

6. MARGINAL COSTING

ASSIGNMENT SOLUTIONS

PROBLEM NO:1

$$a) \text{ P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100 = \frac{\text{Rs. } 7,00,000 - (-3,00,000)}{(\text{Rs. } 57,00,000 - \text{Rs. } 32,00,000)} \times 100 = 40\%$$

$$b) \text{ Total Fixed Cost} = \text{Total Contribution} - \text{Profit} = (\text{Sales} \times \text{P/V Ratio}) - \text{Profit} \\ = \left(\text{Rs. } 57,00,000 \times \frac{40}{100} \right) - \text{Rs. } 7,00,000 = \text{Rs. } 22,80,000 - \text{Rs. } 7,00,000 = \text{Rs. } 15,80,000$$

$$c) \text{ Contribution required to earn a profit of Rs. } 12,00,000 \\ = \text{Total fixed cost} + \text{Profit required} = \text{Rs. } 15,80,000 + \text{Rs. } 12,00,000 = \text{Rs. } 27,80,000$$

$$\text{Required Sales} = \frac{\text{Rs. } 27,80,000}{\text{P/V Ratio}} = \frac{\text{Rs. } 27,80,000}{40\%} = \text{Rs. } 69,50,000$$

PROBLEM NO:2**Workings:**

$$\text{Profit in year 2012-13} = \text{Rs } 25,00,000 \times 10\% = \text{Rs } 2,50,000$$

$$\text{Profit in year 2013-14} = \text{Rs } 20,00,000 \times 8\% = \text{Rs } 1,60,000$$

$$\text{So, P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100 = \frac{\text{Rs. } 2,50,000 - \text{Rs. } 1,60,000}{\text{Rs. } 25,00,000 - \text{Rs. } 20,00,000} \times 100 = \frac{\text{Rs. } 90,000}{\text{Rs. } 5,00,000} \times 100 = 18\%$$

$$i) \text{ Fixed Cost} = \text{Contribution (in year 2012-13)} - \text{Profit (in year 2012-13)} \\ = (\text{Sales} \times \text{P/V Ratio}) - \text{Rs. } 2,50,000 = (\text{Rs. } 25,00,000 \times 18\%) - \text{Rs. } 2,50,000 \\ = \text{Rs. } 4,50,000 - \text{Rs. } 2,50,000 = \text{Rs. } 2,00,000$$

$$ii) \text{ Break-even Point (in Sales)} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{\text{Rs. } 2,00,000}{18\%} = \text{Rs. } 11,11,111 \text{ (Approx)}$$

iii) Calculation of profit, if sale is Rs 30,00,000

$$\text{Profit} = \text{Contribution} - \text{Fixed Cost} = (\text{Sales} \times \text{P/V Ratio}) - \text{Fixed Cost} \\ = (\text{Rs } 30,00,000 \times 18\%) - \text{Rs } 2,00,000 = \text{Rs } 5,40,000 - \text{Rs } 2,00,000 = \text{Rs. } 3,40,000$$

So profit is Rs 3,40,000, if Sale is Rs 30,00,000.

iv) Calculation of Sale, when desired Profit is Rs 4,75,000

$$\text{Contribution Required} = \text{Desired Profit} + \text{Fixed Cost} = \text{Rs. } 4,75,000 + \text{Rs. } 2,00,000 = \text{Rs. } 6,75,000$$

$$\text{Sales} = \frac{\text{Contribution}}{\text{P/V Ratio}} = \frac{\text{Rs. } 6,75,000}{18\%} = \text{Rs. } 37,50,000$$

Sales is Rs 37,50,000 when desired profit is Rs 4,75,000.

$$v) \text{ Margin of Safety} = \frac{\text{Profit}}{\text{P/V Ratio}} = \frac{\text{Rs. } 2,70,000}{18\%} = \text{Rs } 15,00,000$$

So Margin of Safety is Rs 15,00,000 at a profit of Rs. 2,70,000

PROBLEM NO: 3

$$\text{Total Sales} = 2,40,000 \times \frac{100}{40} = \text{Rs. } 6,00,000$$

$$\text{Contribution} = 6,00,000 \times 30\% = \text{Rs. } 1,80,000$$

$$\text{Profit} = \text{M/S} \times \text{P/V ratio} = 2,40,000 \times 30\% = \text{Rs. } 72,000$$

$$\text{Fixed cost} = \text{Contribution} - \text{Profit} = 1,80,000 - 72,000 = \text{Rs. } 1,08,000$$

$$1. \text{ Break-even Sales} = \frac{\text{Fixed Cost}}{\text{P/V ratio}} = \frac{1,08,000}{30\%} = \text{Rs. } 3,60,000$$

$$2. \text{ Profit} = (\text{Sales} \times \text{P/V ratio}) - \text{Fixed cost} = (9,00,000 \times 30\%) - 1,08,000 = \text{Rs. } 1,62,000$$

PROBLEM NO: 4

$$\text{Variable Cost} = 100 - \text{P/V Ratio} = 100 - 60 = 40$$

$$\text{If Variable cost is 40, then selling price} = 100$$

$$\text{If Variable cost is 20, then selling price} = (100 / 40) \times 20 = \text{Rs. } 50$$

PROBLEM NO: 5

$$N = 18,000 \text{ units}$$

$$O = 9,000 \text{ units}$$

$$\text{Ratio (N : O)} = 2:1$$

Let,

$$t = \text{No. of units of 'O' for BEP}$$

$$N = 2t \text{ No. of units for BEP}$$

$$\text{Contribution of 'N'} = \text{Rs. } 10.5 \text{ per unit}$$

$$\text{Contribution of 'O'} = \text{Rs. } 9 \text{ per unit}$$

$$\text{At Break Even Point: } 10.5 \times (2t) + 9 \times t - 15,000 = 0$$

$$30t = 15,000$$

$$t = 500 \text{ units}$$

$$\text{BEP of 'N'} = 2t = 1,000 \text{ units}$$

$$\text{BEP of 'O'} = t = 500 \text{ units}$$

PROBLEM NO: 6

i) Computation of Break-even Point (BEP) for each factory.

