,45,600 - ₹ 3,60,200

= ₹ 14,600 (A)

CHAPTER 15: BUDGET AND BUDGETARY CONTROL

PROBLEM – 1:

Prepare a quantitative production, material usage & purchases budget from the following data of a month.

Particulars	Product A	Product B
Budgeted sales quantity	15,000 units	17,500 units
Material consumption p.u:		
Material P (3 per kg)	2 kgs	4 kgs
Material Q (2 per kg)	$3^{1}/_{8}$ kgs	1 kgs

Stocks of products and materials are as under:

Particulars	Product A	Product B	Material P	Material Q
	(in units)	(in units)	(in kgs)	(in kgs)
Opening stock	750	875	12000	8000
Closing stock	1750	3375	?	?

The company wishes to operate a JIT material inventory system. As an initial procedure, it wishes to maintain a minimum stock of materials equivalent to 2 days consumption. There are 28 working days in a month.

SOLUTION:

Step 1: Production Budget (Units)

Particulars	A	B
Sales	15000 units	17500 units
(+) Closing stock	1750	3375
(-) Opening stock	(750)	(875)
Production	**16000 units**	**20000 units**

Step 2: Material Consumption Budget (Kgs)

Particulars	P	Q
A 16000 units (2 kg : 3 1/8 kg)	32000	50000
B 20000 units (4 : 1)	80000	20000
	112000	**70000**

Step 3: Material Purchase Budget:

Particulars	**P**	**Q**
Raw Material Consumption	112000	70000
(-) Closing stock (WN)	8000	5000
(-) Opening stock of Raw Material	(12000)	(8000)
Purchases (in kg)	**108000**	**67000**
Price (₹)	3	2
In value	**324000**	**134000**

W.N.1: Closing stock of Raw Material (2 days consumption)

P = 112000 x 2 ÷ 28 = 8000 Kg

Q = 70000 x 2 ÷ 28 = 5000 kg

PROBLEM – 2:

The direct Labour hour requirement of three of the products, manufactured in a factory, each involving more than one Labour operation, are estimated as follows:

Direct Labour hour/unit (in minutes)

PRODUCT	**A**	**B**	**C**
Operation X	**18**	**42**	**30**
Operation Y	**--**	**12**	**24**
Operation Z	**12**	**6**	**--**

The factory work 8 hours per day, 6 days a week. The budget quarter is taken as 13 weeks, and during a quarter, lost hours due to leave and holidays and other causes is estimated to be 124 hours. The budgeted hourly rate for the workers manning the operation X, Y and Z are ₹ 2, ₹ 2.550 and ₹ 3 respectively. The budgeted sales of the products during the quarter are A – 9,000 units, B – 15,000 units and C – 12,000 units. There is an opening stock of 5,000 units of B and 4,000 units of C and it is proposed to build up stock at the end of the budget quarter as A – 1,000 units and C – 2,000 units. Prepare a manpower budget showing for each operation;

- **Direct Labour hours**
- **Direct Labour cost and**
- **The number of operatives.**

SOLUTION:

Step 1: Production Budget (Units)

Particulars	A	B	C
Sales	9000	15000	12000
(+) Closing stock	1000	-	2000
(-) Opening stock	-	(5000)	(4000)
Production (Units)	10000	10000	10000

Step 2: Labour Hours budget:

Operations	A	B	C	Total
Operation X	180000 Minutes (10000 units x 18)	420000 Minutes (10000 units x 42)	300000 Minutes (10000 units x 30)	900000 Minutes (or) 15000 Hours
Operation Y	-	120000 min (10000 units x 12)	240000 min (10000 units x 24)	360000 min (or) 6000 Hours
Operation Z	120000 min (10000 units x 12)	60000 min (10000 units x 6)	-	180000 min (or) 3000 Hours

Step 3: Labour cost budget

Operation	Hours	Rate (₹)	Cost (₹)
X	15000 Hours	2	₹ 30000
Y	6000 Hours	2.550	₹ 15300
Z	3000 Hours	3	₹ 9000
Total			**₹ 54300**

Step 4: No. of operatives / workers

Operations	X	Y	Z
A. Hours required per quarter	15000	6000	3000
B. Hours available per worker / per quarter (8 Hours x 6 days x 13 weeks (-) 124 Hours)	500 Hours	500 Hours	500 Hours
C. No. of workers required	**30 workers**	**12 workers**	**6 workers**

PROBLEM – 3:

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

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

The opening stocks of finished goods are 10,000 units and the company experts to maintain the closing stocks of finished goods at 16,250 units at the end of the year. The production pattern in each quarter is based on 80% of the sales of the current quarter and 20% of the sales of the next quarter.

The opening stocks of raw materials at the beginning of the year are 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 purchases the entire annual, requirement of raw materials in the first three quarters in proportion and at the prices given below:

Quarter	Purchases of raw material	Price per kg
I	30%	₹ 2
II	50%	₹ 3
III	20%	₹ 4

The value of the opening stock of the raw material in the beginning of the year is ₹ 20,000.

You are required to present the following for the next year, quarter wise:

- **Production budget (in units)**
- **Raw material consumption budget (in quantity)**
- **Raw material purchases budget (in quantity and value)**
- **Priced stores ledger card of the raw materials using the First in First out method.**

SOLUTION:

Working Note:

Calculation of Total Annual Production

Particulars	(Units)
Sales in 4 quarters	1,53,750
Add: Closing balance	16,250
	170000

Less: Opening balance	(10,000)
Total number of units to be produced in the next year	**1,60,000**

(i) Production Budget (in units)

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 (20% of the sale of next quarter)	7,500	8,250	9,000	12,250	
Total production	**31,500**	**38,250**	**42,000**	**48,250**	**1,60,000**

(ii) Raw Material Consumption Budget In Quantity

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

(iii)Raw material purchase budget (in quantity)

	Qty (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	% of annual requirement	Qty. of material	Rate per kg (₹)	Amount (₹)
(1)	(2)	(3)	(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**

Priced Stores Ledger Card

(of the raw material using FIFO method)

	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
Purchases: (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			

PROBLEM – 3A:

Jigyasa Ltd. is drawing a production plan for its two products Minimax (MM) and Heavyhigh (HH) for the year 20x2-20x3. The company's policy is to hold closing stock of finished goods at 25% of the anticipated volume of sales of the succeeding month. The following are the estimated data for two products:

	Minimax (MM)	Heavyhigh (HH)
Budgeted Production units	1,80,000	1,20,000
	(₹)	(₹)
Direct material cost per unit	220	280
Direct Labour cost per unit	130	120
Manufacturing overhead	4,00,000	5,00,000

The estimated units to be sold in the first four months of the year 20x2-20x3 are as under

	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.

SOLUTION:

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.

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)				1,04,167
			1,12,71,111	**1,01,04,167**

PROBLEM – 4:

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

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

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

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-days weeks in the budgeted period and it is anticipated that sales and production will occur evenly throughout the whole period.

It is anticipated that stock at the beginning of the period will be:

Product-A	400 units
Product-B	200 units
Material-X	1,000 kg.
Material-Y	500 kg.

The anticipated closing stocks for budget period are as below:

Product-A	4 days sales
Product-B	5 days sales
Material-X	10 days consumption
Material-Y	6 days consumption

Required:

CALCULATE the Material Purchase Budget and the Wages Budget for the direct workers, showing the quantities and values, for the next month.

SOLUTION:

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

Number of units to be produced

	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**

(i) Material Purchase Budget

	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		
$\left(\frac{25,300 \text{ kgs}}{20 \text{ days}} \times 10 \text{ days}\right)$	12,650	10,716
$\left(\frac{35,720 \text{ kgs}}{20 \text{ days}} \times 6 \text{ days}\right)$		
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**

(ii) Wages Budget

	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**

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

= ₹ 12,67,8750

PROBLEM - 4A: (RTP SEP 24)

Raja 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 Price:	**Material A**	**₹160 per kg**	
	Materials B	**₹100 per kg**	
Labour Rate:	**Machine Shop**	**₹140 per hour**	
	Assembly Shop	**₹70 per hour**	
	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

(i) CALCULATE number of units of product proposed to be sold and selling price per unit,

(ii) PREPARE Production Budget in units and

(iii)PREPARE Material Purchase Budget in units.

SOLUTION:

Workings

Statement Showing "Total Variable Cost for the year"

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

(i) 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

(ii) 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**

(iii)Materials Purchase Budget (Kg)

Particulars	Material A	Material B
Requirement 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**

PROBLEM – 5:

A company is engaged in the manufacture of specialized sub-assemblies required for certain electronic equipments. The company envisages that in the forthcoming month, December, 20x1, the sales will take a pattern in the ratio of 3:4:2 respectively of sub-assemblies, ACB, MCB and DP.

The following is the schedule of components required for manufacture:

			Component requirements		
Sub-assembly	Selling price	Base Board	IC 08	IC 12	IC 26
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 assemblies are:

	Labour hours per Sub-assembly		
	Grade A	Grade B	Variable overheads per Sub-assembly (₹)
ACB	8	16	₹ 36
MCB	6	12	₹ 24
DP	4	8	₹ 24
Direct wages rate per hour	₹ 5	₹ 4	-

The Labourers work 8 hours a day 25 day a month. The opening stocks of Sub-assemblies and components for December, 20x1 are as under:

Sub-assemblies		Components	
ACB	800	Based Board	1,600
MCB	1,200	IC 08	1,200
DP	2,800	IC 12	6,000
		IC 26	4,000

Fixed overheads amount to ₹ 7,57,200 for the month and a monthly profit target of ₹ 12 lakhs 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 stocks prepared the following budget for December 20x1:

i. Sales budget in quantity and value

ii. Production budget in quantity

iii. Component usage budget in quantity

iv. Component purchases budget in quantity and value

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

SOLUTION:

Working Note:

1. Statement showing contribution:

Sub- assemblies	ACB	MCB	DP	Total
	(₹)	(₹)	(₹)	(₹)
Selling price per unit (Per Unit) : (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**

2. Desired Contribution for the forthcoming month December

	(₹)
Fixed overheads	7,57,200
Desired profit	12,00,000
Desired contribution	**19,57,200**

3. Sales mix required i.e. number of batches for the forthcoming month December

Sales mix required = Desired contribution ÷ contribution × Sales ratio

= ₹ 19,57,200 ÷ 932 (Refer to Working notes 1 and 2)

= 2,100 batches

Budgets for the Month of December

(a) Sales budget in quantity and value

Sub-assemblies	ACB	MCB	DP	Total
Sales (Qty)	6,300 (2,100 × 3)	8,400 (2,100 × 4)	4,200 (2,100 × 2)	
Selling price Per Unit (₹)	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
Sales	6,300	8,400	4,200
Add : Closing stock	720	1,080	2,520
(Opening stock less 10%)	———	———	———
Total quantity required	**7,020**	**9,480**	**6,720**
Less : Opening stock	(800)	(1,200)	(2,800)
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	16,560	7,840	74,160
	(6,220 × 8)	(8,280 × 2)	(3,920 × 2)	
Component IC12	24,880	82,800	15,680	1,23,360
(4:10:4)	(6,220 × 4)	(8,280 × 10)	(3,920 × 4)	
Component IC26 (2:6:8)	12,440	49,680	31,360	93,480
	(6,220 × 2)	(8,280 × 6)	(3,920 × 8)	

(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 (Opening stock less 10%)	1,440	1,080	5,400	3,600	
	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 Per Unit	Total hours	Hours Per Unit	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)			576		1,152	
(D) Wage rate per month (₹)			1,000		800	
(E) Wages payable (₹) : (C × D)			**5,76,000**		**9,21,600**	**14,97,600**

PROBLEM – 6:

K Ltd. produces and markets a very popular product called 'X'. The company is interested in presenting its budget for the second quarter of 20x2-20x3.

The following information are made available for this purpose:

i. It expects to sell 1,50,000 bags of 'X' during the second quarter of 20x2- 20x3 at the selling price of ₹ 1,200 per bag.

ii. Each bag of 'X' requires 2.5 mtr. of raw – material 'Y' and 7.5 mtr. of raw – material

'Z'.

iii. Stock levels are planned as follows:

Particulars	Beginning of Quarter	End of Quarter
Finished Bags of 'X' (Nos.)	45,000	33,000
Raw – Material 'Y' (mtr)	96,000	78,000
Raw – Material 'Z' (mtr)	1,71,000	1,41,000
Empty Bag (Nos.)	1,11,000	84,000

iv. Y' cost ₹160 per mtr., 'Z' costs ₹30 per mtr. and 'Empty Bag' costs ₹110 each.

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

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

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

Required

i. PREPARE a production budget for the said quarter in quantity.

ii. PREPARE a raw – material purchase budget for 'Y', 'Z' and 'Empty Bags' for the said quarter in quantity as well as in rupees.

iii. COMPUTE the budgeted variable cost to produce one bag of 'X'.

SOLUTION:

(i) Production Budget of 'X' for the Second Quarter

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**

(ii) Raw-Materials Purchase Budget in Quantity as well as in ₹ for 1,38,000 Bags of 'X'

Particulars	'Y' Mtr.	'Z' Mtr.	Empty Bags Nos.
Production Requirements Per bag of 'X'	2.5	7.5	1.0
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 permtr./Bag	₹ 160	₹ 30	₹ 110
Cost of Purchase (₹)	**5,23,20,000**	**3,01,50,000**	**1,22,10,000**

(iii) Computation of Budgeted Variable Cost of Production of 1 Bag of 'X'

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 ÷ 60 minutes)	10.50
Variable Manufacturing Overheads	60.00
Variable Cost of Production per bag	**805.50**

PROBLEM – 7:

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, the following information has been made available for the year 20x1:

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 underpriced. 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 to the aforesaid price changes. On the basis of these price changes and the reports of salesmen, the following estimates have been prepared by the Divisional Managers:

Percentage increase in sales over the budgeted sales

Product	East Division	West Division
X	+12.50%	+7.50%
Y	+22.50%	+12.50%

With the help of an 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 after incorporating the above estimates and also show the Budgeted Sales and Actual Sales of 20x1.

SOLUTION:

Statement Showing Sales Budget for 2022-23

Division	Product X			Product Y			Total
	Qty	Rate (₹)	Amount (₹)	Qty	Rate (₹)	Amount (₹)	Amount (₹)
East	1,020 [1]	20	20,400	815 [3]	40	32,600	53,000
West	1,430 [2]	20	28,600	1,225 [4]	40	49,000	77,600
Total	**1,200**		**49,000**	**1,000**		**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 2021-22

Division	Product X			Product Y			Total
	Qty	Rate (₹)	Amount (₹)	Qty	Rate (₹)	Amount (₹)	Amount (₹)
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 2021-22

Division	Product X			Product Y			Total
	Qty	Rate (₹)	Amount (₹)	Qty	Rate (₹)	Amount (₹)	Amount (₹)
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**

PROBLEM – 8:

Float glass Manufacturing Company requires you to PREPARE the Master budget for the next year from the following information:

Sales:	
Toughened Glass	**₹ 6,00,000**
Bent Glass	**₹ 2,00,000**
Direct material cost	**60% of sales**
Direct wages	**20 workers @ ₹ 150 per month**
Factory overheads:	
Indirect Labour	**–**
Works manager	**₹ 500 per month**
Foreman	**₹ 400 per month**
Stores and spares	**2.5% on sales**
Depreciation on machinery	**₹ 12,600**
Light and power	**₹ 3,000**
Repairs and maintenance	**₹ 8,000**
Others sundries	**10% on direct wages**
Administration, selling and distribution expenses	**₹ 36,000 per year**

SOLUTION:

Master Budget for the year ending _____

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 × 12months)		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 (₹ 800000 x 2.5%)	20,000		
Repairs and maintenance	8,000		
Sundry expenses (₹ 36000 x 10%)	3,600	31,600	
Works Cost			**5,74,000**
Gross Profit (Sales – Works cost)			2,26,000
Less: Adm., selling and distribution expenses			36,000
Net Profit			**1,90,000**

PROBLEM – 9:

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 20X2-20X3. The cost details are as follows:

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

Profit is estimated @ 20% on sales.

The following increases in costs are expected during the year:

	In %
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 20x2-20x3 at 85% level of capacity. Also ascertain profit and contribution.

SOLUTION:

ABC Ltd.