Sl. No.		Factory A (Rs)	Factory B (Rs)
A	Selling Price per packet	80	80
B	Variable Cost per packet	65	68
C	Contribution per packet [A - B]	15	12
D	P/V ratio [C ÷ A × 100] (%)	18.75	15
E	Fixed Cost	3,60,000	3,00,000
F	BEP (units) [E ÷ C]	24,000	25,000
G	BEP (Sales) [E ÷ D]	19,20,000	20,00,000

$$\text{ii) Cash BEP (units)} = \frac{\text{Fixed Cost} - \text{Depreciation}}{\text{Contribution per unit}}$$

$$\text{Factory A} = \frac{\text{Rs. } 3,60,000 - \text{Rs. } 60,000}{\text{Rs. } 15} = 20,000 \text{ packets}$$

$$\text{Factory B} = \frac{\text{Rs. } 3,00,000 - \text{Rs. } 30,000}{\text{Rs. } 12} = 22,500 \text{ packets}$$

$$\text{iii) Computation of Combined Break-even Point (units)} = \frac{\text{Combined Fixed Cost}}{\text{Combined Contribution per unit}}$$

$$= \frac{\text{Rs. } 3,60,000 + \text{Rs. } 3,00,000}{\text{Rs. } 15 \frac{2}{5} + \text{Rs. } 12 \frac{3}{5}} = \text{Rs. } 6,60,000 / \text{Rs. } 13.20 = 50,000 \text{ packets}$$

PROBLEM NO:7

- i) Contribution per unit = Selling price - Variable cost = Rs.40 - Rs.16 =Rs.24
 Break-even Point = 4,80,000 / 24 =20,000 units
 Percentage Margin of Safety = Actual Sales Break - even Sales / Actual Sales
 Or, 60% = Actual Sales - 20,000units / Actual Sales
 Actual Sales = 50,000units

	Rs.
Sales Value (50,000 units ×Rs.40)	20,00,000
Less: Variable Cost (50,000 units ×Rs.16)	8,00,000
Contribution	12,00,000
Less: Fixed Cost	4,80,000
Profit	7,20,000
Less: Income Tax @ 40%	2,88,000
Net Return	432,000

Rate of Net Return on Sales = Rs.4,32,000 / 20,00,000×100 = 21.6%

- ii) Products

	X	Y
Selling Price per unit	40	50
Variable Cost per unit	16	10
Contribution per unit	24	40
Individual Product's Contribution Margin	60% (24/40×100)	80% (40/50×100)

Contribution Margin (X & Y): 60%× 7/10 +80%× 3/10 = 66%

Break-even Sales = Rs.10,10,000 ×(6,66,600/66%)

Break-even Sales Mix:

X - 70% of 10,10,000 = Rs.7,07,000 i.e.17,675 units.

Y - 30% of 10,10,000 = Rs.3,03,000 i.e. 6,060 units.

PROBLEM NO: 8

$$P/V \text{ ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = [(15-12) / 15] \times 100 = (3/15) \times 100 = 20\%$$

Marginal of Safety = (Profit) / (P/V Ratio) = 50,000/20% = Rs. 2,50,000

PROBLEM NO: 9

P/V Ratio = 50% of sales

Margin of safety (M.O.S) = 40% of sales

Sales = 1,00,000

M.O.S (in Rs.) = 40,000/-

B.E.P (in Rs.) = 60,000/-

M.O.S (in Rs.) = $\frac{\text{Profit}}{\text{P/v Ratio}}$

40,000 = $\frac{\text{Profit}}{0.5}$

Profit = Rs. 20,000

PROBLEM NO: 10

i) We know that: B.E. Sales x P/V Ratio = Fixed Cost
 or Rs. 1,60,000 x P/V ratio = Rs. 40,000
 P/V ratio = 25%
 We also know that Sales x P/V Ratio = Fixed Cost + Profit
 or Rs. 2,00,000 x 0.25 = Rs. 40,000 + Profit
 or Profit = Rs. 10,000

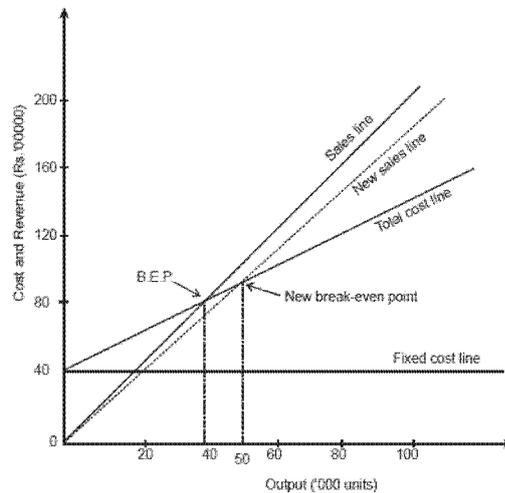
ii) Again B.E. Sales x P/V ratio = Fixed Cost
 or Rs. 40,000 x P/V Ratio = Rs. 20,000
 or P/V ratio = 50 %
 We also know that: Sales x P/V ratio = Fixed Cost + Profit
 or Sales x 0.50 = Rs. 20,000 + Rs. 10,000
 or Sales = Rs. 60,000

PROBLEM NO: 11

a) Contribution = S-V = Rs. 200 - Rs. 100 per unit.
 B.E. Point = $\frac{\text{Fixedcost}}{\text{Contributionperunit}} = \frac{40,00,000}{\text{Rs.100}} = 40,000 \text{ units.}$

b) When selling price is reduced
 New selling price = Rs. 180
 New Contribution = Rs. 180 - Rs.100 = Rs. 80 per unit
 New B.E. Point = $\frac{40,00,000}{\text{Rs.80}} = 50,000 \text{ units}$

The break-even chart is shown below:



PROBLEM NO: 12

Calculation of Profit made in the month of August 2014 by selling 14,000 units.

	Amount per unit (Rs.)	Amount (Rs.)
Sales revenue	18.00	2,52,000
Less: variable cost		
- Direct material	8.00	1,12,000
- Direct labour	3.50	49,000
- Variable overhead	2.50	35,000

Contribution	4.00	56,000
Less: fixed overhead	2.00	28,000
Profit	2.00	28,000

- i) To maintain the same amount of profit i.e. Rs. 28,000 in September 2014 also, the company needs to maintain a contribution of Rs. 56,000.

Let, number of units to be sold in September 2014 is 'x', then the contribution will be

$$\text{Rs. } 18x - [(\text{Rs. } 8 \times 1.10) + \text{Rs. } 3.5 + (\text{Rs. } 2.5 \times 1.05)]x = \text{Rs. } 56,000$$

$$\text{Rs. } 18x - (\text{Rs. } 8.8 + \text{Rs. } 3.5 + \text{Rs. } 2.625)x = \text{Rs. } 56,000$$

$$\text{Or } x = \frac{\text{Rs. } 56,000}{\text{Rs. } 3.075} = 18,211.38 \text{ units or } 18,212 \text{ units.}$$

- ii) Margin of Safety

	August 2014	September 2014
Profit	Rs. 28,000	Rs. 28,000
P/V Ratio	$\frac{4}{18} \times 100$	$\frac{\text{Rs. } 3.075}{\text{Rs. } 18} \times 100$
	Rs. 1,26,000	Rs. 1,63,902
Margin of Safety $\frac{\text{Profit}}{\text{P/V ratio}} \times 100$	$\frac{28,000}{400} \times 18 \times 100$	$\frac{28,000}{307.5} \times 18 \times 100$

PROBLEM NO: 13

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \left(\frac{1,50,000}{3,00,000} \times 100 \right) = 50\%$$

- i) If in the next period company suffered a loss of Rs. 30,000, then

$$\text{Contribution} = \text{Fixed Cost} - \text{Profit} = \text{Rs. } 90,000 - \text{Rs. } 30,000 \text{ (as it is a loss)} = \text{Rs. } 60,000.$$

$$\text{Then Sales} = \frac{\text{Contribution}}{\text{P/V Ratio}} \text{ or } \frac{60,000}{0.50} = \text{Rs. } 1,20,000$$

So, there will be loss of Rs. 30,000 at sales of Rs. 1,20,000.

$$\text{ii) Margin of safety} = \frac{\text{Profit}}{\text{PV ratio}} \text{ or } \frac{90,000}{0.50} = \text{Rs. } 1,80,000$$

Alternative solution of this part:

$$\text{Break-even Sales} = \frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{\text{Rs. } 90,000}{50\%} = \text{Rs. } 1,80,000$$

$$\text{Sales at profit of Rs } 90,000 = \frac{\text{Fixed Cost} + \text{Profit}}{\text{PV Ratio}} = \frac{\text{Rs. } 90,000 + \text{Rs. } 90,000}{50\%} = \frac{\text{Rs. } 1,80,000}{50\%} = \text{Rs. } 3,60,000$$

$$\text{Margin of Safety} = \text{Sales} - \text{Break-even Sales} = 3,60,000 - 1,80,000 = \text{Rs. } 1,80,000$$

PROBLEM NO: 14

Particulars	Factory X	Factory Y
Selling price per unit	50	50
Less: variable cost per unit	40	35
Contribution per unit	10	15
No. of units sold	30,000	20,000
Total contribution	3,00,000	3,00,000
Less: fixed cost	2,00,000	3,00,000
Profit	1,00,000	Nil
B.E.P (in units) = $\frac{\text{Fixed cost}}{\text{Contribution}}$	$\frac{2,00,000}{10} = 20,000 \text{ units}$	$\frac{3,00,000}{15} = 20,000 \text{ units}$

Overall Break Even Point = 20,000 + 20,000 = 40,000 Units

PROBLEM NO: 15

$$\text{Margin of safety (\%)} = \frac{3,750 \text{ units}}{3,750 \text{ units} + 1,250 \text{ units}} = 75\%$$

$$\text{Total Sales} = \frac{\text{Rs. } 1,87,500}{0.75} = \text{Rs. } 2,50,000$$

$$= \text{Total Sales} - \text{Total Cost} = \text{Rs. } 2,50,000 - \text{Rs. } 1,93,750 = \text{Rs. } 56,250$$

$$\text{P/V Ratio} = \frac{\text{Profit}}{\text{Margin of safety (Rs.)}} \times 100 = \frac{\text{Rs. } 56,250}{\text{Rs. } 1,87,500} \times 100 = 30\%$$

$$\text{Break even Sales} = \text{Total Sales} \times [100 - \text{Margin of Safety \%}] = \text{Rs. } 2,50,000 \times 0.25 = \text{Rs. } 62,500$$

$$\text{Fixed Cost} = \text{Sales} \times \text{P/V Ratio} - \text{Profit} = \text{Rs. } 2,50,000 \times 0.30 - \text{Rs. } 56,250 = \text{Rs. } 18,750$$

PROBLEM NO: 16**Working Note:**

1. Current utilization 90% capacity and Turnover is Rs 9,45,000

$$\text{No. of units} = \text{Rs. } 9,45,000 / \text{Rs. } 30 = 31,500 \text{ units}$$

Variable Cost per units:

Material	9.00
Labour cost	7.00
Variable overheads	4.25
Total Variable Cost	20.25
Selling price	30.00
Contribution per unit (Selling price - Variable Cost)	9.75

Calculation of Total Fixed Cost

Particulars	Amount (Rs.)
Semi-variable cost	2,10,000
Less: Variable cost (31,500 units × Rs. 4.25)	1,33,875
Fixed Cost	76,125
Add: Fixed cost up to 90% level	94,500
Total Fixed Cost	1,70,625

2. Present Profit:

$$\text{Contribution (31,500 units at Rs 9.75)} \quad 3,07,125$$

$$\text{Less: Fixed cost} \quad \underline{1,70,625}$$

$$\text{Profit} \quad \underline{1,36,500}$$

- i) Break-even point = Total Fixed Cost / Contribution per unit = Rs. 1,70,625 / Rs. 9.75 = 17,500 Units

$$\text{At 17,500 units, output level is} = \frac{17,500}{31,500} \times 90\% = 50\%$$

So, at 50% activities level, this company reaches at BEP

$$\text{ii) Sales (Units)} = \frac{\text{Fixed Cost} + \text{Profit}}{\text{Contribution per unit}}$$

$$10\% \text{ of sales} = 10\% \text{ of Rs } 30 = \text{Rs } 3 \text{ per unit profit.}$$

Let us assume 'S' is the no. of units to be sold, hence profit will be 3S

$$\text{So, S} = \frac{\text{Rs. } 1,70,625 + 3S}{\text{Rs. } 9.75}$$

$$\text{Or, } 9.75 S = 1,70,625 + 3S$$

$$\text{Or, } S = 1,70,625 \div 6.75 = 25,278 \text{ units.}$$

$$\text{iii) Sales (units)} = \frac{\text{Rs. } 1,70,625 + 1,41,375}{\text{Rs. } 9.75} = \text{Rs. } 3,12,000 \div \text{Rs. } 9.75 = 32,000 \text{ units}$$

32,000 units is beyond 90% activity level. In such case, the fixed cost will be increased by Rs 15,000 to Rs. 3,27,000.

$$\text{Then, } S = \text{Rs. } 3,27,000 / \text{Rs. } 9.75 = 33,538 \text{ units} \quad \text{i.e. } \frac{33,538}{35,000} \times 100 = 95.82\% \text{ activity level.}$$

PROBLEM NO: 17

i) P/V Ratio - 50%

Margin of Safety - 40%

Sales 500 Units for Rs. 5,00,000

Selling price per Unit - Rs. 1,000

Calculation of Break Even Point (BEP)

$$\text{Margin of Safety Ratio} = \frac{\text{Sales} - \text{BEP}}{\text{Sales}} \times 100$$

$$40 = \frac{5,00,000 - \text{BEP}}{5,00,000} \times 100$$

$$\text{BEP (in sales)} = \text{Rs. } 3,00,000$$

$$\text{BEP (in Unit)} = \text{Rs. } 3,00,000 \div \text{Rs. } 1,000 = 300 \text{ units}$$

ii) Sales in units to earn a profit of 10% on sales

$$\text{Sales} = \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P/V Ratio}}$$

Let the Sales be x

$$\text{Profit} = 10\% \text{ of } x \text{ i.e. } 0.1x$$

Thus,

$$X = \left(\frac{1,50,000 + 0.1x}{50\%} \right)$$

$$\text{Or, } x = \text{Rs. } 3,75,000$$

To find out sales in units amount of sales Rs. 3,75,000 is to be divided by Selling Price per unit

$$\text{Thus - Sales (in units)} = \frac{\text{Rs. } 3,75,000}{\text{Rs. } 1,000} = 375 \text{ Units}$$

WORKING NOTES:

1. Selling price = Rs. 5,00,000 + Rs. 500 = Rs. 1,000 per unit
2. Variable cost per unit = Selling Price - (Selling Price x P/V Ratio) = Rs. 1,000 x 50% = Rs. 500
3. Profit at present level of sales

$$\text{Margin of Safety} = \frac{\text{Profit}}{\text{P/V Ratio}}$$

$$\text{Margin of Safety} = 40\% \text{ of Rs. } 5,00,000 = \text{Rs. } 2,00,000$$

$$\text{Rs. } 2,00,000 = \frac{\text{Profit}}{50\%}$$

$$\text{Profit} = \text{Rs. } 1,00,000$$

$$4. \text{ Fixed Cost} = (\text{Sales} \times \text{P/V Ratio}) - \text{Profit} = (\text{Rs. } 5,00,000 \times 50\% - \text{Rs. } 1,00,000) = \text{Rs. } 1,50,000$$

(Note: Alternative ways of calculation of 'Break Even Point' and required sales to earn a profit of 10% of sales' can be adopted to solve the problem.)

PROBLEM NO: 18

$$\text{P/V ratio} = \frac{\text{Selling price} - \text{Variable cost per unit}}{\text{Selling price}} = \frac{\text{Rs. } 10 - \text{Rs. } 8}{\text{Rs. } 10} = 20\%$$

$$\text{Margin of safety} = \frac{\text{Profit}}{\text{P/V Ratio}} = \frac{\text{Rs. } 30,000}{20\%} = \text{Rs. } 1,50,000$$

PROBLEM NO: 19

$$\text{P/V ratio} = 28\%$$

$$\text{Quarterly fixed Cost} = \text{Rs. } 2,80,000$$

$$\text{Desired Profit} = \text{Rs. } 70,000$$

$$\begin{aligned} \text{Sales revenue required to achieve desired profit} &= \frac{\text{Fixed cost} + \text{Desired profit}}{\text{p/v ratio}} = \frac{2,80,000 + 70,000}{28\%} \\ &= \text{Rs. } 12,50,000 \end{aligned}$$