Budget for 85% capacity level for the period 2022-23

Budgeted production (units)		**85,000**
	Per Unit (₹)	**Amount (₹)**
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
Variable cost	**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
Fixed cost		5,11,000
Total cost		**37,85,200**
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:**

	(₹)		**(₹)**
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:**

	(₹)		(₹)
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:**

	(₹)		**(₹)**
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:**

	(₹)		(₹)
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

PROBLEM – 9A:

A department of Company X attains sale of ₹ 6,00,000 at 80 per cent of its normal capacity and its expenses are given below:

Administration costs:	**₹**
Office salaries	**90,000**
General expenses	**2 per cent of sales**
Depreciation	**7,500**
Rates and taxes	**8,750**
Selling costs:	
Salaries	**8 per cent of sales**
Travelling expenses	**2 per cent of sales**
Sales office expenses	**1 per cent of sales**
General expenses	**1 per cent of sales**
Distribution costs:	
Wages	**15,000**
Rent	**1 per cent of sales**
Other expenses	**4 per cent of sales**

PREPARE flexible administration, selling and distribution costs budget, operating at 90 per cent, 100 per cent and 110 per cent of normal capacity.

SOLUTION:

Flexible Budget of Department of Company 'X'

	80% (₹)	**90% (₹)**	**100% (₹)**	**110% (₹)**
Sales	6,00,000	6,75,000	7,50,000	8,25,000
Administration Costs:				
Office Salaries (fixed)	90,000	90,000	90,000	90,000
General expenses (2% of Sales)	12,000	13,500	15,000	16,500
Depreciation (fixed)	7,500	7,500	7,500	7,500
Rent and rates (fixed)	8,750	8,750	8,750	8,750
(A) Total Adm. Costs	1,18,250	1,19,750	1,21,250	1,22,750
Selling Costs:				
Salaries (8% of sales)	48,000	54,000	60,000	66,000
Travelling expenses (2% of sales)	12,000	13,500	15,000	16,500
Sales office (1% of sales)	6,000	6,750	7,500	8,250
General expenses (1% of sales)	6,000	6,750	7,500	8,250
(B) Total Selling Costs	72,000	81,000	90,000	99,000

Distribution Costs:				
Wages (fixed)	15,000	15,000	15,000	15,000
Rent (1% of sales)	6,000	6,750	7,500	8,250
Other expenses (4% of sales)	24,000	27,000	30,000	33,000
(C) Total Distribution Costs	45,000	48,750	52,500	56,250
Total Costs (A + B + C)	**2,35,250**	**2,49,500**	**2,63,750**	**2,78,000**

Note: In the absence of information, it has been assumed that office salaries, depreciation, rates and taxes and wages remain the same at 110% level of activity also. However, in practice some of these costs may change if present capacity is exceeded.

PROBLEM – 10:

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

Variable expenses	**₹1260**
Semi-variable expenses	**₹1200**
Fixed expenses	**₹1800**

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.

SOLUTION:

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/Budgeted Hours		**0.61**	**0.55**	**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).

PROBLEM – 11: (PYP May 24)

A factory is currently working at 60% capacity and produces 12,000 units of a product. Management is thinking to increase the working capacity either to 70% or 90% level. It is estimated that at both the levels, it will be able to sell all the produced units. The other details are as under:

- **At 70% capacity, the cost of raw materials increases by 4% and the selling price falls by 3%.**
- **At 90% capacity, the cost of raw materials increases by 5% and selling price falls by 4%.**
- **At 60% capacity, the product cost is ₹ 360 per unit and it is sold at ₹ 400 per unit.**
- **The unit cost of 360 consists of the following:**

Material	**₹ 200**
Labour	**₹ 60**
Factory overhead	**₹ 60 (50 % fixed)**
Administrative & Selling overhead	**₹ 40 (60 % fixed)**

- **Additional advertising cost of ₹ 20,000 is to be incurred for selling the product above 80% capacity.**

You are required to:

(i) Calculate the profits of the company when the factory works at 60%, 70% and 90% capacity level.

(ii) Offer your comments regarding increase in the capacity based on profit calculated.

SOLUTION:

(i) Expense Budget at 60%, 70% & 90% level

	60% (12,000 units)		70% (14,000 units)		90% (18,000 units)	
	Per unit (₹)	Amount (₹)	Per unit (₹)	Amount (₹)	Per unit (₹)	Amount (₹)
Sales **(A)**	400	48,00,000	388	54,32,000	384	69,12,000
Variable Costs:						
Direct Material	200	24,00,000	208	29,12,000	210	37,80,000
Direct Wages	60	7,20,000	60	8,40,000	60	10,80,000

Variable Factory Overheads	30	3,60,000	30	4,20,000	30	5,40,000
Variable Administrative & Selling Overheads	16	1,92,000	16	2,24,000	16	2,88,000
Total Variable Cost (B)	**306**	**36,72,000**	**314**	**43,96,000**	**316**	**56,88,000**
Contribution **(C)=(A–B)**	94	11,28,000	74	10,36,000	68	12,24,000
Fixed Costs:						
Fixed Factory Overheads (50%)	--	3,60,000	--	3,60,000	--	3,60,000
Fixed Administrative & Selling Overheads (60%)	--	2,88,000	--	2,88,000	--	2,88,000
Adverting Cost	--	--	--	--	--	20,000
Total Fixed Costs (D)	--	6,48,000	--	6,48,000	--	6,68,000
Profit (C – D)	**--**	**4,80,000**	**--**	**3,88,000**	**--**	**5,56,000**

(ii) Comment: Increase of production capacity to 90% is likely to increase the profit to maximum of ₹ 5,56,000 due to increase in contribution while fixed cost is slightly increased due to in advertising cost. At 70% capacity, profit is reduced to minimum of ₹ 3,88,00 due to decrease in selling price by 3% along with increase in raw material cost by 4% resulting in decrease of contribution. Therefore, it is recommended that factory should operate at 90% capacity.

PROBLEM – 11A:

During the FY 2021-22, P Limited has produced 60,000 units operating at 50% capacity level. The cost structure at the 50% level of activity is as under:

	₹
Direct Material	**300 per unit**
Direct Wages	**100 per unit**
Variable Overheads	**100 per unit**
Direct Expenses	**60 per unit**
Factory Expenses (25% fixed)	**80 per unit**

Selling and Distribution Exp. (80% variable)	40 per unit
Office and Administrative Exp. (100% fixed)	20 per unit

The company anticipates that in FY 20x2-20x3, 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 2021-22.**

ii. **PREPARE an Expense budget on marginal cost basis for the FY 20x2-20x3 for the company at 50% and 60% level of activity and FIND OUT the profits at respective levels.**

SOLUTION:

(i) Calculation of Budgeted profit for the FY 2021-22

	60,000 units	
	Per unit (₹)	**Amount (₹)**
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 & Dist. 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 2022-23 at 50% & 60% level

	60,000 units		72,000 units	
	Per unit (₹)	Amount (₹)	Per unit (₹)	Amount (₹)
Sales **(A)**	880.00	5,28,00,000	880.00	6,33,60,000
Variable Costs:				
- Direct Material	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**

PROBLEM – 11B: **(PYP SEP 24)**

Savi Limited is currently working at 80% of its capacity level and furnished the following information for current period:

Production / Sales	**96,000 units**
Direct Variable Cost	**₹ 20 per unit**
Factory Overheads	**₹ 8,40,000**
Administrative Overheads (Fixed)	**₹ 20,60,000**
Sales Commission	**2% of Sales Value**
Transportation Expenses	**₹ 4,000 per truck (Loading Capacity 4,000 units)**

The selling price of the product is ₹ 120 per unit and Factory Overheads are 80% variable in nature.

The management of Savi Limited has come.to know that there will be high fluctuations in the demand of the product in upcoming year and it would not be an easy task to predict the demand. Selling price per unit will not be affected by demand fluctuations.

Savi Limited has decided to prepare a flexible budget for. the product at 60%, 80% and 100% capacity level.

You are required to prepare the Flexible Budget showing total cost of the product at each level.

SOLUTION:

Flexible Budget of Savi Ltd

	60% (72,000 units) (₹)	**80% (96,000 units) (₹)**	**100% (1,20,000 units) (₹)**
Sales **(A)**	120.00	120.00	120.00
Variable Costs:			
- Direct Variable Cost	20.00	20.00	20.00
-Variable Factory Overheads (WN1)	7.00	7.00	7.00
- Sales Commission (2%)	2.40	2.40	2.40
- Transportation Expenses	1.00	1.00	1.00
Total Variable Cost **(B)**	30.40	30.40	30.40
Contribution Per Unit **(C) = (A – B)**	89.60	89.60	89.60
Total Contribution (D)	**64,51,200.00**	**86,01,600.00**	**1,07,52,000.00**
Fixed Costs:			
- Administrative Overheads (100%)	20,60,000.00	20,60,000.00	20,60,000.00
- Factory Overheads (20%)	1,68,000.00	1,68,000.00	1,68,000.00
Total Fixed Costs **(E)**	22,28,000.00	22,28,000.00	22,28,000.00
Profit **(D-E)**	42,23,200.00	63,73,600.00	85,24,000.00
Total Cost	**44,16,800.00**	**51,46,400.00**	**58,76,000.00**

WN 1:

Variable factory Overheads = ₹ 8,40,000 x 80% = ₹ 6,72,000

Variable factory Overheads per unit = ₹ 6,72,000 ÷ 96,000 Units = ₹ 7

PROBLEM – 12:

The accountant of manufacturing company provides you the following details for year 20x1-20X2:

	₹		**₹**
Direct materials	**1,75,000**	**Other variable costs**	**80,000**
Direct Wages	**1,00,000**	**Other fixed costs**	**80,000**

Fixed factory overheads	1,00,000	Profit	1,15,000
Variable factory overheads	1,00,000	Sales	7,50,000

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

	A	B
Output (units)	2,00,000	1,00,000
Selling price per unit	₹ 2.00	₹ 3.50
Direct materials per unit	₹ 0.50	₹ 0.75
Direct wages per unit	₹ 0.25	₹ 0.50

Variable factory overhead is absorbed as a percentage of direct wages. Other variable costs have been computed as: Product A ₹ 0.25 per unit; and B ₹ 0.30 per unit.

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

	Product C
Output (units)	2,00,000
Selling price per unit	₹ 1.75
Direct materials per unit	₹ 0.40
Direct wages per unit	₹ 0.25

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

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

SOLUTION:

Budget Showing Current Position and Position for 2022-23

	Position for 2021-22			Position for 2022-23			
	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	4,00,000	3,50,000	7,50,000	3,00,000	1,75,000	3,50,000	8,25,000
Direct Material	1,00,000	75,000	1,75,000	75,000	37,500	80,000	1,92,500
Direct wages	50,000	50,000	1,00,000	37,500	25,000	50,000	1,12,500
Factory Overhead (100% of Direct	50,000	50,000	1,00,000	37,500	25,000	50,000	1,12,500

Wages) (variable) Other variable costs	50,000	30,000	80,000	37,500	15,000	50,000	1,02,500
(B) Marginal Cost	2,50,000	2,05,000	4,55,000	1,87,500	1,02,500	2,30,000	5,20,000
(C) Contribution (A-B)	**1,50,000**	**1,45,000**	**2,95,000**	**1,12,500**	**72,500**	**1,20,000**	**3,05,000**
Fixed costs – Factory			1,00,000				1,00,000
– Others			80,000				80,000
(D) Total fixed cost			1,80,000				1,80,000
Profit (C – D)			**1,15,000**				**1,25,000**

Comments: Introduction of Product C is likely to increase profit by ₹ 10,000 (i.e. from ₹ 1,15,000 to ₹ 1,25,000) in 2022-23 as compared to 2021-22. Therefore, introduction of product C is recommended.

PROBLEM – 13:

TQM Ltd. has furnished the following information for the month ending 30th June:

	Master Budget	Actual	Variance
Units produced and sold	**80,000**	**72,000**	
Sales (₹)	**3,20,000**	**2,80,000**	**40,000 (A)**
Direct material (₹)	**80,000**	**73,600**	**6,400 (F)**
Direct wages (₹)	**1,20,000**	**1,04,800**	**15,200 (F)**
Variable overheads (₹)	**40,000**	**37,600**	**2,400 (F)**
Fixed overhead (₹)	**40,000**	**39,200**	**800 (F)**
Total Cost	**2,80,000**	**2,55,200**	

The Standard costs of the products are as follows:

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

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

Required:

i. **PREPARE Flexible budget for the month and compare with actual results.**

ii. **CALCULATE Material, Labour, Variable Overhead and Fixed Overhead Expenditure variances.**

SOLUTION:

(i) Statement showing Flexible Budget and its comparison with actual

		Master Budget 80,000 units	Flexible Budget (at standard cost)		Actual for 72,000 units	Variance
			Per unit	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:

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)

$$= 70,400 \text{ units} \left(₹1.50 - \frac{₹1,04,800}{70,400 \text{ units}} \right)$$

= ₹ 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 x ₹ 0.50) – ₹ 37,600

= ₹ 1,600 (A)

Fixed Overhead Expenditure = Budgeted fixed overhead – Actual fixed overhead

= ₹ 40,000 – ₹ 39,200 = ₹ 800 (F)

PROBLEM – 14: (MTP 1 MAY 24)

P Ltd. manufactures two products called 'X' and 'Y'. Both products use a common raw material Z. The raw material Z is purchased @ ₹ 72 per kg from the market. The company has decided to review inventory management policies for the forthcoming year. The following forecast information has been extracted from departmental estimates for the year ended 31st March 2025 (the budget period):

	Product X	Product Y
Sales (units)	28,000	13,000
Finished goods stock increase by year-end	320	160
Post-production rejection rate (%)	4	6
Material Z usage (per completed unit, net of wastage)	5 kg	6 kg
Material Z wastage (%)	10	5

Additional information:

- **Usage of raw material Z is expected to be at a constant rate over the period.**
- **Annual cost of holding one unit of raw material in stock is 11% of the material cost.**
- **The cost of placing an order is ₹ 15,600 per order.**
- **The management of P Ltd. has decided that there should not be more than 40 orders in a year for the raw material Z.**

Required:

(a) (i) Prepare Production budget for Products X and Y (in units) for the year ended 31st March 2025.

(ii) Calculate the Economic Order Quantity for Material Z (in kgs).

(b) Prepare Purchases budget for Material Z (in kgs and value) for the year ended 31st March 2025.

(c) If there is a sole supplier for the raw material Z in the market and the supplier do not sale more than 4,000 kg. of material Z at a time. Keeping the management purchase policy and production quantity mix into consideration, calculate the maximum number of units of Product X and Y that could be produced.

SOLUTION:

(a)

(i) Production Budget (in units) for the year ended 31st March 2025

	Product X	Product Y
Budgeted sales (units)	28,000	13,000
Add: Increase in closing stock	320	160
No. good units to be produced	28,320	13,160
Post production rejection rate	4%	6%
No. of units to be produced	29,500 $\left(\frac{28,320}{0.96}\right)$	14,000 $\left(\frac{13,160}{0.94}\right)$

(ii) Calculation of Economic Order Quantity for Material Z

$$EOQ = \sqrt{\frac{2 \times 2,52,310 \times 15,600}{72 \times 11\%}} = \sqrt{\frac{5,04,620 \times 15,600}{72 \times 11\%}} = 31,526.95 \text{ kg}$$

(b) Purchase budget (in kgs and value) for Material Z

	Product X	Product Y
No. of units to be produced	29,500	14,000
Usage of Material Z per unit of production	5 kg.	6 kg.
Material needed for production	1,47,500 kg.	84,000 kg.
Materials to be purchased	1,63,889 kg. $\left(\frac{1,47,500}{0.90}\right)$	88,421 kg. $\left(\frac{84,000}{0.95}\right)$
Total quantity to be purchased	2,52,310 kg.	
Rate per kg. of Material Z	₹ 72	
Total purchase price	₹ 1,81,66,320	

(c) Since, the maximum number of orders per year cannot be more than 40 orders and the maximum quantity per order that can be purchased is 4,000 kg. Hence, the total quantity of Material Z that can be available for production:

= 4,000 kg. × 40 orders = 1,60,000 kg.