PROBLEM NO: 20

Variable cost to sales = 70%, Contribution to sales = 30%, Or P/V Ratio 30%

We know that: $\text{BES} \times \text{P/V Ratio} = \text{Fixed Cost}$

$$\text{BES} \times 0.30 = \text{Rs. } 90,000$$

$$\text{Or BES} = \text{Rs. } 3,00,000$$

It is given that break-even occurs at 60% capacity.

$$\text{Capacity sales} = \text{Rs. } 3,00,000 \div 0.60 = \text{Rs. } 5,00,000$$

Computation of profit of 75% Capacity

$$75\% \text{ of capacity sales (i.e. Rs. } 5,00,000 \times 0.75) = \text{Rs. } 3,75,000$$

$$\begin{aligned} \text{Less: Variable cost (i.e. Rs. } 3,75,000 \times 0.70) &= \text{Rs. } 2,62,500 \\ &= \text{Rs. } 1,12,500 \end{aligned}$$

$$\text{Less: Fixed Cost} = \text{Rs. } 90,000$$

$$\text{Profit} = \text{Rs. } 22,500$$

PROBLEM NO: 21

	2012	2013	Difference
Sales Units	80,000	1,20,000	40,000
Sale Value @ Rs 40	32,00,000	48,00,000	16,00,000
Total Cost (Rs)	34,40,000	45,60,000	11,20,000

$$\text{Variable Cost per unit} = \frac{\text{Change in Total Cost}}{\text{Change in sales volume}} = \frac{\text{Rs. } 11,20,000}{40,000 \text{ units}} = \text{Rs. } 28 \text{ per unit}$$

$$\text{Total Fixed Cost (Rs)} = \text{Rs. } 45,60,000 - (1,20,000 \text{ units} \times \text{Rs. } 28) = \text{Rs. } 12,00,000$$

$$\text{i) Break-even point (in units)} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{\text{Rs. } 12,00,000}{(\text{Rs. } 40 - \text{Rs. } 28)} = 1,00,000 \text{ units}$$

$$\begin{aligned} \text{ii) Profit at 75\% Capacity in 2014.} &= (2,00,000 \text{ units} \times 75\%) \times \text{Contribution per unit} - \text{Fixed Cost} \\ &= 1,50,000 \text{ units} \times \text{Rs. } 12 - \text{Rs. } 12,00,000 = \text{Rs. } 6,00,000. \end{aligned}$$

PROBLEM NO: 22**a) Marginal Cost Statement:**

Particulars	Amount	Break Even Point	Margin Of Safety
Sales	1,00,000	75,000	25,000
Less: Variable Cost (60%)	60,000	45,000	15,000
Contribution (40%)	40,000	30,000	10,000
Less: Fixed Cost	30,000	30,000	-
Profit	10,000	-	10,000

$$\text{Profit Volume Ratio} = \frac{\text{Contribution}}{\text{Sales}} = \frac{40,000}{1,00,000} = 40\%$$

$$\text{Break Even point} = \frac{\text{Fixedcost}}{\text{ProfitVolumeRatio}} = \frac{30,000}{40\%} = 75,000$$

$$\text{Margin of Safety} = 1,00,000 - 75,000 = 25,000$$

b) Sensitive Analysis Statement:

Particulars	A	B	C	D	E	F
Sales	1,20,000 (1L x 120%)	95,000 (1L x 95%)	1,00,000	1,00,000	1,20,000 (1L x 120%)	1,04,500 (1L x 110% x 95%)
Less: variable Cost	60,000	57,000 (60,000 x 95%)	66,000 (60,000 x 110%)	60,000	54,000 (60,000 x 90%)	62,700 (60,000 x 95% x 110%)
Contribution	60,000	38,000	34,000	40,000	66,000	41,800
Less: Fixed Cost	30,000	30,000	30,000	27,000 (30,000 x 90%)	33,000 (30,000 x 110%)	25,000 (30,000 - 5,000)
Profit/loss	30,000	8,000	4,000	13,000	33,000	16,800
P.V.R	50%	40%	34%	40%	55%	40%
BEP	60,000	75,000	88,235	67,500	60,000	62,500
M.O.S	60,000	20,000	11,765	32,500	60,000	42,000

PROBLEM NO: 23

Option (i): Increase in profit when due to change in a manufacturing process there is reduction in joint fixed cost and increase in variable costs.

	Amount (Rs.)
Revised Contribution from 12,000 units of A due to 7.5% increase in Variable Cost {12,000 units × (Rs.200 - Rs.129)}	8,52,000
Revised Contribution from 12,000 units of B due to 7.5% increase in Variable Cost {12,000 units × (Rs.120 - Rs.64.50)}	6,66,000
Total Revised Contribution	15,18,000
Less: Fixed Cost (Rs.15,00,000 - 15% × Rs.15,00,000)	12,75,000
Revised Profit	2,43,000
Less: Existing Profit	1,80,000
Increase in Profit	63,000

Option (ii): Increase in profit when the price of product A increased by 20% and the price elasticity of its demand would be unity over the range of price.

	Amount (Rs.)
Budgeted Revenue from Product A (12,000 units × Rs.200)	24,00,000
Revised Demand (in units) (Rs.24,00,000 / Rs.240)	10,000
Revised Contribution (in Rs.) [10,000 units × (Rs.240 - Rs.120)]	12,00,000
Less: Existing Contribution (12,000 units × Rs.80)	9,60,000
Increase in Profit (Contribution)	2,40,000

*Note: Since Price Elasticity of Demand is 1, therefore the Revenue in respect of Products will remain same.

Option (iii): Increase in profit on the simultaneous introduction of above two options.