	Product X	Product Y
Material needed for production to maintain the same production mix	1,03,929 kg. $\left(1,60,000 \times \frac{1,63,889}{2,52,310}\right)$	56,071 kg. $\left(1,60,000 \times \frac{88,421}{2,52,310}\right)$
Less: Process wastage	10,393 kg	2,804 kg
Net Material available for production	93,536 kg	53,267 kg
Units to be produced	18,707 units $\left(\frac{93,536\ kg}{5\ kg}\right)$	8,878 units $\left(\frac{53,267\ kg}{6\ kg}\right)$

PROBLEM – 15: (MTP 1 JAN 25)

The following information relates to Anu Limited, a AI enabled toy manufacturing company:

The selling price of a toy is ₹ 3,000, and sales are made on credit and invoiced on the last day of the month.

Variable costs of production per toy are materials (₹ 1,000), labour (₹ 800), and overhead (₹400)

The sales manager has forecasted the following volumes:

Month	No. of Toys
November	1,000
December	1,000
January	1,000
February	1,250
March	1,500
April	2,000
May	1,900
June	2,200
July	2,200
August	2,300

Customers are expected to pay 50% One month after the sale and 50% Two months after the sale.

The company produces the toys two months before they are sold and the creditors for materials are paid two months after production.

Variable overheads are paid in the month following production and are expected to increase by 25 % in April; 75% of wages are paid in the month of production and 25% in the following month. A wage increase of 25% will take place on 1st March.

The company needs funds for the running the business and purchase of new machine so it will sell one of its freehold properties in June for ₹ 20,00,000, and buy a new machine in June for ₹ 5,00,000. Depreciation is currently ₹ 10,000 per month, and will rise to ₹ 15,000 after the purchase of the new machine.

The company's corporation tax of ₹ 1,00,000 is due for payment in March.

The company presently has a cash balance at bank on 31 December 2023, of ₹ 50,000.

You are required to PREPARE a cash budget for the six months from January to June, 2024.

SOLUTION:

Workings:

1. Sale receipts

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Forecast sales (S)	1,000	1,000	1,000	1,250	1,500	2,000	1,900	2,200
	₹	₹	₹	₹	₹	₹	₹	₹
S × 3000	30,00,000	30,00,000	30,00,000	37,50,000	45,00,000	60,00,000	57,00,000	66,00,000
Debtors pay:								
1 month 50%		15,00,000	15,00,000	15,00,000	18,75,000	22,50,000	30,00,000	28,50,000
2nd month 50%		-	15,00,000	15,00,000	15,00,000	18,75,000	22,50,000	30,00,000
	-	15,00,000	30,00,000	30,00,000	33,75,000	41,25,000	52,50,000	58,50,000

2. Variable overheads

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹	₹
Variable overhead (Q × 400)	4,00,000	5,00,000	6,00,000	8,00,000	7,60,000			
Variable overhead (Q × 500)						11,00,000	11,00,000	11,50,000

Paid one month later		4,00,000	5,00,000	6,00,000	8,00,000	7,60,000	11,00,000	11,00,000

3. Wages payments

Month	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹
Wages (Q × 800)	10,00,000	12,00,000	16,00,000				
Wages (Q × 1,000)				19,00,000	22,00,000	22,00,000	23,00,000
75% this month	7,50,000	9,00,000	12,00,000	14,25,000	16,50,000	16,50,000	17,25,000
25% next month		2,50,000	3,00,000	4,00,000	4,75,000	5,50,000	5,50,000
	7,50,000	11,50,000	15,00,000	18,25,000	21,25,000	22,00,000	22,75,000

Cash Budget – Six Months Ended June

	Jan	Feb	Mar	Apr	May	Jun
	₹	₹	₹	₹	₹	₹
Receipts:						
Sales receipts	30,00,000	30,00,000	33,75,000	41,25,000	52,50,000	58,50,000
Freehold property	-	-	-	-	-	20,00,000
	30,00,000	**30,00,000**	**33,75,000**	**41,25,000**	**52,50,000**	**78,50,000**
Payments:						
Materials	10,00,000	12,50,000	15,00,000	20,00,000	19,00,000	22,00,000
Var. overheads	5,00,000	6,00,000	8,00,000	7,60,000	11,00,000	11,00,000
Wages	11,50,000	15,00,000	18,25,000	21,25,000	22,00,000	22,75,000
Machine	-	-	-	-	-	5,00,000
Tax	-	-	1,00,000	-	-	-
	26,50,000	**33,50,000**	**42,25,000**	**48,85,000**	**52,00,000**	**60,75,000**
Net cash flow	3,50,000	(3,50,000)	(8,50,000)	(7,60,000)	50,000	17,75,000
Balance b/f	50,000	4,00,000	50,000	(8,00,000)	(15,60,000)	(15,10,000)
Cumulative cash flow	4,00,000	50,000	(8,00,000)	(15,60,000)	(15,10,000)	2,65,000

PROBLEM – 16: **(RTP MAY 24)**

M Ltd. is a public sector undertaking (PSU), produces a product A. The company is in process of preparing its revenue budget for the year 2024. 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 2023 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 2024 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 2024 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 2024.

(viii) Power cost for the year 2023 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 2023, 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 2023, 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 2024.

(xi) During the year 2023, the company has paid ₹ 6,00,000 for car hire charges (excluding fuel cost). In year 2024, 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 2023 is ₹ 80,40,00,000 and it will

be 15% lower in 2024.

You being an associate to the budget controller of the company, PREPARE Revenue (Flexible) budget for the year 2024 and also show the budgeted profit/ loss for the year.

SOLUTION:

Revenue Budget (Flexible Budget) of M Ltd. for the Year 2024

	Particulars	PY 2023	CY 2024
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 [(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) + (iii)]**	**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)	**Tota power cost [(iii)×(iv)]**	**42**	**45.024**
G	Safety and maintenance Cost	60	67.20 [112% × 4,20,000]
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)**

PROBLEM – 17: (MTP 2 MAY 24)

Aman International School has a total of 180 students consisting of 6 sections with 30 students per section. The school plans for a picnic around the city during the week-end to places such as Prayag zoo, the Capi Park, Azad planetarium etc. A private transport operator has come forward to lease out the buses for taking the students. Each bus will have a maximum capacity of 50 (excluding 2 seats reserved for the teachers accompanying the students). The school will employ two teachers for each bus, paying them an allowance of ₹ 500 per teacher. It will also lease out the required number of buses. The following are the other cost estimates:

	Cost per student (₹)
Breakfast	50
Lunch	100
Tea	10
Entrance fee at zoo	20

Rent ₹ 6500 per bus.

Special permit fee ₹ 500 per bus.

Block entrance fee at the planetarium ₹ 2500. Prizes to students for games ₹ 500.

No cost are incurred in respect of the accompanying teachers (except the allowance of ₹ 500 per teacher).

You are required to PREPARE:

(a) A flexible budget estimating the total cost for the levels of 60, 90,120,150 and 180 students. Each item of cost is to be indicated separately.

(b) COMPARE the average cost per student at these levels.

(c) WHAT will be your conclusions regarding the break-been level of student if the school proposes to collect ₹ 400 per student?

SOLUTION:

a) Flexible Budget for different levels

	₹	₹	₹	₹	₹
No. of Students	60	90	120	150	180
Variable Cost					
Breakfast	3000	4500	6000	7500	9000
Lunch	6000	9000	12000	15000	18000
Tea	600	900	1200	1500	1800
Entrance fee	1200	1800	2400	3000	3600
Sub-Total (A)	**10800**	**16200**	**21600**	**27000**	**32400**
Variable cost/unit	180	180	180	180	180
Semi-Variable Cost					
Bus rent	13000	13000	19500	19500	26000
Special permit fee	1000	1000	1500	1500	2000
Allowance for teachers	2000	2000	3000	3000	4000
Sub-total (B)	**16000**	**16000**	**24000**	**24000**	**32000**
Fixed Cost					
Block entrance fee	2500	2500	2500	2500	2500
Prize to students	500	500	500	500	500
Sub total (C)	**3000**	**3000**	**3000**	**3000**	**3000**
Total cost (A + B + C)	29,800	35,200	48,600	54,000	67,400
b) Cost per student	**496.67**	**391.11**	**405.00**	**360.00**	**374.44**

c) Break-even level

	₹
Collection per students	400
Less Variable Cost	180
Contribution	**220**

Since semi-fixed costs relate to a block of 50 students, the fixed and semi-variable cost for three level will be:

Level of Student	**51 – 100**	**101 – 150**	**151 - 200**
Fixed + Semi-variable cost (₹)	19,000	27,000	35,000
Contribution per unit (₹)	220	220	220
Break Even level of students	**86**	**123**	**159**

PROBLEM – 18:

The following data is available for DKG and Co:

Standard working hours	**8 hours per day of 5 days per week**
Maximum capacity	**50 employees**
Actual working	**40 employees**
Actual hours expected to be worked per four week	**6,400 hours**
Standard 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 a national event.

CALCULATE the following ratios:

1. **Efficiency Ratio**
2. **Activity Ratio**
3. **Calendar Ratio**
4. **Standard Capacity Usage Ratio**
5. **Actual Capacity Usage Ratio**
6. **Actual Usage of Budgeted Capacity Ratio**

SOLUTION:

Maximum Capacity in a budget period

= 50 Employees × 8 Hours × 5 Days × 4 Weeks = 8,000 Hours

Budgeted Hours

40 Employees × 8 Hours × 5 Days × 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 x 5 Days)

Actual No. of Days = 20 – 1 = 19 Days

1. Efficiency Ratio = $\frac{\text{Standard Hours}}{\text{Actual Hours}} \times 100 = \frac{7000 \text{ Hours}}{6000 \text{ Hours}} \times 100 = 116.67\%$

2. Activity Ratio = $\frac{\text{Standard Hours}}{\text{Budgeted Hours}} \times 100 = \frac{7000 \text{ Hours}}{6,400 \text{ Hours}} \times 100 = 109.375\%$

3. Calendar Ratio $\frac{\text{Available working days}}{\text{Budgeted working days}} \times 100 = \frac{19 \text{ days}}{20 \text{ days}} \times 100 = 95\%$

4. Standard Capacity usage ratio $= \frac{\text{Budgeted Hours}}{\text{Maximum possible hours in the budgeted period}} \times 100$

$= \frac{6400 \text{ Hours}}{8000 \text{ Hours}} \times 100 = 80\%$

5. Actual Capacity usage ratio $= \frac{\text{Actual Hours worked}}{\text{Max possible working hours in a period}} \times 100$

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

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

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

1. INTRODUCTION TO COST AND MANAGEMENT ACCOUNTING

Multiple Choice Questions

1. ..... is anything for which a separate measurement is required.
   (a) Cost unit
   (b) Cost object
   (c) Cost driver
   (d) Cost centre

2. Which of the following is true about Cost control?
   (a) It is a corrective function
   (b) It challenges the set standards
   (c) It ends when targets achieved
   (d) It is concerned with future

3. Cost units used in power sector is:
   (a) Kilometer (K.M)
   (b) Kilowatt-hour (kWh)
   (c) Number of electric points
   (d) Number of hours

4. Process Costing method is suitable for
   (a) Transport sector
   (b) Chemical industries
   (c) Dam construction
   (d) Furniture making

5. Which of the following is Not true about the cost control and cost reduction:
   (a) Cost control seeks to attain lowest possible cost under best conditions.
   (b) Cost control emphasises on past and present.
   (c) Cost reduction is a corrective function. It operates even when an efficient cost control system exists.
   (d) Cost control ends when targets are achieved.

6. The advantage of using IT in Cost Accounting does not include:
   (a) Integration of various functions
   (b) Stock needs to be reconciled with Goods Received Note
   (c) Reduction in multicity of documents
   (d) Customised reports can be prepared.

7. A taxi provider charges minimum ₹ 80 thereafter ₹ 12 per kilometer of distance travelled, the behaviour of conveyance cost is:
   (a) Fixed Cost
   (b) Semi-variable Cost
   (c) Variable Cost
   (d) Administrative cost.

8. A Ltd. has three production department, and each department has two machines, which of the following cannot be treated as cost centre for cost allocation:
   (a) Machines under the production department
   (b) Production departments
   (c) Both Production department and machines
   (d) A Ltd.

9. Which of the following is an example of functional classification of cost:
   (a) Direct Material Cost
   (b) Fixed Cost
   (c) Administrative Overheads
   (d) Indirect Overheads.

10. Ticket counter in a Railway Station is an example of
   (a) Cost Centre
   (b) Revenue Centre
   (c) Profit Centre
   (d) Investment Centre

Answers to the MCQs

1.	(b)	2.	(c)	3.	(b)	4.	(b)	5.	(a)	6.	(b)
7.	(b)	8.	(d)	9.	(c)	10.	(b)				

2. MATERIAL COST

Multiple Choice Questions

1. Direct material can be classified as
   (a) Fixed cost
   (b) Variable cost
   (c) Semi-variable cost.
   (d) Prime Cost

2. In most of the industries, the most important element of cost is
   (a) Material
   (b) Labour
   (c) Overheads
   (d) Administration Cost

3. Which of the following is considered to be the normal loss of materials?
   (a) Loss due to accidents
   (b) Pilferage
   (c) Loss due to breaking the bulk
   (d) Loss due to careless handling of materials.

4. In which of following methods of pricing, costs lag behind the current economic values?
   (a) Last-in-first out price
   (b) First-in-first out price
   (c) Replacement price
   (d) Weighted average price

5. Continuous stock taking is a part of
   (a) Annual stock taking
   (b) Perpetual inventory
   (c) ABC analysis.
   (d) Bin Cards

6. In which of the following methods, issues of materials are priced at pre-determined rate?
   (a) Inflated price method

(b) Standard price method

(c) Replacement price method

(d) Market price method.

7. When material prices fluctuate widely, the method of pricing that gives absurd results is

(a) Simple average price

(b) Weighted average price

(c) Moving average price

(d) Inflated price.

8. When prices fluctuate widely, the method that will smooth out the effect of fluctuations is

(a) Simple average

(b) Weighted average

(c) FIFO

(d) LIFO

9. Under the FSN system of inventory control, inventory is classified on the basis of:

(a) Volume of material consumption

(d) Frequency of usage of items of inventory

(c) Criticality of the item of inventory for production

(d) Value of items of inventory

10. Form used for making a formal request to the purchasing department to purchase materials is a - :

(a) Material Transfer Note

(b) Purchase Requisition Note

(c) Bill of Materials

(d) Material Requisition Note

Answers to the MCQs

1.	(b)	**2.**	(a)	**3.**	(c)	**4.**	(b)	**5.**	(b)	**6.**	(b)
7.	(a)	**8.**	(b)	**9.**	(b)	**10.**	(b)				

Case Scenarios

QUESTION 1: The purchase committee of A Ltd. has been entrusted to review the material procurement policy of the company. The chief marketing manager has appraised the committee that the company at present produces a single product X by using two raw materials A and B in the ratio of 3:2. Material A is perishable in nature and has to be used within 10 days from Goods received note (GRN) date otherwise material becomes obsolete. Material B is durable in nature and can be used even after one year. Material A is purchased from the local market within 1 to 2 days of placing order. Material B, on the other hand, is purchased from neighbouring state and it takes 2 to 4 days to receive the material in the store.

The purchase price of per kilogram of raw material A and B is ₹ 30 and ₹ 44 respectively exclusive of taxes. To place an order, the company has to incur an administrative cost of ₹ 1,200. Carrying cost for Material A and B is 15% and 5% respectively. At present material A is purchased in a lot of 15,000 kg. to avail 10% discount on market price. GST applicable for both the materials is 18% and the input tax credit is availed.

The sales department has provided an estimate that the company could sell 30,000 kg. in January 2024 and also projected the same trend for the entire year.

The ratio of input and output is 5:3. Company works for 25 days in a month and production is carried out evenly.

The following queries/ calculations to be kept ready for purchase committees' reference:

i. For the month of January 2024, what would be the quantity of the materials to be requisitioned for both material A and B:
   (a) 9,000 kg & 6,000 kg respectively
   (b) 18,000 kg & 12,000 kg respectively
   (c) 27,000 kg & 18,000 kg respectively
   (d) 30,000 kg & 20,000 kg respectively.

ii. The economic order quantity (EOQ) for both the material A & B:
   (a) 13,856 kg & 16,181 kg respectively
   (b) 16,197 kg & 17,327 kg respectively
   (c) 16,181 kg & 17,165 kg respectively
   (d) 13,197 kg & 17,165 kg respectively

iii. What would the maximum stock level for material A:
   (a) 18,200 kg.
   (b) 12,000 kg.

(c) 16,000 kg.

(d) 16,200 kg.

iv. Calculate saving/ loss in purchase of Material A if the purchase order quantity is equal to EOQ.

(a) Profit of ₹3,21,201.

(b) Loss of ₹3,21,201.

(c) Profit of ₹2,52,500.

(d) Loss of ₹2,52,500.

v. What would the minimum stock level for material A:

(a) 1,800 kg.

(b) 1,200 kg.

(c) 600 kg.

(d) 2,400 kg.

Answer:

i. (d) ii. (a) iii. (b) iv. (b) v. (c)

(i) (d)

Monthly Production of X = 30,000 kgs.

Raw Material Required = 30,000 × 5 ÷ 3 = **50,000 kgs.**

Material A = 50,000 × 3 ÷ 5 = **30,000 kg.**

Material B = 50,000 × 2 ÷ 5 = **20,000 kg.**

(ii) (a)

Calculation of Economic Order Quantity (EOQ):

$$\text{Material A} = \sqrt{\frac{2 \times \text{Annual consumption} \times \text{Order cost}}{\text{Carrying cost per unit p.a.}}}$$

$$= \sqrt{\frac{2 \times (30{,}000 \times 12) \times 1{,}200}{15\% \text{ of } 30}} = \mathbf{13{,}856\ kg.}$$

$$\text{Material B} = \sqrt{\frac{2 \times (20{,}000 \times 12) \times 1{,}200}{5\% \text{ of } 44}} = \mathbf{16{,}181\ kg.}$$

(iii) (b)

Calculation of Maximum Stock level: Since, the Material A is perishable in nature and it required to be used within 10 days, hence, the Maximum Stock Level shall be lower of two:

(a) Stock equal to 10 days consumption

=30000 ÷ 25 × 10 days = 12,000 kg.

(b) Maximum Stock Level for Material A:

Re-order Quantity + Re-order level – (Min consumption* × Min. lead time)

Where,

Re-order Quantity = 15,000 kg.

Re-order level = Max. Consumption* × Max. Lead time

= 30,000 ÷ 25 × 2 days = 2,400 kg.

Maximum stock Level = 15,000 kg. + 2,400 kg. - (30,000 ÷ 25 × 1 day)

= 17,400 – 1,200 = 16,200 kg.

Stock required for 10 days consumption is lower than the maximum stock level calculated through the formula. Therefore, Maximum Stock Level will be **12,000 kg.**

(*Since, production is processed evenly throughout the month hence material consumption will also be even.)

(iv) (b)

Calculation of Savings/ loss in Material A if purchase quantity equals to EOQ.

	Purchase Quantity = 15,000 kg.	**Purchase Quantity = EOQ i.e. 13,856 kg.**
Annual consumption	3,60,000 kg. (30,000 × 12 months)	3,60,000 kg. (30,000 × 12 months)
No. of orders [Note- (i)]	30 (3,60,000 ÷ 12,000)	30 (3,60,000 ÷ 12,000)
Ordering Cost (a)	₹ 36,000 (₹ 1200 × 30)	₹ 36,000 (₹ 1200 × 30)
Carrying Cost (b) [Note- (ii)]	₹ 30,375 (15% of ₹ 27 × 7,500)	₹ 31,176 (15% of ₹ 30 × 6,928)
Purchase Cost (c) (for good portion)	₹ 97,20,000 (₹ 27 × 3,60,000)	₹ 1,08,00,000 (₹ 30 × 3,60,000)
Loss due to obsolescence (d) [Note- (iii)]	₹ 24,30,000 [₹ 27 × (30 × 3,000)]	₹ 16,70,400 [₹ 30 × (30 × 1,856)]
Total Cost [(a) + (b) + (c) + (d)]	₹ 1,22,16,375	₹ 1,25,37,576

Purchasing of material -A at present policy of 15,000 kg. saves ₹ **3,21,201**.

Notes: (i) Since, material gets obsolete after 10 days, the quantity in excess of 10 days consumption i.e. 12,000 kg. are wasted. Hence, after 12,000 kg. a fresh order needs to be given.

(ii) Carrying cost is incurred on average stock of Materials purchased.

(iii) the excess quantity of material becomes obsolete and loss has to be incurred.

(v) (c)

Minimum Stock Level for Material A

= Re-order level – (Average Consumption Rate x Average Re-order Period)

= 2400 – (1200 x 1.5) = **600 kgs**

Re-order level = Max. Consumption* × Max. Lead time

= 30,000 ÷ 25 × 2 days = 2,400 kg.

Average Consumption Rate = (30,000 ÷ 25 + 30,000 ÷ 25) ÷ 2

= 1,200 Kg

Average Re-order Period = (1 + 2) ÷ 2 = 1.5 Days

Stock required for 10 days consumption is lower than the maximum stock level calculated through the formula. Therefore, Maximum Stock Level will be 12,000 kg.

(*Since, production is processed evenly throughout the month hence material consumption will also be even.)

3. EMPLOYEE COST AND DIRECT EXPENSES

Multiple Choice Questions

1. Idle time is the time under which-
   (a) Full wages are paid to workers
   (b) No productivity is given by the workers
   (c) Both (a) and (b)
   (d) None of the above

2. Cost of idle time due to non- availability of raw material is-
   (a) Charged to overhead costs
   (b) Charged to respective jobs
   (c) Charged to costing profit and loss account
   (d) None of the above

3. Time and motion study is conducted by-
   (a) Time keeping department
   (b) Personnel department
   (c) Payroll department
   (d) Engineering department

4. Identify, which one of the following, does not account for increasing labour productivity-
   (a) Job satisfaction
   (b) Motivating workers
   (c) High labour turnover
   (d) Proper supervision and control

5. Labour turnover is measured by-
   (a) Number of persons replaced/ average number of workers
   (b) Numbers of persons separated / number of workers at the beginning of the year
   (c) (Number of persons replaced + number of persons separated)/(number of persons at the beginning + the number of persons at the end of the year)
   (d) None of the above

6. Time booking refers to a method wherein …… of an employee is recorded.
   (a) Attendance
   (b) Food expenses
   (c) Health status
   (d) Time spent on a particular job

7. Employee Cost includes-
   (a) Wages and salaries
   (b) Allowances and incentives
   (c) Payment for overtime
   (d) All of the above

8. If the time saved is less than 50% of the standard time, then the wages under Rowan and Halsey premium plan on comparison gives-
   (a) More wages to workers under Rowan plan than Halsey plan
   (b) More wages to workers under Halsey plan than Rowan plan
   (c) Equal wages under two plans
   (d) None of the above

9. Standard time of a job is 60 hours and guaranteed time rate is ₹ 0.30 per hour. What is the amount of wages under Rowan plan if job is completed in 48 hours?
   (a) ₹ 16.20
   (b) ₹ 17.28
   (c) ₹ 18.00
   (d) ₹ 14.40

10. Important factors for control of employee cost can be-
    (a) Time and Motion Study
    (b) Control over idle time and overtime
    (c) Control over employee turnover
    (d) All of the above

11. Out of the following methods attendance is marked by recognizing an employee based on physical and behavioural traits-
    (a) Punch Card Attendance method

(b) Bio- Metric Attendance system

(c) Attendance Register method

(d) Token Method

12. If overtime is required for meeting urgent orders, the overtime premium should be charged as-

(a) Respective job

(b) Overhead cost

(c) Costing P& L A/c

(d) None of above

Answers to the MCQs

1.	(c)	2.	(c)	3.	(d)	4.	(c)	5.	(a)	6.	(d)
7.	(d)	8.	(a)	9.	(b)	10.	(d)	11.	(b)	12.	(a)

Case Scenarios

QUESTION 1: The board of the J Ltd. has been appraised by the General Manager (HR) that the employee attrition rate in the company has increased. The following facts has been presented by the GM(HR):

(1) Training period of the new recruits is 50,000 hours During this period their productivity is 60% of the experienced workers Time required by an experienced worker is 10 hours per unit.

(2) 20% of the output during training period was defective. Cost of rectification of a defective unit was ₹ 25.

(3) Potential productive hours lost due to delay in recruitment were 1,00,000 hours

(4) Selling price per unit is ₹ 180 and P/V ratio is 20%.

(5) Settlement cost of the workers leaving the organization was ₹ 1,83,480.

(6) Recruitment cost was ₹ 1,56,340

(7) Training cost was ₹ 1,13,180

You being an associate finance to GM(HR), has been asked the following questions:

i. How much quantity of output is lost due to labour turnover?

(a) 10,000 units

(b) 8,000 units

(c) 12,000 units

(d) 12,600 units

ii. How much loss in the form of contribution, the company incurred due to labour turnover?

(a) ₹ 4,32,000

(b) ₹ 4,20,000

(c) ₹ 4,36,000

(d) ₹ 4,28,000

iii. What is the cost repairing of defective units?

(a) ₹ 75,000

(b) ₹ 15,000

(c) ₹ 50,000

(d) ₹ 25,000

iv. Calculate the profit lost by the company due to increased labour turnover.

(a) ₹ 7,50,000

(b) ₹ 15,00,000

(c) ₹ 5,00,000

(d) ₹ 9,00,000

v. How much quantity of output is lost due to inexperience of the new worker?

(a) 1,000 units

(b) 2,600 units

(c) 2,000 units

(d) 12,600 units

Answer:

i.	(c)	**ii.**	(a)	**iii.**	(b)	**iv.**	(d)	**v.**	(c)

(i) (c)

Output by experienced workers in 50,000 hours

= 50,000 ÷ 10 =5,000 units

∴ Output by new recruits = 60% of 5,000 = 3,000 units

Loss of output = 5,000 – 3,000 = 2,000 units

Total loss of output = Due to delay recruitment + Due to inexperience

= 10,000 + 2,000 = 12,000 units

(ii) (a)

Contribution per unit = 20% of ₹ 180 = ₹ 36

Total contribution lost = ₹ 36 × 12,000 units = ₹ 4,32,000

(iii) (b)

Cost of repairing defective units = 3,000 units × 0.2 × ₹ 25 = ₹ 15,000

(iv) (d)

Calculation of loss of profit due to labour turnover

	(₹)
Loss of Contribution	4,32,000
Cost of repairing defective units	15,000
Recruitment cost	1,56,340
Training cost	1,13,180
Settlement cost of workers leaving	1,83,480
Profit forgone in 2022-23	9,00,000

(v) (c)

Output by experienced workers in 50,000 hours

= = 5,000 units 50,000 10

Output by new recruits = 60% of 5,000 = 3,000 units

Loss of output = 5,000 – 3,000 = 2,000 units

4. OVERHEADSABSORPTION COSTING METHOD

Multiple Choice Questions

1. "Fixed overhead costs are not affected in monetary terms during a given period by a change in output". But this statement holds good provided:
   (a) Increase in output is not substantial
   (b) Increase in output is substantial
   (c) Both (a) and (b)
   (d) None of the above

2. ..... capacity is defined as actually utilised capacity of a plant.
   (a) Theoretical
   (b) Installed
   (c) Practical
   (d) Normal

3. The allotment of whole items of cost to cost centres or cost units is called:
   (a) Overhead absorption
   (b) Cost apportionment
   (c) Cost allocation
   (d) None of the above

4. Primary packing cost is a part of:
   (a) Direct material cost
   (b) Production Cost
   (c) Selling overheads
   (d) Distribution overheads

5. Director's remuneration and expenses form part of:
   (a) Production overhead
   (b) Administration overhead
   (c) Selling overhead
   (d) Distribution overhead

6. Which of the following is not the classification of overhead based on its functionality?
   (a) Factory Overhead
   (b) Administrative Overhead
   (c) Fixed Overhead
   (d) Selling Overhead

7. Bad debt is an example of:
   (a) Distribution overhead
   (b) Production overhead
   (c) Selling overhead
   (d) Administration overhead

8. Normal capacity of a plant refers to the difference between:
   (a) Maximum capacity and practical capacity
   (b) Practical capacity and normal capacity
   (c) Practical capacity and estimated idle capacity as revealed by long term sales trend.
   (d) Maximum capacity and actual capacity

9. The difference between actual factory overhead and absorbed factory overhead will be usually at the minimum level, provided pre- determined overhead rate is based on:
   (a) Maximum capacity
   (b) Direct labour hours
   (c) Machine hours
   (d) Normal capacity

10. Which of the following overhead cost may not be apportioned on the basis of direct wages?
   (a) Worker's Holiday Pay
   (b) Perquisites to worker
   (c) ESI contribution
   (d) Managerial Salaries

Answers to the MCQs

1.	(a)	**2.**	(c)	**3.**	(c)	**4.**	(b)	**5.**	(b)	**6.**	(c)
7.	(c)	**8.**	(c)	**9.**	(d)	**10**	(d)				

Case Scenarios

QUESTION 1: During half year ending inter departmental review meeting of P Ltd., cost variance report was discussed and the performance of the departments were assessed. The following figures were presented.

For a period of first six months of the financial year, following information were extracted from the books:

Actual production overheads	₹ 34,08,000
The above amount is inclusive of the following payments made:	
Paid as per court's order	₹ 4,50,000
Expenses of previous year booked in current year	₹ 1,00,000
Paid to workers for strike period under an award	₹ 4,20,000
Obsolete stores written off	₹ 36,000

Machine worked during the period was 3,000 hours

At the of preparation of revenue budget, it was estimated that a total of ₹ 50,40,000 would be required for budgeted machine hours of 6,000 as production overheads for the entire year.

During the meeting, a data analytic report revealed that 40% of the over/under-absorption was due to defective production policies and the balance was attributable to increase in costs.

You were also present at the meeting; the chairperson of the meeting has asked you to be ready with the followings for the performance appraisal of the departmental heads:

(i) How much was the budgeted machine hour rate used to recover overhead?

(a) ₹ 760

(b) ₹ 820

(c) ₹ 780

(d) ₹ 840

(ii) How much amount of production overhead has been recovered (absorbed) upto the end of half year end?

(a) ₹ 25,20,000

(b) ₹ 34,08,000

(c) ₹ 24,00,000

(d) ₹ 24,60,000

(iii) What is the amount of overhead under/ over absorbed?

(a) 1,18,000 over-absorbed

(b) 1,18,000 under- absorbed

(c) 18,000 over-absorbed

(d) 18,000 under-absorbed

(iv) What is the supplementary rate for apportionment of over/under absorbed overheads over WIP, Finished goods and Cost of sales?

(a) ₹ 0.315 per unit

(b) ₹ 0.472 per unit

(c) ₹ 0.787 per unit

(d) ₹ 1 per unit

(v) What is the amount of over/under absorbed overhead apportioned to Work in Progress?

(a) ₹ 9,440

(b) ₹ 42,480

(c) ₹ 18,880

(d) ₹ 70,800

Answer:

i. (d) **ii.** (a) **iii.** (a) **iv.** (b) **v.** (c)

(i) (d)

Budgeted Machine hour rate (Blanket rate)

= ₹ 50,40,000 ÷ 6,000 hours = ₹ 840 per hour

(ii) (a) ₹ 25,20,000

(iii) (a)

	Amount (₹)	Amount (₹)
Total production overheads actually incurred during the period		34,08,000
Less: Amount paid to worker as per court order		4,50,000
Expenses of previous year booked in the current year		1,00,000
Wages paid for the strike period under an award		4,20,000
Obsolete stores written off	36,000	10,06,000
		24,02,000
Less: Production overheads absorbed as per machine hour rate (3,000 hours × ₹ 840*)		25,20,000
Amount of over absorbed production overheads		1,18,000

(iv) (b)

Accounting treatment of over absorbed production overheads: As, 40% of the over absorbed overheads were due to defective production policies, this being abnormal, hence should be credited to Costing Profit and Loss Account.

Amount to be credited to Costing Profit and Loss Account

= ₹ 1,18,000 × 40% = ₹ 47,200.

Balance of over absorbed production overheads should be distributed over Works in progress, Finished goods and Cost of sales by applying supplementary rate*.