	Amount (Rs.)
Revised Contribution from Product A [10,000 units × (Rs.240 - Rs.129)]	11,10,000
Revised Contribution from Product B [12,000 units × (Rs.120 - Rs.64.50)]	6,66,000
Total Revised Contribution	17,76,000
Less: Revised Fixed Cost	12,75,000
Revised Profit	5,01,000
Less: Existing Profit	1,80,000
Increase in Profit	3,21,000

A comparison of increase in profit figures under above three options clearly indicates that the option (iii) is the best as it increases the profit of the concern by Rs.3,21,000.

Note: The budgeted profit / (loss) for 2018 in respect of products A and B should be Rs. 2,10,000 and (Rs.30,000) respectively instead of Rs. 1,50,000 and Rs. 30,000.

Workings:

1. Contribution per unit of each product:

Particulars	Product	
	A (Rs.)	B (Rs.)
Contribution per unit (Sales × P/V Ratio)	80	60
	(Rs.200 × 40%)	(Rs.120 × 50%)

2. Number of units to be sold:

Total Contribution - Fixed Cost = Profit

Let x be the number of units of each product sold, therefore:

$$(80x + 60x) - \text{Rs.}15,00,000 = \text{Rs.}1,50,000 + \text{Rs.}30,000$$

$$\text{Or } x = 12,000 \text{ units}$$

PROBLEM NO: 24

WORKINGS:

a) Contribution per unit = Selling price per unit - Total variable cost = Rs.3,400 - Rs.2,890 = Rs.510

b) Profit = Total Contribution - Total Fixed Cost
 = 55,000 units × Rs.510 - Rs.1,80,00,000
 = Rs.2,80,50,000 - Rs.1,80,00,000 = Rs.1,00,50,000

i) Break Even Sales (in units) = $\frac{\text{Total Fixed Cost}}{\text{Contribution per unit}} = \frac{\text{Rs.}1,80,00,000}{\text{Rs.}510} = 35,294.12 \text{ or } 35,294 \text{ units}$

ii) Margin of safety in units = Sales units - Break even sales in units = 55,000 - 35,294 = 19,706 units.

Or

$$= \frac{\text{Profit}}{\text{Contribution per unit}} = \frac{\text{Rs.}1,00,50,000}{\text{Rs.}510} = 19,705.88 \text{ or } 19,706 \text{ units}$$

iii) To maintain the same amount of profit, total contribution should be equal to present profit + Total fixed cost = Rs.1,00,50,000 + (Rs.1,80,00,000 + Rs.20,00,000) = Rs.3,00,50,000.

Revised contribution per unit = Rs.510 - 10% of Rs.2,890 = Rs.221

No of units to be sold = $\frac{\text{Re required contribution}}{\text{Revised contribution per unit}} = \frac{\text{Rs.}3,00,50,000}{\text{Rs.}221} = 1,35,972.85 \text{ or } 1,35,973 \text{ units}$

Therefore, to maintain profit amount of Rs.1,00,50,000, Kevin Ltd. has to sell 80,973 (1,35,973 - 55,000) additional units of C123.

PROBLEM NO: 25

- i) Total Fixed Cost = Rs. 6,00,000 + Rs. 20,00,000 + Rs. 8,00,000 + Rs. 2,00,000 = Rs. 36,00,000
 Contribution per unit = Rs.600 - Rs.470 = Rs.130
 P/V Ratio = $\frac{\text{Contribution per unit}}{\text{Selling Price}} \times 100 = \frac{\text{Rs.130}}{\text{Rs.600}} \times 100 = 21.67\%$
 Break-even Point = $\frac{\text{Total Fixed Cost}}{\text{Contribution per unit}} \times 100 = \frac{\text{Rs.36,00,000}}{\text{Rs.130}} = 27,692.31$ or 27,693 units
 Break-even Sales = $\frac{\text{Total Fixed Cost}}{\text{P/V Ratio}} = \frac{\text{Rs.36,00,000}}{21.67\%} = \text{Rs}1,66,12,829$

Calculation of Profit/ (loss):

Total Contribution (Rs130 × 35,000 units) = Rs.45,50,000

Less: Fixed Cost = Rs.36,00,000

Profit = Rs. 9,50,000

- ii) Revised Selling Price = Rs.600 - 5% of Rs.600 = Rs.570
 Revised Variable cost = Rs.410
 Revised Contribution = Rs.570 - Rs.410 = Rs.160
 Break-even Point = $\frac{\text{Rs.36,00,000} + \text{Rs.9,00,000}}{\text{Rs.160}} = 28,125$ units
- iii) Revised Selling Price = Rs.600 + 5% of Rs.600 = Rs.630
 Revised Variable cost = Rs.470 + Rs.5 = Rs.475
 Revised Contribution = Rs.630 - Rs.475 = Rs.155
 Break-even Point = Rs.36,00,000 / Rs.155 = 23,225.81 or 23,226 units

PROBLEM NO: 26

- P/V ratio = $\frac{\text{Contribution}}{\text{Sales}} = \frac{2,00,000}{8,00,000} = 25\%$
 Margin of safety = $\frac{\text{Profit}}{\text{P/V ratio}} = \frac{1,50,000}{25\%} = \text{Rs } 6,00,000$

Alternatively:

Fixed cost = Contribution - Profit = Rs 2,00,000 - Rs1,50,000 = Rs 50,000

B.E. Point = Rs 50,000 ÷ 25% = Rs 2,00,000

Margin of Safety = Actual sales - B.E. sales = 8,00,000 - 2,00,000 = 6,00,000

PROBLEM NO: 27

- a) B.E.P = Fixed Cost/Contribution per unit* = Rs. 1,50,000 / Rs. 15 = 10,000 Units.
 *(Contribution per unit = Sales per unit - Variable cost per unit = Rs. 30 - Rs. 15)
- b) Sales to earn a Profit of Rs. 20,000 = (Fixed Cost + Desired Profit) /Contribution per unit x S.P.
 = (Rs. 1,50,000 + Rs. 20,000) ÷ 15 x 30
 = Rs. 1,70,000 ÷ 15 x 30
 = Rs. 3,40,000 or, $\frac{\text{Rs.1,70,000}}{\text{P/V Ratio}} = \frac{\text{Rs.1,70,000}}{50\%} = \text{Rs. } 3,40,000$