Amount to be distributed = ₹ 1,18,000 × 60% = ₹ 70,800

Supplementary rate = ₹ 70,800 ÷ 1,50,000 units = 0.472 per unit

(v) (c)

Apportionment of over absorbed production overheads over WIP, Finished goods and Cost of sales:

	Equivalent completed units	**Amount (₹)**
Work-in-Progress (80,000 units × 50% × 0.472)	40,000	18,880
Finished goods (20,000 units × 0.472)	20,000	9,440
Cost of sales (90,000 units × 0.472)	90,000	42,480
Total	1,50,000	70,800

5. ACTIVITY BASED COSTING

Multiple Choice Questions

1. A cost driver is:

   (a) An item of production overheads

   (b) A common cost which is shared over cost centres

   (c) Any cost relating to transport

   (d) An activity which generates costs

2. In activity based costing, costs are accumulated by activity using:

   (a) Cost drivers

   (b) Cost objects

   (c) Cost pools

   (d) Cost benefit analysis

3. A cost driver:

   (a) Is a force behind the overhead cost

   (b) Is an allocation base

   (c) Is a transaction that is a significant determinant of cost

   (d) All of the above

4. Which of the following is not a correct match:

Activity	**Cost Driver**
(a) Production Scheduling	Number of Production runs
(b) Despatching	Number of dispatch orders
(c) Goods receiving	Goods received orders
(d) Inspection	Machine hours

5. Transactions undertaken by support department personnel are the appropriate cost drivers Find the one which is **not** appropriate:

   (a) The number of purchase, supplies and customers' orders drives the cost associated with new material inventory, work-in-progress and finished goods inventory

   (b) The number of production runs undertaken drives production scheduling, inspection and material handling

   (c) The quality of raw material issued drives the cost of receiving department costs

(d) The number of packing orders drives the packing costs

6. Steps in ABC include:

(a) Identification of activities and their respective costs

(b) Identification of cost driver of each activity and computation of an allocation rate per activity

(c) Allocation of overhead cost to products/ services based on the activities involved

(d) All of the above

7. Which of the following is not a benefit of ABC?

(a) Accurate cost allocation

(b) Improved decision making

(c) Better control on activity and costs

(d) Reduction of prime cost

8. The steps involved for installation of ABC in a manufacturing company include the following except:

(a) Borrowing fund

(b) Feasibility study

(c) Building up necessary IT infrastructure and training of line employees

(d) Strategy and value chain analysis

9. Which of the following statements are true:

(1) Activity based Management involves activity analysis and performance measurement.

(2) Activity based costing serves as a major source of information in ABM.

(a) (1) True; (2) False

(b) (1) True; (2) True

(c) (1) False; (2) True

(d) (1) False; (2) False

10. The key elements of activity based budgeting are:

(a) Type of activity to be performed

(b) Quantity of activity to be performed

(c) Cost of activity to be performed

(d) All of the above

Answers to the MCQs

1.	(d)	**2.**	(c)	**3.**	(d)	**4.**	(d)	**5.**	(c)	**6.**	(d)
7.	(d)	**8.**	(a)	**9.**	(b)	**10.**	(d)				

Case Scenarios

QUESTION 1: The sales department of A Limited is analysing the customer profitability for its Product Z. It has decided to analyse the profitability of its five new customers using activity-based costing method. It buys Product Z at ₹5,400 per unit and sells to retail customers at a listed price of ₹ 6,480 per unit. The data pertaining to five customers are:

	Customers				
	A	**B**	**C**	**D**	**E**
Units sold	4,500	6,000	9,500	7,500	12,750
Listed Selling Price	₹ 6,480	₹ 6,480	₹ 6,480	₹ 6,480	₹ 6,480
Actual Selling Price	₹ 6,480	₹ 6,372	₹ 5,940	₹ 6,264	₹ 5,832
Number of Purchaseorders	15	25	30	25	30
Number of Customervisits	2	3	6	2	3
Number of deliveries	10	30	60	40	20
Kilometers travelled perdelivery	20	6	5	10	30
Number of expediteddeliveries	0	0	0	0	1

After a detailed analysis and computation, the following activities has beenidentified and respective cost has been calculated:

Activity	**Cost Driver Rate**
Order taking	₹ 4,500 per purchase order
Customer visits	₹ 3,600 per customer visit
Deliveries	₹ 7.50 per delivery Km travelled
Product handling	₹ 22.50 per case sold
Expedited deliveries	₹ 13,500 per expedited delivery

You have been assigned the following task of computing different costinformation for managerial decision making:

(i) How much cost on customer visit is incurred on customer E?

(a) ₹ 7,200

(b) ₹ 10,800

(c) ₹ 21,600

(d) ₹ 3,600

(ii) What is the cost of goods sold for customer D?

(a) ₹ 2,43,00,000

(b) ₹ 3,24,00,000

(c) ₹ 5,13,00,000

(d) ₹ 4,05,00,000

(iii) How much is the cost of expediting delivery for customer A?

(a) ₹ 13,500

(b) ₹ 27,000

(c) ₹ 40,500

(d) ₹ 0

(iv) Compute the customer-level operating income of each of customers A.

(a) ₹ 55,72,350

(b) ₹ 46,82,550

(c) ₹ 47,57,400

(d) ₹ 50,57,325

(v) Compute the customer-level operating income of each of five retailcustomers D and E.

(a) ₹ 46,82,550 & 50,65,720

(b) ₹ 55,72,350 & 46,85,500

(c) ₹ 47,57,400 & 55,72,350

(d) ₹ 61,88,550 & 50,57,325

Answers to the Case Scenarios

i.	**(b)**	**ii.**	**(d)**	**iii.**	**(c)**	**iv.**	**(b)**	**v.**	**(d)**

(i) (b) ₹ 10,800

(ii) (d) ₹ 4,05,00,000

(iii) (c) ₹ 0

(iv) (b) ₹ 46,82,550

(v) (d) ₹ 61,88,550 & 50,57,325

Working note:

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

	Customers				
	A	**B**	**C**	**D**	**E**
Units sold: (a)	4,500	6,000	9,500	7,500	12,750
Revenues (at listed price) (₹): (b) {(a) ×₹ 6,480)}	2,91,60,000	3,88,80,000	6,15,60,000	4,86,00,000	8,26,20,000
Revenues (at listed price) (₹): (c) {(a) ×Actual selling price)}	2,91,60,000 (4,500 × 6,480)	3,82,32,000 (6,000 × 6,372)	5,64,30,000 (9,500 × 5,940)	4,69,80,000 (7,500 × 6,264)	7,43,58,000 (12,750 × 5,832)
Discount (₹) (d) {(b) – (c)}	0	6,48,000	51,30,000	16,20,000	82,62,000
Cost of goods sold (₹) : (e) {(a) x ₹ 5,400}	2,43,00,000	3,24,00,000	5,13,00,000	4,05,00,000	6,88,50,000
Customer level operating activities costs					
Order taking costs (₹): (No. of purchase orders × ₹ 4,500)	67,500	1,12,500	1,35,000	1,12,500	1,35,000
Customer visits costs (₹) (No. of customer visits x ₹ 3,600)	7,200	10,800	21,600	7,200	10,800
Delivery vehicles travel costs (₹) (Kms travelled by delivery vehicles x ₹ 7.50 per km.)	1,500	1,350	2,250	3,000	4,500
Product handling costs (₹) {(a) x ₹ 22.50}	1,01,250	1,35,000	2,13,750	1,68,750	2,86,875

Cost of expediting deliveries (₹) {No. of expedited deliveries x ₹ 13,500}	-	-	-	-	13,500
Total cost of customer level operating activities (₹)	1,77,450	2,59,650	3,72,600	2,91,450	4,50,675

Computation of Customer level operating income

	Customers				
	A	B	C	D	E
	(₹)	(₹)	(₹)	(₹)	(₹)
Revenues (At list price) (Refer to working note)	2,91,60,000	3,82,32,000	5,64,30,000	4,69,80,000	7,43,58,000
Less: Cost of goods sold (Refer to working note)	(2,43,00,000)	(3,24,00,000)	(5,13,00,000)	(4,05,00,000)	(6,88,50,000)
Gross margin	48,60,000	58,32,000	51,30,000	64,80,000	55,08,000
Less: Customer level operating activities costs (Refer to working note)	(1,77,450)	(2,59,650)	(3,72,600)	(2,91,450)	(4,50,675)
Customer level operating income	46,82,550	55,72,350	47,57,400	61,88,550	50,57,325

6. COST SHEET

Multiple Choice Questions

1. Generally, for the purpose of cost sheet preparation, costs are classified on the basis of:
   (a) Functions
   (b) Variability
   (c) Relevance
   (d) Nature

2. Which of the following does not form part of prime cost:
   (a) Cost of packing
   (b) Cost of transportation paid to bring materials to factory
   (c) GST paid on raw materials (input credit cannot be claimed)
   (d) Overtime premium paid to workers

3. A Ltd. received an order, for which it purchased a special frame formanufacturing, it is a part of:
   (a) Direct Materials
   (b) Direct expenses
   (c) Factory Overheads
   (d) Administration Overheads

4. Salary paid to plant supervisor is a part of
   (a) Direct expenses
   (b) Factory overheads
   (c) Quality control cost
   (d) Administration cost

5. Depreciation of director's laptop is treated as a part of:
   (a) Administration Overheads
   (b) Factory Overheads
   (c) Direct Expenses
   (d) Research & Development cost.

6. A manufacture has set-up a lab for testing of products for compliance withstandards, salary of this lab staffs are part of:
   (a) Works overheads
   (b) Quality Control Cost
   (c) Direct Expenses
   (d) Research & Development Cost.

7. Audit fees paid to auditors is part of:
   (a) Administration Cost
   (b) Production cost
   (c) Selling & Distribution cost
   (d) Not shown in cost sheet.

8. Salary paid to factory store staff is part of:
   (a) Factory overheads
   (b) Production Cost
   (c) Direct Employee cost
   (d) Direct Material Cost.

9. Canteen expenses for factory workers are part of:
   (a) Factory overhead
   (b) Administration Cost
   (c) Marketing cost
   (d) None of the above.

10. A company pays royalty to State Government on the basis of production, it istreated as:
   (a) Direct Material Cost
   (b) Factory Overheads
   (c) Direct Expenses
   (d) Administration cost.

Answers to the MCQs

1.	(a)	**2.**	(a)	**3.**	(b)	**4.**	(b)	**5.**	(a)	**6.**	(b)
7.	(a)	**8.**	(a)	**9.**	(a)	**10.**	(c)				

Case Scenarios

QUESTION 1: M Ltd. is producing a single product and may expand into product diversification in next one to two years M Ltd. is amongst a labour-intensive company where majority of processes are done manually. Employee cost is a major cost element in the total cost of the company. The company conventionally uses performance parameters Earnings per manshift (EMS) to measure cost paid to an employee for a shift of 8 hours, and Output per manshift (OMS) to measure an employee's output in a shift of 8 hours

The Chief Manager (Finance) of the company has emailed you few information related to the last month. The email contains the following data related to the last month:

During the last month, the company has produced 2,34,000 tonnes of output. Expenditures for the last months are:

(i) Raw materials consumed ₹ 50,00,000

(ii) Power consumed 13,000 Kwh @ ₹ 8 per Kwh to run the machines forproduction.

(iii) Diesels consumed 2,000 litres @ ₹ 93 per litre to run power generatorused as alternative or backup for power cuts.

(iv) Wages & salary paid – ₹ 6,40,00,000

(v) Gratuity & leave encashment paid – ₹ 64,20,000

(vi) Hiring charges paid for HEMM- ₹ 30,00,000. HEMM are directly used inproduction.

(vii) Hiring charges paid for cars used for official purpose – ₹ 66,000

(viii) Reimbursement of diesel cost for the cars – ₹ 22,000

(ix) The hiring of cars attracts GST under RCM @5% without credit.

(x) Maintenance cost paid for weighing bridge (used for weighing of finalgoods at the time of dispatch) – ₹ 12,000

(xi) AMC cost of CCTV installed at weighing bridge (used for weighing offinal goods at the time of dispatch) and factory premises is ₹ 8,000 and ₹ 18,000 per month respectively.

(xii) TA/ DA and hotel bill paid for sales manager - ₹ 36,000

(xiii) The company has 1,800 employees works for 26 days in a month.You are asked to calculate the followings:

i. What is the amount of prime cost incurred during the last month:

(a) ₹ 7,54,20,000

(b) ₹ 7,57,10,000

(c) ₹ 7,56,06,000

(d) ₹ 7,87,10,000

ii. What is the total and per shift cost of production for last month:

(a) ₹ 7,87,10,000 and ₹ 336.37 respectively

(b) ₹ 7,87,10,000 and ₹ 1,681.84 respectively

(c) ₹ 7,87,28,000 and ₹ 1,682.22 respectively

(d) ₹ 7,87,28,000 and ₹ 336.44 respectively

iii. What is the value of administrative cost incurred during the last month?

(a) ₹ 92,400

(b) ₹ 88,000

(c) ₹ 1,48,400

(d) ₹ 1,44,000

iv. What is the value of selling and distribution cost and total cost of sales?

(a) ₹ 36,000 & `7,88,76,400 respectively

(b) ₹ 56,000 & `7,88,76,400 respectively

(c) ₹ 36,000 & `7,88,72,000 respectively

(d) ₹ 56,000 & `7,88,72,000 respectively

v. What is the value EMS and OMS for the last month?

(a) ₹ 1,504.70 & 5 tonnes respectively

(b) ₹ 1,367.52 & 5 tonnes respectively

(c) ₹ 1,504.70 & 4.37 tonnes respectively

(d) ₹ 1,367.52 & 4.37 tonnes respectively

Answer:

i.	(d)	**ii.**	(c)	**iii.**	(a)	**iv.**	(b)	**v.**	(a)

i. (d) Please refer cost sheet below for prime cost

ii. ©

Please refer cost sheet below for cost of productionCost of production per manshift

= Cost of production ÷ Total manshift

₹ 7,87,28,000 ÷ 46,800 = ₹ 1,682.22

iii. (a) Car hire charges including GST @5%, please refer the cost sheet

iv. (b)

Selling and distribution cost includes the following:

Maintenance cost for weighing bridge	12,000
AMC cost of CCTV installed at weigh bridge	8,000
TA/ DA & hotel bill of sales manager	36,000
	56,000

For Cost of Sale please refer the cost sheet

v. **(a)**

Manshift = 1,800 employees × 26 days = 46,800 manshiftsComputation of earnings per manshift (EMS):

EMS = Total employee benefits paid ÷ Manshift

= ₹ 7,04,20,000 ÷ 46,800 = ₹ 1504.70

Computation of Output per manshift (OMS):

OMS = Total Output / Production ÷ Manshift

2,34,000 Tonne ÷ 46,800 = 5 tonnes

Workings

Cost Sheet of M Ltd. for the last month

Particulars	Amount (₹)	Amount (₹)
Materials consumed		50,00,000
Wages & Salary	6,40,00,000	
Gratuity & leave encashment	64,20,000	7,04,20,000
Power cost (13,000 kwh × ₹ 8)	1,04,000	
Diesel cost (2,000 ltr × ₹ 93)	1,86,000	2,90,000
HEMM hiring charges		30,00,000
Prime Cost		**7,87,10,000**
AMC cost of CCTV installed atfactory premises		18,000
Cost of Production/ Cost of Goods Sold		**7,87,28,000**
Hiring charges of cars	66,000	
Reimbursement of diesel cost	22,000	
	88,000	
Add: GST @5% on RCM basis	4,400	92,400
Maintenance cost for weighingbridge	12,000	
AMC cost of CCTV installed atweigh bridge	8,000	20,000
TA/ DA & hotel bill of salesmanager		36,000
Cost of Sales		**7,88,76,400**

7. COST ACCOUNTING SYSTEMS

Multiple Choice Questions

1. Under the Non-integrated accounting system
   (a) Same ledger is maintained for cost and financial accounts by accountants
   (b) Separate ledgers are maintained for cost and financial accounts
   (c) (a) and (b) both
   (d) None of the above

2. Notional costs
   (a) May be included in Integrated accounts
   (b) May be included in Non- integrated accounts
   (c) Cannot be included in Non-integrated accounts
   (d) None of the above

3. Under Non-integrated accounting system, the account made to complete double entry is
   (a) Stores ledger control account
   (b) Work in progress control account
   (c) Finished goods control account
   (d) General ledger adjustment account

4. Integrated systems of accounts are maintained
   (a) In separate books of accounts for costing and financial accounting purposes
   (b) In same books of accounts
   (c) Both (a) & (b)
   (d) None of the above

5. Under Non-integrated system of accounting, purchase of raw material is debited to which account
   (a) Material control account / Stores ledger control account
   (b) General ledger adjustment account
   (c) Purchase account
   (d) None of the above

6. Under Non-integrated accounts, if materials worth ₹ 1,500 are purchased for a special job, then which account will be debited:
   (a) Special job account / Work in Process account
   (b) Material Control account
   (c) Cost Control account
   (d) None of the above

7. Which account is to be debited if materials worth ₹ 500 are returned to vendor under Non-integrated accounts:
   (a) Cost ledger control account
   (b) Finished goods control account
   (c) WIP control account
   (d) None of the above

8. Which of the following items is included in cost accounts?
   (a) Notional rent
   (b) Donations
   (c.) Transfer to general reserve
   (d) Rent receivable

9. When costing loss is ₹ 5,600, administrative overhead under-absorbed being ₹ 600, the loss as per financial accounts should be
   (a) ₹ 5,600
   (b) ₹ 6,200
   (c) ₹ 5,000
   (d) None of the above

10. Which of the following items should be added to costing profit to arrive at financial profit?
   (a) Over-absorption of works overhead
   (b) Interest paid on debentures
   (c) Income tax paid
   (d) All of the above

Answers to the MCQs

1.	(b)	**2.**	(b)	**3.**	(d)	**4.**	(b)	**5.**	(a)
6.	(a)	**7.**	(a)	**8.**	(a)	**9.**	(b)	**10.**	(a)

8. UNIT & BATCH COSTING

Multiple Choice Questions

1. Different businesses in order to determine cost of their product or serviceoffering follow:
   (a) Different methods of Costing
   (b) Uniform Costing
   (c) Different techniques of costing
   (d) None of the above

2. In order to determine cost of the product or service, following are used:
   (a) Techniques of costing like Marginal, Standard etc.
   (b) Methods of Costing
   (c) Comparatives
   (d) All of the above

3. Unit Costing is applicable where:
   (a) Product produced are unique and no 2 products are same
   (b) Dissimilar articles are produced as per customer specification
   (c) homogeneous articles are produced on large scale
   (d) Products made require different raw materials

4. In case product produced or jobs undertaken are of diverse nature, the systemof costing to be used should be:
   (a) Process costing
   (b) Operating costing
   (c) Job costing
   (d) None of the above

5. Job Costing is:
   (a) Applicable to all industries regardless of the products or services provided
   (b) Technique of costing
   (c) Suitable where similar products are produced on mass scale
   (d) Method of costing used for non- standard and non- repetitive products.

6. The production planning department prepares a list of materials and storesrequired for the completion of a specific job order, this list is known as:
   (a) Bin card
   (b) Bill of material
   (c) Material requisition slip
   (d) None of the above

7. Batch costing is a type of:
   (a) Process costing
   (b) Job Costing
   (c) Differential costing
   (d) Direct costing

8. Batch costing is similar to that under job costing except with the difference thata:
   (a) Job becomes a cost unit.
   (b) Batch becomes the cost unit instead of a job
   (c) Process becomes a cost unit
   (d) None of the above

9. The main points of distinction between job and contract costing includes:
   (a) Length of time to complete.
   (b) Big jobs
   (c) Activities to be done outside the factory area
   (d) All of the above

10. Economic batch quantity is that size of the batch of production where:
    (a) Average cost is minimum
    (b) Set-up cost of machine is minimum
    (c) Carrying cost is minimum
    (d) Both (b) and (c)

Answers to the MCQs

1.	(a)	**2.**	(b)	**3.**	(c)	**4.**	(c)	**5.**	(d)	**6.**	(b)
7.	(b)	**8.**	(b)	**9.**	(d)	**10.**	(d)				

Case Scenarios

QUESTION 1: 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 atime. 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 ofMaterial-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 shiftof 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 the product:

Large	Medium	Small
3,00,000	7,50,000	20,00,000

The following information has been sought from you for the purpose ofperformance review meeting:

(i) Number of large size bottles that can be processed in a batch?

(a) 5,000 bottles

(b) 1,666 bottles

(c) 3,333 bottles

(d) 8,333 bottles

(ii) Total number of batches to be run to process medium size bottles

(a) 180

(b) 225

(c) 240

(d) 645

(iii) Material -W required for small size bottles

(a) 1,26,00,000 ltrs

(b) 1,68,00,000 ltrs

(c) 1,57,50,000 ltrs

(d) 1,51,50,000 ltrs

(iv) Calculate total profit/ loss per batch.

(a) ₹ 3,46,28,460

(b) ₹ 2,56,28,360

(c) ₹ 2,82,17,370

(d) ₹ 1,88,56,360

(v) Compute Economic Batch Quantity (EBQ) for small size bottles.

(a) 1,34,234 ltrs

(b) 2,12,243 ltrs

(c) 1,57,882 ltrs

(d) 3,46,592 ltrs

Answer:

i.	(b)	ii.	(b)	iii.	(b)	iv.	(c)	v.	(d)

(i) (b)

Working note 1: Maximum number of bottles that can be processed in a batch:

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.

(ii) (b)

Working note 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.

(iii)(b)

Working note 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 perbottle (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 ofoutput (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 perlitre of output (ml)	25	25	25	
G	Material-C required (Litre) [(C × F) ÷ 1000]	**22,500**	**28,125**	**30,000**	**80,625**

(iv)(c) Workings:

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 × 20workers]**	**900**	**1,140**	**1,200**	**3,240**

5. Power consumption in Kwh

		Large	Medium	Small	Total
For processing					
A	No. of batches	180	225	240	645
B	Hours required perbatch (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 perhour	90	90	90	90
E	Power consumption inKwh [C × D]	28,350	35,437.5	37,800	1,01,587.5
F	Per batch consumption(Kwh) [E ÷ A]	157.5	157.5	157.5	157.5
For set-up					

G	Hours required perbatch (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 perhour [20% × 90]	18	18	18	18
J	Power consumption inKwh [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

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	**Total Profit [O - P]**				**2,82,17,370**

(v) (d)

Computation of Economic Batch Quantity (EBQ):

$$EBQ = \sqrt{\frac{2 \times D \times S}{C}}$$

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
Set-up Cost:				
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
D	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**

9. JOB COSTING

Multiple Choice Questions

1. In case product produced or jobs undertaken are of diverse nature, the systemof costing to be used should be:
   (a) Process costing
   (b) Operating costing
   (c) Job costing
   (d) None of the above

2. The production planning department prepares a list of materials and storesrequired for the completion of a specific job order, this list is known as:
   (a) Bin card
   (b) Bill of material
   (c) Material requisition slip
   (d) None of the above

3. Job costing is similar to that under Batch costing except with the difference thata:
   (a) Job becomes a cost unit.
   (b) Batch becomes the cost unit instead of a job
   (c) Process becomes a cost unit
   (d) None of the above.

4. In job costing which of the following documents are used to record the issue ofdirect material to a job':
   (a) Goods received note
   (b) Material requisition
   (c) Purchase order
   (d) Purchase requisition

5. The most suitable cost system where the products differ in type of materialsand work performed is :
   (a) Job Costing
   (b) Process Costing
   (c) Operating Costing

(d) None of these.

6. Which of the following statements is true:

(a) Job cost sheet may be used for estimating profit of jobs.

(b) Job costing cannot be used in conjunction with marginal costing.

(c) A production order is an order received from a customer for particularjobs.

(d) None of these.

7. Which of the following statements is true:

(a) Job cost sheet may be prepared for facilitating routing and scheduling ofthe job

(b) Job costing can be suitably used for concerns producing uniformly anyspecific product

(c) Job costing cannot be used in companies using standard costing

(d) Neither (a) nor (b) nor (c)

Answers to the MCQs

1.	(c)	**2.**	(b)	**3.**	(a)	**4.**	(b)	**5.**	(a)	**6.**	(a)
7.	(d)										

10. Process & Operation Costing

Multiple Choice Questions

1. The type of process loss that should not be allowed to affect the cost of good units is:
   (a) Abnormal loss
   (b) Normal loss
   (c) Seasonal loss
   (d) Standard loss

2. 200 units were introduced in a process in which 20 units is the normal loss. If the actual output is 150 units, then there is:
   (a) No abnormal loss
   (b) No abnormal gain
   (c) Abnormal loss of 30 units
   (d) Abnormal gain of 30 units

3. 100 units are processed at a total cost of ₹ 160, normal loss is 10%, & scrap units are sold @ ₹ 0.25 each. If the output is 80 units, then the value of abnormal loss is:
   (a) ₹ 2.50
   (b) ₹ 16
   (c) ₹ 17.50
   (d) ₹ 17.75

4. When average method is used in process costing, the opening inventory costs are:
   (a) Subtracted from the new costs
   (b) Added to the new costs
   (c) Kept separate from the costs of the new period
   (d) Averaged with other costs to arrive at total cost

5. Spoilage that occurs under inefficient operating conditions and is ordinarily controllable is called:
   (a) Normal spoilage
   (b) Abnormal spoilage
   (c) Normal defectives
   (d) None of the above

6. The cost of normal process loss is -

(a) Absorbed by good units produced and amount realised by the sale of loss units should be debited to the process account.

(b) Debited to costing profit and loss account.

(c) Absorbed by good units produced.

(d) Debited to costing profit and loss account and amount realised by the sale of loss units should be credited to the process account.

7. The value of abnormal loss is equal to:

(a) Total cost of materials

(b) Total process cost less realizable value of normal loss

(c) Total process cost less cost of scrap

(d) Total process cost less realizable value of normal loss less value of transferred out goods.

8. Inter-process profit is calculated, because:

(a) a process is a cost centres

(b) each process has to report profit

(c) the efficiency of the process is measured

(d) the wages of employees are linked to the process profitability.

9. Under Weighted Average (Average) Method:

(a) The cost to complete the opening WIP is ignored.

(b) The cost to complete the opening WIP and other completed units are calculated separately.

(c) The cost of opening work-in-process and cost of the current period are aggregated and the aggregate cost is divided by output in terms of completed units.

(d) Closing stock of work in process is valued at current cost.

10. A process account is debited by abnormal gain, the value is determined as:

(a) Equal to the value of normal loss

(b) Cost of good units less realizable value of normal loss

(c) Cost of good units less realizable value of actual loss

(d) Equal to the value of good units less closing stock

11. Lean Labs develops 55mm film using a four-step process that moves progressively through four departments. The company specializes in overnight service and has the largest drug store chain as its primary customer. Currently, direct labor, direct materials, and overhead are accumulated by departments.

The cost accumulation system that best describes the system Lean Labs is using is:

(a) Operation costing.

(b) Activity-based costing.

(c) Job-order costing.

(d) Process costing.

12. When compared with normal spoilage, abnormal spoilage:

(a) Arises more frequently from factors that are inherent in the manufacturing process.

(b) Is given the same accounting treatment as normal spoilage.

(c) Is generally thought to be more controllable by purchase department than production department.

(d) Is not typically influenced by the "tightness" of production standards.

13. Assume 550 units were worked on during a period in which a total of 500 good units were completed. Normal spoilage consisted of 30 units; abnormal spoilage, 20 units. Total production costs were ₹ 2,200. The company accounts for abnormal spoilage separately on the income statement as loss due to abnormal spoilage. Normal spoilage is not accounted for separately. What is the cost of the good units produced?

(a) ₹ 2,080

(b) ₹ 2,115

(c) ₹ 2,200

(d) ₹ 2,332

14. IC Limited uses process costing systems and inspects its goods post manufacturing. An engineer noticed on May 31st the following:

Good units completed	15,000
Normal spoilage (units)	300
Abnormal spoilage (units)	100

Unit costs were: Material ₹ 2.50 and conversion costs (Labour & overheads) ₹ 6.00. The number of units that company would transfer to its finished goods stock and the related cost of these units are:

(a) 15,000 units transferred at a cost of ₹ 127,500

(b) 15,000 units transferred at a cost of ₹ 130,050

(c) 15,000 units transferred at a cost of ₹ 135,000

(d) 15,300 units transferred at a cost of ₹ 130,05

Answers to the MCQs

1.	(a)	**2.**	(c)	**3.**	(c)	**4.**	(b)	**5.**	(b)	**6.**	(c)
7.	(d)	**8.**	(c)	**9.**	(c)	**10.**	(b)	**11.**	(d)	**12.**	(d)
13.	(b)	**14.**	(b)								

Case Scenarios

QUESTION 1: Arnav Ltd. manufactures chemical solutions used in paint and adhesive products. Chemical solutions are produced in different processes. Some of the processes are hazardous in nature which may results in fire accidents.

At the end of the last month, one fire accident occurred in the factory. The fire destroyed some of the paper files containing records of the process operations for the month.

You being an associate to the Chief Manager (Finance), are assigned to prepare the process accounts for the month during which the fire occurred. From the documents and files of other sources, following information could be retrieved:

Opening work-in-process at the beginning of the month was 500 litres, 80% complete for labour and 60% complete for overheads. Opening work-in-process was valued at ₹ 2,78,000.

Closing work-in-process at the end of the month was 100 litres, 20% complete for labour and 10% complete for overheads.

Normal loss is 10% of input (fresh) and total losses during the month were 800 litres partly due to the fire damage.

Output transferred to finished goods was 3,400 litres. Losses have a scrap value of ₹ 20 per litre.

All raw materials are added at the commencement of the process.

The cost per equivalent unit is ₹ 660 for the month made up as follows: Raw Material ₹ 300 Labour ₹ 200 Overheads ₹ 160

The company uses FIFO method to value work-in-process and finished goods. The following information are required for managerial decisions:

i. How much quantity of raw material introduced during the month?

(a) 4,300 Litres

(b) 3,500 Litres

(c) 4,200 Litres

(d) 3,800 Litres

ii. The Quantity of normal loss and abnormal loss are:

(a) Normal loss- 380 litres & Abnormal loss- 420 litres

(b) Normal loss- 350 litres & Abnormal loss – 450 litres

(c) Normal loss- 430 litres & Abnormal loss – 370 litres

(d) Normal loss- 420 litres & Abnormal loss – 380 litres.

iii. Value of raw material added to the process during the month is:

(a) ₹ 10,10,000

(b) ₹ 10,33,600

(c) ₹ 10,18,400

(d) ₹ 10,20,000

iv. Value of labour and overhead in closing Work-in-process are:

(a) ₹ 4,000 & ₹ 1,600 respectively

(b) ₹ 20,000 & ₹ 16,000 respectively

(c) ₹ 16,000 & ₹ 9,000 respectively

(d) ₹ 13,200 & ₹ 6,600 respectively

v. Value of output transferred to finished goods is:

(a) ₹ 22,57,200

(b) ₹ 20,06,400

(c) ₹ 22,44,000

(d) ₹ 19,27,200

Answer:

i.	(d)	**ii.**	(a)	**iii.**	(b)	**iv.**	(a)	**v.**	(c)

i. d

Inflow into process	Litres	Outflow from process	Litres
Opening WIP	500	Transferred to finished goods	3,400
Quantity introduced (Balancing figure)	3,800	Total loss	800
		Closing WIP	100
	4,300		4,300

ii. a

Total loss	800 litres
Normal loss (10% of fresh input i.e. 3,800)	380 litres

Abnormal loss	420 litres

iii. **b**

Calculation of Equivalent production units

Input Details	Units	Output Particulars	Units	Equivalent Production					
				Material		Labour		Overheads	
				%	Units	%	Units	%	Units
Opening WIP	500	From Opening WIP	500	-	-	20	100	40	200
Fresh inputs	3,800	From fresh units	2900	100	2900	100	2900	100	2900
		Normal loss	380	-		-		-	
		Closing WIP	100	100	100	20	20	10	10
		Abnormal loss	420	100	420	100	420	100	420
	4,300		4,300		3,420		3,440		3,530

Value of raw materials introduced during the month

	Equivalent units	Cost per EU (₹)	Total cost (₹)
Total value of raw material	3420	300	10,26,000
Add: Scrap value of normal loss	380	20	7,600
Value of raw material introduced			**10,33,600**

iv. **a**

Value of labour and overhead in closing Work in process

Cost elements	Equivalent units	Cost per EU (₹)	Total cost (₹)
Labour	20	200	**4,000**
Overheads	10	160	**1,600**

v. **c**

Value of output transferred to finished goods

Output transferred (Units) × Equivalent cost per unit

3,400 Litres × ₹ 660 = ₹ 22,44,000

11. JOINT PRODUCTS AND BY PRODUCTS

Multiple Choice Questions

1. In sugar manufacturing industries molasses is also produced along with sugar. Molasses may be of smaller value as compared with the value of sugar and is known as:
   (a) Common product
   (b) By- product
   (c) Joint product
   (d) None of them

2. Method of apportioning joint costs on the basis of output of each jointproduct at the point of split off is:
   (a) Sales value method
   (b) Physical unit method
   (c) Average cost method
   (d) Marginal cost and contribution method

3. In the Net realisable value method, for apportioning joint costs over the jointproducts, the basis of apportionment would be:
   (a) Selling price per unit of each of the joint products
   (b) Selling price multiplied by units sold of each of the joint products
   (c) Sales value of each joint product less further processing costs ofindividual products
   (d) Both (b) and (c)

4. The main purpose of accounting of joint products and by- products is to:
   (a) Determine the opportunity cost
   (b) Determine the replacement cost
   (c) Determine profit or loss on each product line
   (d) None of the above

5. Under net realizable value method of apportioning joint costs to jointproducts, the selling & distribution cost is:
   (a) Added to joint cost
   (b) Deducted from further processing cost
   (c) Deducted from sales value

(d) Ignored

6. Which of the following is a co-product:
   (a) Diesel and Petrol in an oil refinery
   (b) Edible oils and oil cakes
   (c) Curd and butter in a dairy
   (d) Mustard oil and Sunflower oil in an oil processing company.