Note: P/V Ratio = $\frac{\text{Contribution}}{\text{Sales}} \times 100$

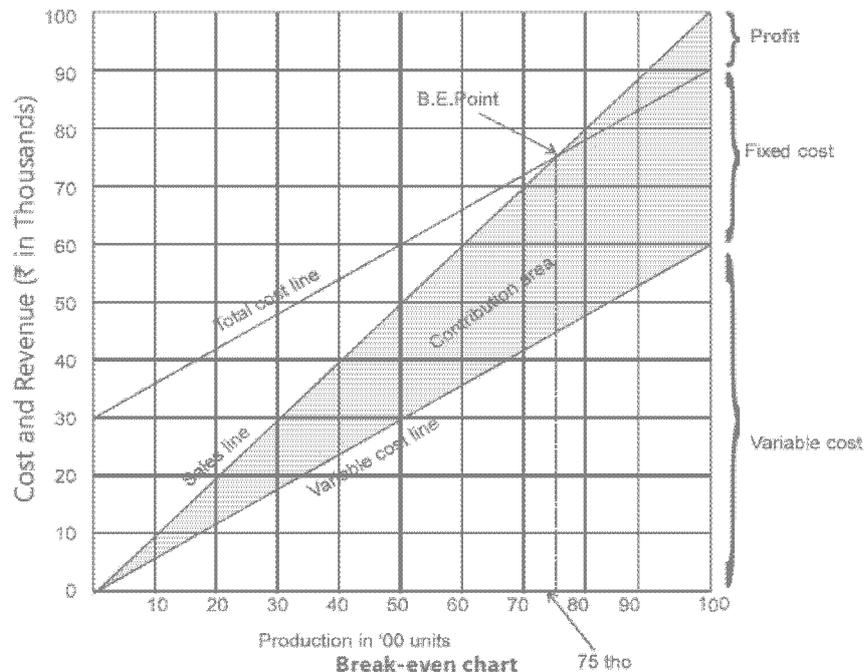
PROBLEM NO: 28

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

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

$$\text{Margin of safety} = \text{Actual Sales} - \text{BE point} = 1,00,000 - 75,000 = \text{Rs. } 25,000$$

Break-even chart showing contribution is shown below:

**PROBLEM NO: 29**

Units sold	Sales value (Rs)	Profit/ (loss) (Rs)
16,000 units	4,80,000 (Rs 30 × 16,000 units)	(1,60,000) (Rs 10 × 16,000 units)
40,000 units	12,00,000 (Rs 30 × 40,000 units)	3,20,000 (Rs 8 × 40,000 units)

$$P/V \text{ Ratio} = \frac{\text{Change in profit}}{\text{Change in sales value}} \times 100 = \frac{\text{Rs. } 3,20,000 - (-\text{Rs. } 1,60,000)}{\text{Rs. } 12,00,000 - \text{Rs. } 4,80,000} \times 100 = \frac{\text{Rs. } 4,80,000}{\text{Rs. } 7,20,000} \times 100 = 66.67\%$$

$$\text{Total Contribution in case of 40,000 units} = \text{Sales Value} \times P/V \text{ Ratio} = \text{Rs } 12,00,000 \times 66.67\% = \text{Rs } 8,00,000$$

$$\text{So, Fixed cost} = \text{Contribution} - \text{Profit} = \text{Rs } 8,00,000 - \text{Rs } 3,20,000 = \text{Rs } 4,80,000$$

$$\text{i) Break-even Point in Rupees} = \frac{\text{Fixed Cost}}{P/V \text{ Ratio}} = \frac{\text{Rs } 4,80,000}{66.67\%} = \text{Rs } 7,20,000$$

$$\text{ii) If sales volume is 50,000 units, then profit} = \text{Sales Value} \times P/V \text{ Ratio} - \text{Fixed Cost} \\ = 50,000 \text{ units} \times \text{Rs } 30 \times 66.67\% - \text{Rs } 4,80,000 = \text{Rs } 5,20,000$$

$$\text{iii) Minimum level of production where the company needs not to close the production, if unavoidable fixed cost is Rs } 1,50,000: \\ \frac{\text{Avoidable fixed cost}}{\text{Contribution per unit}} = \frac{\text{Total fixed cost} - \text{Unavoidable Fixed cost}}{\text{Contribution per unit}} \\ = \frac{\text{Rs. } 4,80,000 - \text{Rs. } 1,50,000}{\text{Rs. } 30 \times 66.67\%} = \frac{\text{Rs. } 3,30,000}{\text{Rs. } 20} = 16,500 \text{ units.}$$

At production level of $\geq 16,500$ units, company needs not to close the production.

PROBLEM NO: 30**1. Comparative Profitability Statements**

Particulars	Process- A (Rs)	Process- B (Rs)
Selling Price per unit	20.00	20.00
Less: Variable Cost per unit	12.00	14.00
Contribution per unit	8.00	6.00
Total Contribution	32,00,000 (Rs 8 × 4,00,000)	24,00,000 (Rs 6 × 4,00,000)
Less: Total fixed costs	30,00,000	21,00,000
Profit	2,00,000	3,00,000
*Capacity (units)	4,30,000	5,00,000
Total Contribution at full capacity	34,40,000 (Rs 8 × 4,30,000)	30,00,000 (Rs 6 × 5,00,000)
Fixed Cost	30,00,000	21,00,000
Profit	4,40,000	9,00,000

Process- B should be chosen as it gives more profit.