7. Which of the following is an example of by-product
   (a) Diesel and Petrol in an oil refinery
   (b) Edible oils and oil cakes
   (c) Curd and butter in a dairy
   (d) Mustard seeds and mustard oil.

8. Which of following method can be used when the joint products are ofunequal quantity and used for captive consumption:
   (a) Technical estimates, using market value of similar goods
   (b) Net Realisable value method
   (c) Physical Units method
   (d) Market value at split-off method.

9. Which of the following statement is not correct in relation to Co-products:
   (a) Co-products may also have joint products
   (b) Costing for co-products are done according to process costing method
   (c) Co-products do not have any by-products
   (d) Co-products are treated as a separate cost object for costing purpose.

10. When a by-product does not have any realisable value, the cost of by-product is:
   (a) Transferred to Costing Profit & Loss A/c
   (b) By-product cost is borne by the good units
   (c) By-product cost is ignored
   (d) By-product cost is determined taking value of similar goods

11. SG Ltd manufactures two products from a joint milling process. The two products developed are Mine support (MS) and Commercial building (CB). A standard production run incurs joint costs of ₹ 1,00,000 and results in 60,000 units of MS and 90,000 units of CB.

Each MS sells for ₹ 200 per unit, and each CB sells for ₹ 450 per unit.

Assuming no further processing work is done after the split-off point, the amount of joint cost allocated to Commercial building (CB) on a physical quantity allocation basis would be:

(a) ₹ 60,000.

(b) ₹ 180,000.

(c) ₹ 225,000.

(d) ₹ 120,000.

12. Kay Company manufactures two hair care lotions, Livi and Sili, out of a joint process. The joint (common) costs incurred are ₹ 6,30,000 for a standard production run that generates 1,80,000 gallons of Livi and 1,20,000 gallons of Sili. Livi sells for ₹ 240 per gallon, and Sili sells for ₹ 390 per gallon.

If additional processing costs beyond the split-off point are ₹ 140 per gallon for Livi and ₹ 90 per gallon for Sili, the amount of joint cost of each production run allocated to Livi on a physical-quantity basis is:

(a) ₹ 340,000.

(b) ₹ 378,000.

(c) ₹ 232,000.

(d) ₹ 580,000.

13. For the purpose of allocating joint costs to joint products, the sales price at point of sale, reduced by cost to complete after split-off, is assumed to be equal to the:

(a) Joint costs

(b) Sales price less a normal profit margin at point of sale

(c) Net sales value at split off

(d) Total costs.

Answers to the MCQs

1.	(b)	**2.**	(b)	**3.**	(d)	**4.**	(c)	**5.**	(c)	**6.**	(d)
7.	(b)	**8.**	(a)	**9.**	(c)	**10.**	(b)	**11.**	(a)	**12.**	(b)
13.	(c)										

Case Scenarios

QUESTION 1: Pokemon Chocolates manufactures and distributes chocolate products. It purchases Cocoa beans and processes them into two intermediate products:

Chocolate powder liquor base Milk-chocolate liquor base

These two intermediate products become separately identifiable at a single split off point. Every 500 pounds of cocoa beans yields 20 gallons of chocolate – powder liquor base and 30 gallons of milk-chocolate liquor base.

The chocolate powder liquor base is further processed into chocolate powder. Every 20 gallons of chocolate-powder liquor base yields 200 pounds of chocolate powder. The milk-chocolate liquor base is further processed into milk-chocolate. Every 30 gallons of milk-chocolate liquor base yields 340 pounds of milk chocolate.

Production and sales data for October, 2023 are:

Cocoa beans processed 7,500 pounds

Costs of processing Cocoa beans to split off point(including purchase of beans) ₹ 7,12,500

	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, 2023 separable costs of processing chocolate-powder liquor into chocolate powder are ₹ 3,02,812.50. The October 2023 separable costsof processing milk-chocolate liquor base into milk-chocolate are ₹ 6,23,437.50.

Pokemon full processes both of its intermediate products into chocolate powder or milk-chocolate. There is an active market for these intermediate products. In October, 2023, Pokemon could have sold the chocolate powder liquor base for ₹ 997.50 a gallon and the milk-chocolate liquor base for ₹ 1,235 a gallon. You are required to show how the joint cost of ₹ 7,12,500 would be allocated between the chocolate powder and milk- chocolate liquor bases:

(i) how much joint cost is allocated between the chocolate powder and milk-chocolate liquor bases respectively using Sales value at split off point?

(a) ₹ 2,22,656.25 and ₹ 4,89,843.75

(b) ₹ 2,49,375 and ₹ 4,63,125

(c) ₹ 2,21,587.50 and ₹ 4,90,912.50

(d) ₹ 2,85,000 and ₹ 4,27,500

(ii) how much joint cost is allocated between the chocolate powder and milk-chocolate liquor bases respectively using Physical measure (gallons)?

(a) ₹ 2,22,656.25 and ₹ 4,89,843.75

(b) ₹ 2,49,375 and ₹ 4,63,125

(c) ₹ 2,21,587.50 and ₹ 4,90,912.50

(d) ₹ 2,85,000 and ₹ 4,27,500

(iii) how much joint cost is allocated between the chocolate powder and milk-chocolate liquor bases respectively using Estimated net realisable value, (NRV)?

(a) ₹ 2,22,656.25 and ₹ 4,89,843.75

(b) ₹ 2,49,375 and ₹ 4,63,125

(c) ₹ 2,21,587.50 and ₹ 4,90,912.50

(d) ₹ 2,85,000 and ₹ 4,27,500

(iv) What is the constant gross-margin percentage NRV?

(a) 8%

(b) 9%

(c) 12%

(d) 12.5%

(v) How much joint cost is allocated between the chocolate powder and milk-chocolate liquor bases respectively using Constant gross-margin percentage NRV?

(a) ₹ 2,22,656.25 and ₹ 4,89,843.75

(b) ₹ 2,49,375 and ₹ 4,63,125

(c) ₹ 2,21,587.50 and ₹ 4,90,912.50

(d) ₹ 2,85,000 and ₹ 4,27,500

Answer:

i.	(b)	**ii.**	(d)	**iii.**	(a)	**iv.**	(a)	**v.**	(c)

(i) (b)

Sales Value at Split-off Point Method

	Chocolate powder liquor base	**Milk chocolate liquor base**	**Total**
Sales value of products at split off	₹ 2,99,250*	₹ 5,55,750**	₹ 8,55,000
Weights	0.35	0.65	1.00
Joint cost allocated	₹ 2,49,375 (₹ 7,12,500 ×0.35)	₹ 4,63,125 (₹ 7,12,500 ×0.65)	₹ 7,12,500

*(3,000 lbs ÷ 200 lbs) × 20 gallon × ₹ 997.50 = ₹ 2,99,250

** (5,100 lbs ÷ 340 lbs) × 30 gallon × ₹ 1,235 = ₹ 5,55,750

(ii) (d)

Physical Measure Method

	Chocolate powder liquor base	Milk chocolate liquor base	Total
Output	300 gallon*	450 gallon**	750 gallons
Weight	300 ÷ 750 = 0.40	450 ÷ 750 = 0.60	1.00
Joint costallocated	₹ 2,85,000 (₹ 7,12,500 x 0.40)	₹ 4,27,500 (₹ 7,12,500 x 0.60)	₹ 7,12,500

*(3,000 lbs ÷ 200 lbs) × 20 gallon = 300 gallon

** (5,100 lbs ÷ 340 lbs) × 30 gallon = 450 gallon

(iii)(a)

Net Realisable Value (NRV) Method

	Chocolate powder liquor base	Milk chocolate liquor base	Total
Final sales value of production	₹ 5,70,000 (3,000 lbs × ₹ 190)	₹ 12,11,250 (5,100 lbs × ₹ 237.50)	₹ 17,81,250
Less: Separable costs	₹ 3,02,812.50	₹ 6,23,437.50	₹ 9,26,250
Net realisable value at split off point	₹ 2,67,187.50	₹ 5,87,812.50	₹ 8,55,000
Weight	0.3125	0.6875	1.00
	(2,67,187.50 ÷ 8,55,000)	(5,87,812.5 ÷ 8,55,000)	
Joint cost allocated	₹ 2,22,656.25 (₹ 7,12,500 x 0.3125)	₹ 4,89,843.75 (₹ 7,12,500 x 0.6875)	₹ 7,12,500

(iv)(a)

Final sales value of total production = ₹ 17,81,250

Less: Joint and separable cost = ₹ 16,38,750 (₹ 7,12,500 + ₹ 9,26,250)Gross Margin = ₹ 1,42,500

Gross margin (%) = ₹ 1,42,500 ÷ ₹ 17,81,250 × 100 = 8%

(v) (c)

Constant Gross Margin (%) NRV method

	Chocolate powder Liquor base	Milk chocolate liquor Base	Total
Final sales value ofproduction	₹ 5,70,000	₹ 12,11,250	₹ 17,81,250
Less: Gross margin* 8%	₹ 45,600	₹ 96,900	₹ 1,42,500
Cost of goodsavailable for sale	₹ 5,24,400	₹ 11,14,350	₹ 16,38,750
Less: Separable costs	₹ 3,02,812.50	₹ 6,23,437.50	₹ 9,26,250
Joint cost allocated	₹ 2,21,587.50	₹ 4,90,912.50	₹ 7,12,500

12. SERVICE COSTING

Multiple Choice Questions

1. Composite cost unit for a hospital is:
   (a) Per patient
   (b) Per patient-day
   (c) Per day
   (d) Per bed

2. Cost of diesel and lubricant is an example of:
   (a) Operating cost
   (b) Fixed charges
   (c) Semi-variable cost
   (d) None of the above

3. Cost units used in power sector is:
   (a) Kilo meter (K.M)
   (b) Kilowatt-hour (kWh)
   (c) Number of electric points
   (d) Number of hours

4. Absolute Tonne-km. is an example of:
   (a) Composite units in power sector
   (b) Composite unit of transport sector
   (c) Composite unit for bus operation
   (d) Composite unit for oil and natural gas

5. Depreciation is treated as fixed cost if it is related to:
   (a) Activity level
   (b) Related with machine hours
   (c) Efflux of time
   (d) None of the above

6. Jobs undertaken by IT & ITES organizations are considered as:
   (a) Project

(b) Batch work

(c) Contract

(d) All the above

7. In Toll Road costing, the repetitive costs include:

(a) Maintenance cost

(b) Annual operating costs

(c) None of the above

(d) Both (a) and (b)

8. BOT approach means:

(a) Build, Operate and Transfer

(b) Buy, Operate and Transfer

(c) Build, Operate and Trash

(d) Build, Own and Trash

9. Pre-product development activities in insurance companies, include:

(a) Processing of Claim

(b) Selling of policy

(c) Provision of conditions

(d) Policy application processing

10. Which of the following costing method is not appropriate for costing ofeducational institutes:

(a) atch Costing

(b) Activity Based Costing

(c) Absorption Costing

(d) Process Costing

Answers to the MCQs

1.	**(b)**	2.	**(a)**	3.	**(b)**	4.	**(b)**	5.	**(c)**	6.	**(a)**
7.	**(a)**	8.	**(a)**	9.	**(c)**	10.	**(d)**				

Case Scenarios

QUESTION 1: A 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 following 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 fullcharge	--	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 every8- 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

You have been approached by the management of A LMV Pvt. Ltd. for consultation on the two options of operating the cab service. The expected questions that may be asked by the management are as follows:

(i) What would be the depreciable value of EV Car?

(a) ₹ 13,50,000

(b) ₹ 15,20,000

(c) ₹ 14,40,000

(d) ₹ 12,00,000

(ii) What would be the monthly cost of electricity for an EV car?

(a) ₹ 1,425

(b) ₹ 1,500

(c) ₹ 1,450

(d) ₹ 1,525

(iii) What would be the total cost to be incurred for replacement of tyres forEV car?

(a) ₹ 32,000

(b) ₹ 24,000

(c) ₹ 12,000

(d) ₹ 16,000

(iv) Calculate the operating cost of vehicle per month per car for CNG options.

(a) ₹ 36,627.78

(b) ₹ 24,000.50

(c) ₹ 43.708.33

(d) ₹ 16,605.55

(v) Calculate the operating cost of vehicle per month per car for EV options

(a) ₹ 36,627.78

(b) ₹ 24,000.50

(c) ₹ 43.708.33

(d) ₹ 16,605.55

Answer:

i.	(d)	**ii.**	(a)	**iii.**	(d)	**iv.**	(a)	**v.**	(c)

(i) (d) ₹ 12,00,000

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**

(ii) (a) ₹1,425

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**

(iii) (d) ₹16,000

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**

(iv) (a) ₹ 36,627.78

(v) (c) ₹ 43.708.33

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**

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**

13. Standard Costing

Multiple Choice Questions

1. Under standard cost system the cost of the product determined at the beginning of production is its:
   (a) Direct cost
   (b) Pre-determined cost
   (c) Historical cost
   (d) Actual cost

2. The deviations between actual and standard cost is known as:
   (a) Multiple analysis
   (b) Variable cost analysis
   (c) Variance analysis
   (d) Linear trend analysis

3. The standard which is attainable under favourable conditions is:
   (a) Theoretical standard
   (b) Expected standard
   (c) Normal standard
   (d) Basic standard

4. The standard most suitable from cost control point of view is:
   (a) Normal standard
   (b) Theoretical standard
   (c) Expected standard
   (d) Basic standard

5. Overhead cost variances is:
   (a) The difference between overheads recovered on actual output - actual overhead incurred.
   (b) The difference between budgeted overhead cost and actual overhead cost.
   (c) Obtained by multiplying standard overhead absorption rate with the difference between standard hours for actual output and actual hours worked.
   (d) None of the above

6. Which of the following variance arises when more than one material is used in the manufacture of a product:
   (a) Material price variance
   (b) Material usage variance
   (c) Material yield variance
   (d) Material mix variance

7. If standard hours for 100 units of output are 400 @ ₹ 2 per hour and actual hours take are 380 @ ₹ 2.25 per, then the labour rate variance is:
   (a) ₹ 95 (adverse)
   (b) ₹ 100 (adverse)
   (c) ₹ 25 (favourable)
   (d) ₹ 120 (adverse)

8. Controllable variances are best disposed-off by transferring to:
   (a) Cost of goods sold
   (b) Cost of goods sold and inventories
   (c) Inventories of work-in-progress and finished goods
   (d) Costing profit and loss account

9. Idle time variance is obtained by multiplying:
   (a) The difference between standard and actual hours by the actual rate of labour per hour
   (b) The difference between actual labour hours paid and actual labour hours worked by the standard rate
   (c) The difference between standard and actual hours by the standard rate of labour per hour
   (d) None of the above.

10. Basic standards are:
    (a) Those standards, which require high degree of efficiency and performance.
    (b) Average standards and are useful in long term planning.
    (c) Standards, which can be attained or achieved
    (d) Assuming to remain unchanged for a long time.

Answers:

1.	(b)	**2.**	(c)	**3.**	(a)	**4.**	(c)	**5.**	(a)	**6.**	(d)
7.	(a)	**8.**	(d)	**9.**	(b)	**10.**	(d)				

Case Scenarios

QUESTION 1: K Ltd. is a manufacturer of a single product A. 8,000 units of the product A has been produced in the month of March 2024. At the beginning of the year a total 1,20,000 units of the product-A has been planned for production. The cost department has provided the following estimates of overheads:

Fixed	**₹ 12,00,000**	**Variable**	**₹ 6,00,000**
Semi-Variable	**₹ 1,80,000**		

Semi-variable charges are considered to include 60 per cent expenses of fixed nature and 40 per cent of variable nature.

The records of the production department shows that the company could have operated for 20 days but there was a festival holiday during the month.

The actual cost data for the month of March 2024 are as follows:

Fixed	**₹ 1,19,000**	**Variable**	**₹ 48,000**
Semi-Variable	**₹ 19,200**		

The cost department of the company is now preparing a cost variance report for managerial information and action. You being an accounts officer of the company are asked to calculate the following information for preparation of the variance report:

i. What is the amount of variable overhead cost variance for the month of March 2024:

(a) ₹ 10,200 (A)

(b) ₹ 10,400 (A)

(c) ₹ 10,800 (A)

(d) ₹ 10,880 (A)

ii. What is the amount of fixed overhead volume variance for the month of March 2024:

(a) ₹ 9,000 (F)

(b) ₹ 9,000 (A)

(c) ₹ 21,800 (A)

(d) ₹ 11,000 (A)

iii. What is the amount of fixed overhead expenditure variance for the month of March 2024:

(a) ₹ 21,520 (A)

(b) ₹ 21,500 (A)

(c) ₹ 21,400 (A)

(d) ₹ 21,480 (A)

iv. What is the amount of fixed overhead calendar variance for the month of March 2024:

(a) ₹ 5,400 (A)

(b) ₹ 5,450 (A)

(c) ₹ 5,480 (A)

(d) ₹ 5.420 (A)

v. What is the amount of fixed overhead cost variance for the month of March 2024:

(a) ₹ 43,320 (A)

(b) ₹ 43,300 (A)

(c) ₹ 43,200 (A)

(d) ₹ 43,380 (A)

Answers to the Case Scenarios

i.	(d)	**ii.**	(c)	**iii.**	(a)	**iv.**	(b)	**v.**	(a)

i. d

Variable Overhead Cost = Standard Variable Overheads for Variance Production – Actual Variable Overheads

= ₹ 44,800 – ₹ 55,680

= **₹ 10,880 (A)**

ii. c

Fixed Overhead Volume = Absorbed Fixed Overheads – Variance Budgeted Fixed Overheads

= ₹ 87,200 – ₹ 1,09,000

= **₹ 21,800 (A)**

iii. a

Fixed Overhead Expenditure = Budgeted Fixed Overheads – Variance Actual Fixed Overheads

= ₹ 10.9 × 10,000 units – ₹ 1,30,520

= **₹ 21,520 (A)**

iv. b

Calendar Variance = Possible Fixed Overheads – Budgeted Fixed Overheads

= ₹ 1,03,550 – ₹ 1,09,000

= **₹ 5,450 (A)**

v. a

Fixed Overhead Cost Variance = Absorbed Fixed Overheads – Actual Fixed Overheads

= ₹ 87,200 – ₹ 1,30,520

= **₹ 43,320 (A)**

WORKING NOTE

Fixed Overheads = Budgeted Fixed Overheads / Budgeted Output = 12,00,000 ÷ 1,20,000	₹ 10.00
Fixed Overheads element in Semi-Variable Overheads i.e. 60% of ₹ 1,80,000	₹ 1,08,000
Fixed Overheads = Budgeted Fixed Overheads / Budgeted Output ₹ 1,08,000 ÷ 120,000	₹ 0.90
Standard Rate of Absorption of Fixed Overheads per unit (₹ 10.00 + ₹ 0.90)	₹ 10.90
Fixed Overheads Absorbed on 8,000 units @ ₹ 10.90	₹ 87,200
Budgeted Variable Overheads Add: Variable element in Semi-Variable Overheads 40% of ₹ 1,80,000 Total Budgeted Variable Overheads Standard Variable Cost per unit = Budgeted Variable Overheads ÷ Budgeted Output	₹ 6,00,000 ₹ 72,000 ₹ 6,72,000 ₹ 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 = Budgeted Fixed Overheads ÷ Budgeted Days × Actual Days = 1,09,000 ÷ 20 days × 19 days	₹ 1,03,550
Actual Fixed Overheads (₹ 1,19,000 + 60% of ₹ 19,200)	₹ 1,30,520
Actual Variable Overheads (₹ 48,000 + 40% of ₹ 19,200)	₹ 55,680

14. MARGINAL COSTING

Multiple Choice Questions

1. Under marginal costing the cost of product includes:
   (a) Prime costs only.
   (b) Prime costs and variable overheads.
   (c) Prime costs and fixed overheads.
   (d) Prime costs and factory overheads.

2. Reporting under marginal costing is accomplished by:
   (a) Treating all costs as period costs.
   (b) Eliminating the work-in-progress inventory account.
   (c) Matching variable costs against revenue and treating fixed costs as period costs.
   (d) Including only variable costs in income statement.

3. Period costs are:
   (a) Variable costs.
   (b) Fixed costs.
   (c) Prime costs.
   (d) Overheads costs.

4. When sales and production (in units) are same then profit under:
   (a) Marginal costing is higher than that of absorption costing.
   (b) Marginal costing is lower than that of absorption costing.
   (c) Marginal costing is equal to that of absorption costing.
   (d) None of the above.

5. When sales exceed production (in units) then profit under:
   (a) Marginal costing is higher than that of absorption costing.
   (b) Marginal costing is lower than that of absorption costing.
   (c) Marginal costing is equal than that of absorption costing.
   (d) None of above.

6. The main difference between marginal costing and absorption costing is regarding the treatment of:
   (a) Prime cost.
   (b) Fixed overheads.
   (c) Direct materials.
   (d) Variable overheads.

7. Under profit volume ratio, the term profit:
   (a) Means the sales proceeds in excess of total costs.
   (b) Means the same thing as is generally understood.
   (c) Is a misnomer, it in fact refers to contribution i.e. (sales revenue-variable costs).
   (d) None of the above.

8. Factors which can change the break-even point:
   (a) Change in fixed costs.
   (b) Change in variable costs.
   (c) Change in the selling price.
   (d) All of the above.

9. If P/V ratio is 40% of sales then what about the remaining 60% of sales:
   (a) Profit.
   (b) Fixed cost.
   (c) Variable cost.
   (d) Margin of safety.

10. The P/V ratio of a product is 0.6 and profit is ₹ 9,000. The margin of safety is:
   (a) ₹ 5,400
   (b) ₹ 15,000
   (c) ₹ 22,500
   (d) ₹ 3,600

Case Scenarios

QUESTION 1: A meeting of the heads of departments of the Arnav Ltd. has been called to review the operating performance of the company in the last financial year. The head of the production department appraised that during the last year the company could operate at 70% capacity level but in the coming financial year 95% capacity level can be achieved if an additional amount of ₹ 100 Crore on capex and working capital is incurred.

The head of the finance department has presented that during the last financial year the company had a P/V ratio of 40%, margin of safety and the break-even were ₹ 50 crore and ₹ 200 crore respectively.

To the reply to the proposal of increasing the production capacity level to 95%, the head of the finance department has informed that this could be achieved if the selling price and variable cost are reduced by 8% and 5% of sales respectively. Fixed cost will also increase by ₹ 20 crore due to increased depreciation on additional assets. The additional capital will be arranged at a cost of 15% p.a. from a bank.

In the coming financial year, it has been aimed to achieve an additional profit of ₹ 10 crore over and above the last year's profit after adjusting the interest cost on the additional capital.

The following points is required to be calculated on urgent basis to put the same in the meeting. You being an assistant to the head of finance, has been asked the followings:

i. What will be the revised sales for the coming financial year?

(a) ₹ 322.22 Crore

(b) ₹ 311.11 Crore

(c) ₹ 300.00 Crore

(d) ₹ 324.24 Crore

ii. What will be the revised break-even point for the coming financial year?

(a) ₹ 222.22 Crore

(b) ₹ 252.22 Crore

(c) ₹ 244.44 Crore

(d) ₹ 255.56 Crore

iii. What will be the revised margin of safety for the coming financial year?

(a) ₹ 100 Crore

(b) ₹ 58.89 Crore

(c) ₹ 55.56 Crore

(d) ₹ 66.66 Crore

iv. The profit of the last year and for the coming year are:

(a) ₹ 50 Crore & ₹ 95 Crore respectively

(b) ₹ 20 Crore & ₹ 65 Crore respectively

(c) ₹ 20 Crore & ₹ 30 Crore respectively

(d) ₹ 45 Crore & ₹ 66.66 Crore respectively

v. The total cost of the last year and for the coming year are:

(a) ₹ 230 Crore & ₹ 292.22

(b) ₹ 230 Crore & ₹ 275 Crore

(c) ₹ 220 Crore & ₹ 282.22 Crore

(d) ₹ 220 Crore & ₹ 292.22 Crore

Answers:

i.	(a)	**ii.**	(d)	**iii.**	(d)	**iv.**	(c)	**v.**	(a)

i. **a**

Revised Sale = Revised FixedCost + Expected Profit ÷ P / V Ratio

= {₹ 115 + (20 + 10)} ÷ 45% = ₹ 322.22 crores

ii. **d**

Revised Break – even Point = Fixed Cost ÷ P / V Ratio

= ₹ 115 Crore ÷ 45% = ₹ 255.56 Crore (Refer working notes)

iii. **d**

Revised Margin of Safety = Revised Sales – Revised Break– even Sales

= ₹ 322.22Crores – ₹ 255.56Crores = ₹ 66.66 Crores.

iv. **c**

₹ 20 Crore & ₹ 30 Crore respectively (Refer working note)

v. **a**

Total cost in last year = ₹ 230 Crore

Total cost in coming year = Variable Cost + Fixed Cost Revised sales × 55% + 115 Crore

= ₹ 322.22 Crore × 55% + ₹ 115 Crore = ₹ 292.22 Crore

Working Note

Present Sales and Profit

Total Sales	=	Break – even Sales + Margin of Safety
	=	₹ 200 Crores + ₹ 50 Crores
	=	₹ 250 Crores
P/V Ratio	=	40%
Variable Cost	=	60% of Sales
	=	₹ 250 Crores × 60%
	=	₹ 150 Crores
Fixed Cost	=	Break – even Sales × P/V Ratio
	=	₹ 200 Crores × 40%
	=	₹ 80 Crores
Total Cost	=	₹ 150 Crores + ₹ 80 Crores
	=	₹ 230 Crores
Profit	=	Total Sales – Total Cost
	=	₹ 250 Crores – ₹ 230 Crores
	=	₹ 20 Cores

Revised Sales	(₹in Crores)
Present Fixed Cost	80.00
Increase in Fixed Cost	20.00
Interest at 15 per cent on Additional Capital (₹ 100Crores × 15%)	15.00
Total Revised Fixed Cost (in crore)	115.00
Assuming that the Present Selling Price is ₹ 100	
Revised Selling Price will be (8% Less)	92.00
New Variable Cost (Reduced from 60% to 55%) of Sales (₹ 92 × 55%)	50.60
Contribution (₹ 92.00 – ₹ 50.60)	41.40

New P / V Ratio = ₹ 41.40 ÷ ₹ 90.00 x 100 = 45%

15. Budgets & Budgetary Control

Multiple Choice Questions

1. If a company wishes to establish a factory overhead budget system in which estimated costs can be derived directly from estimates of activity levels, it should prepare a:
   (a) Master budget
   (b) Cash budget
   (c) Flexible budget
   (d) Fixed budget

2. The classification of fixed and variable cost is useful for the preparation of:
   (a) Master budget
   (b) Flexible budget
   (c) Cash budget
   (d) Capital budget

3. Budget manual is a document:
   (a) Which contains different type of budgets to be formulated only.
   (b) Which contains the details about standard cost of the products to be made.
   (c) Setting out the budget organization and procedures for preparing a budget including fixation of responsibilities, formats and records required for the purpose of preparing a budget and for exercising budgetary control system.
   (d) None of the above

4. The budget control organization is usually headed by a top executive who is known as:
   (a) General manager
   (b) Budget director/budget controller
   (c) Accountant of the organization
   (d) None of the above

5. "A favourable budget variance is always an indication of efficient performance".
   Do you agree, give reason?
   (a) A favourable variance indicates, saving on the part of the organization hence it indicates efficient performance of the organization.
   (b) Under all situations, a favourable variance of an organization speaks about its efficient

performance.

(c) A favourable variance does not necessarily indicate efficient performance, because such a variance might have been arrived at by not carrying out the expenses mentioned in the budget.

(d) None of the above.

6. A budget report is prepared on the principle of exception and thus-

(a) Only unfavourable variances should be shown

(b) Only favourable variance should be shown

(c) Both favourable and unfavourable variances should be shown

(d) None of the above

7. Purchases budget and materials budget are same:

(a) Purchases budget is a budget which includes only the details of all materials purchased

(b) Purchases budget is a wider concept and thus includes not only purchases of materials but also other item's as well

(c) Purchases budget is different from materials budget; it includes purchases of other items only

(d) None of the above

8. Efficiency ratio is:

(a) The extent of actual working days avoided during the budget period

(b) Activity ratio/ capacity ratio

(c) Whether the actual activity is more or less than budgeted activity

(d) None of the above

9. Activity Ratio depicts:

(a) Whether actual capacity utilized exceeds or falls short of the budgeted capacity

(b) Whether the actual hours used for actual production were more or less than the standard hours

(c) Whether actual activity was more or less than the budgeted capacity

(d) None of the above

10. Which of the following is usually a short-term budget:

(a) Capital expenditure budget

(b) Research and development budget

(c) Cash budget

(d) Sales budget

Answers to the MCQs

1.	(c)	2.	(b)	3.	(c)	4.	(b)	5.	(c)	6.	(c)
7.	(b)	8.	(b)	9.	(c)	10.	(c)				

Case Scenarios

QUESTION 1: M Ltd. is a public sector undertaking (PSU), produces a product A. The company is in process of preparing its revenue budget for the year 2024. 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 2023 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 1 st July 2024 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 2024.

(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 2023, 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 2023, 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 2024.

(xi) During the year 2023, the company has paid ₹ 6,00,000 for car hire charges (excluding fuel cost). In year 2024, 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 2023 is ₹ 80,40,00,000 and it will be 15% lower in 2024.

You being an associate to the budget controller of the company is expected to answer the following question:

(i) What would be the sales volume for the FY 2024?

(a) 4,70,400 tonnes

(b) 4,70,000 tonnes

(c) 4,70,600 tonnes

(d) 4,70,200 tonnes

(ii) What would be quantity of raw material in FY 2024?

(a) 9,66,000 tonnes

(b) 1,81,000 tonnes

(c) 10,81,900 tonnes

(d) 10,81,920 tonnes

(iii) What would be the car hire charges for the FY 2023?

(a) ₹ 6,00,000

(b) ₹ 6,50,000

(c) ₹ 6,40,000

(d) ₹ 6,20,000

(iv) What would be the car hire charges for the FY 2024?

(a) ₹ 6,00,000

(b) ₹ 7,74,900

(c) ₹ 6,83,000

(d) ₹ 6,20,000

(v) What would be the budgeted profit/ loss for the year 2024?

(a) ₹ 1273.043 lakhs

(b) (₹ 5142 lakhs)

(c) ₹ 5142 lakhs

(d) (₹ 1273.043 lakhs)

Answers:

i.	**(a)**	**ii.**	**(d)**	**iii.**	**(a)**	**iv.**	**(b)**	**v.**	**(d)**

(i) (a) 4,70,400 tonnes

(ii) (d) 10,81,920 tonnes

(iii)(a) ₹ 6,00,000

(iv)(b) ₹ 7,74,900

(v) (d) (₹ 1273.043 lakhs)

Revenue Budget (Flexible Budget) of M Ltd. for the Year 2024

	Particulars	**PY 2023**	**CY 2024**
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) + (iii)]**	**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% × 4,20,000]**
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)**	**(1,273.043)**

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