2.

Particulars	Process- A (Rs)	Process- B (Rs)
*Capacity (units)	6,00,000	5,00,000
Total contribution	48,00,000 (Rs 8 × 6,00,000)	30,00,000 (Rs 6 × 5,00,000)
Fixed Cost	30,00,000	21,00,000
Profit	18,00,000	9,00,000

Process-A be chosen.

***Note: It is assumed that capacity produced equals sales.**

PROBLEM NO: 31**i)**

Particulars	Part A	Part B
Machine "A" (4,000 hrs)	6,666	16,000
Machine "B" (4,500 hrs)	9,000	8,181
Alloy Available (13,000 kg.)	8,125	8,125
Maximum Number of Parts to be manufactured	6,666	8,125
Particulars	(Rs.)	(Rs.)
Material (Rs.12.5 × 1.6 kg.)	20.00	20.00
Variable Overhead: Machine "A"	48.00	20.00
Variable Overhead: Machine "B"	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 A : to be used	4,000
Machine B : to be used	3,333
Underutilized Machine Hours (4,500 hrs. - 3,333 hrs.)	1,167
Compensation for unutilized machine hours (1,167hrs. × Rs.60) ... (II)	70,020
Reduction in Price by 10%, Causing fall in Contribution of Rs.14.50 per unit (6,666 units × Rs.14.5) ... (III)	96,657
Total Contribution ... (I + II - III)	1,53,345

PROBLEM NO: 32

		X	Y	Z
I.	Contribution per unit (Rs.)	4	3	5
II.	Units (Lower of Production / Market Demand)	2,000	2,000	900
III.	Possible Contribution (Rs.) [I × II]	8,000	6,000	4,500
IV.	Opportunity Cost* (Rs.)	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 (Rs. 6,000 from Y, Rs. 4,500 from Z).

PROBLEM NO: 33i) **Statement of Cost and Profit under Marginal Costing**for the year ending 31st March, 2014 Output = 3,20,000 units

Particulars	Amount (Rs.)	Amount (Rs.)
Sales: 3,10,000 units @ Rs. 80		2,48,00,000
Marginal cost / variable cost:		
Variable cost of production (3,20,000 x Rs. 40)	1,28,00,000	
Add: Opening stock 40,000 units @ Rs. 40	<u>16,00,000</u>	
	1,44,00,000	
Less: Closing Stock $\left(\frac{\text{Rs. } 1,44,000}{3,60,000} \times 50,000 \text{ units}^* \right)$	(20,00,000)	
Variable cost of production of 3,10,000 units	1,24,00,000	
Add: Variable selling expenses @ Rs. 12 per unit	<u>37,20,000</u>	<u>1,61,20,000</u>
Contribution (sales-variable cost)		86,80,000
Less: Fixed production cost	24,00,000	
Fixed selling expenses	<u>16,00,000</u>	<u>(40,00,000)</u>
Actual profit under marginal costing		46,80,000

*Closing stock = 40,000 + 3,20,000 - 3,10,000 = 50,000 units

ii) **Statement of Cost and Profit under Marginal Costing**for the year ending 31st March, 2014 Output = 3,20,000 units

Particulars	Amount (Rs.)	Amount (Rs.)
Sales: 3,10,000 units @ Rs. 80		2,48,00,000
Less: Cost of Goods sold:		
Variable cost of production (3,20,000 @ Rs. 40)	1,28,00,000	
Add: Fixed cost of production absorbed 3,20,000 units @ Rs. 6 (WN 1)	<u>19,20,000</u>	
	1,47,20,000	
Add: Opening Stock : $\left(\frac{\text{Rs. } 1,47,20,000}{3,20,000} \times 40,000 \right)$	<u>18,40,000</u>	
	1,65,60,000	
Less: Closing Stock: $\left(\frac{\text{Rs. } 1,65,60,000}{3,60,000} \times 50,000 \right)$	(23,00,000)	
Production cost of 3,10,000 units	1,42,60,000	
Adjustment for Over/under-absorption:		
Under absorption of fixed production overheads ⁽²⁾	<u>4,80,000</u>	
Cost of Goods Sold	1,47,40,000	
Selling expenses:		
Variable: Rs. 12 x 3,10,000 units	37,20,000	
Fixed	<u>16,00,000</u>	<u>(2,00,60,000)</u>
Actual profit under absorption costing		47,40,000

Workings:

- Absorption rate for fixed cost of production = $\frac{\text{Rs. } 24,00,000}{4,00,000 \text{ units}} = \text{Rs. } 6 \text{ per unit}$
- Fixed production overhead under absorbed = $\text{Rs. } (24,00,000 - 19,20,000) = \text{Rs. } 4,80,000$

PROBLEM NO: 34**a) Statement of Profit under Absorption Costing**

Particulars	April (Rs.)	May (Rs.)	June (Rs.)
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 @ Rs.1,480	0	5,92,000	4,44,000
- Production cost @ Rs.1,480	68,08,000	65,12,000	81,40,000
- Closing Stock @ Rs.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. × Rs. 120)	480
Direct labour (6 hours × Rs. 60)	360
Variable production Overhead (150% of Rs. 360)	540
Total Variable cost	1,380
Fixed production overhead = $\frac{\text{Rs. } 60,00,000}{60,000 \text{ units}}$	100
	1,480

2. Calculation of Opening and Closing stock

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

b) Statement of Profit under Marginal Costing

Particulars	April (Rs.)	May (Rs.)	June (Rs.)
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	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

c) Reconciliation of profit under Absorption costing to Marginal Costing

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

Note: "Sales commission: 15% of sales value", is omitted in the problem, students have to consider it while solving the problem.

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THE END