

## 10. MARGINAL COSTING

## ASSIGNMENT SOLUTIONS

## PROBLEM NO: 1

	Sales (Rs.)	Profit (Rs.)
Year 2010	1,20,000	8,000
Year 2011	1,40,000	13,000
Difference	20,000	5,000

$$\text{i) P/V Ratio} = \frac{\text{Difference in Profit}}{\text{Difference in Sales}} \times 100 = \frac{\text{Rs. 5,000}}{\text{Rs. 20,000}} \times 100 = 25\%$$

	(Rs.)
Contribution in 2010 (1,20,000 × 25%)	30,000
Less: Profit	8,000
Fixed Cost*	22,000
*Contribution = Fixed cost + Profit	
Fixed cost = Contribution - Profit	

$$\text{ii) Break-even point} = \frac{\text{Fixed cost}}{\text{P/V Ratio}} = \frac{\text{Rs. 22,000}}{25\%} = \text{Rs. 88,000}$$

iii) Profit when sales are Rs.1,80,000	(Rs.)
Contribution (Rs.1,80,000 × 25%)	45,000
Less: Fixed cost	22,000
Profit	23,000

iv) Sales to earn a profit of Rs.12,000

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

v) Margin of safety in 2011:

$$\text{Margin of safety} = \text{Actual sales} - \text{Break-even sales} = \text{Rs. 1,40,000} - \text{Rs. 88,000} = \text{Rs. 52,000}.$$

## PROBLEM NO: 2

(a) Contribution = S-V = Rs. 200 - Rs. 100 per unit.

$$\text{B.E. Point} = \frac{\text{Fixed cost}}{\text{Contribution per unit}} = \frac{40,00,000}{\text{Rs. 100}} = 40,000 \text{ units.}$$

(b) When selling price is reduced

New selling price = Rs. 180

New Contribution = Rs. 180 - Rs. 100 = Rs. 80 per unit

$$\text{New B.E. Point} = \frac{40,00,000}{\text{Rs. 80}} = 50,000 \text{ units}$$

## PROBLEM NO: 3

$$\begin{aligned} \text{i) P/V Ratio} &= \left[ \frac{\text{change in profit}}{\text{change in sales}} \times 100 \right] \\ &= \left[ \frac{45,60,000 - 34,40,000}{1,20,000 - 80,000} \times 100 \right] \\ &= 28 \end{aligned}$$

Particulars	Cost per unit	Total amount
Sales	40	48,00,000
(-) Variable cost	28	(33,60,000)
contribution	12	14,40,000
(-) fixed cost (b/f)		12,00,000
profit		2,40,000

Profit = sales-total cost = 48,00,000 – 45,60,000=-2,40,000

ii) 
$$\text{P/V Ratio} = \frac{\text{Total Contribution}}{\text{Total sales}}$$

$$= \frac{14,40,000}{48,00,000} \times 100$$

$$= 30\%$$

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

iv) Profit if the firm operated at 75% of capacity:

	2,00,000 units * 75% = 1,50,000 units
Sales (1,50,000 * 40)	60,00,000
(-) variable cost (1,50,000 * 28)	(42,00,000)
contribution	18,00,000
(-) fixed cost	(12,00,000)
Profit	6,00,000

### **PROBLEM NO:4**

#### **Marginal cost Statement**

Particulars	2011
Sales	6,00,000
(-) Variable cost	(3,30,000)
<b>Contribution</b> (Sales × P/v Ratio)	<b>2,70,000</b>
(-) Fixed cost	(1,35,000)
<b>Profit/(loss)</b>	<b>1,35,000</b>
MOS × P/v Ratio	(3,00,000 × 45%)
MOS (Sales × % MOS)	3,00,000 (6,00,000 × 50%)

i) 2012:-

Variable cost = 3,30,000

$$\text{Variable cost ratio} = \frac{\text{Variable cost}}{\text{Sales}}$$

$$70\% = \frac{3,30,000}{\text{Sales}}$$

$$\text{Sales} = 4,71,428$$

ii) 2012:-

Total sales = 4,71,428

(-) MOS (20%) = (94,286)

BEP 3,77,142

$$\text{BEP} = \frac{\text{Fixed cost}}{\text{P/v Ratio}}$$

$$3,77,142 = \frac{\text{Fixed cost}}{30\%}$$

Fixed cost = 1,13,143

$$\text{iii) BEP} = \frac{\text{Fixed cost}}{\text{P/v Ratio}} = \frac{1,13,143}{30\%} = 3,77,143$$

**PROBLEM NO:5**

$$\frac{\text{Change in profit}}{\text{Change in Sales}} = \text{P/V Ratio}$$

$$\rightarrow \text{North} = \frac{(200)}{(500)} \times 100 = 40\%$$

$$\rightarrow \text{East} = \frac{20}{100} \times 100 = 20\%$$

$$\rightarrow \text{South} = \frac{(110)}{(200)} \times 100 = 55\%$$

**Marginal cost Statement**

Particulars	North	East	South	Total
Sales	2000	1000	500	3500
(-) Variable cost	(1200)	(800)	(225)	(2225)
<b>Contribution</b>	800 (2000 × 40%)	200 (1000 × 20%)	275 (500 × 55%)	<b>1275</b>
(-) Fixed cost (b/f)	(650)	(50)	(175)	(875)
<b>Profit/Loss</b>	150	150	100	<b>400</b>
BEP ( $\frac{\text{Fixed cost}}{\text{PVRatio}}$ )	1625 ( $\frac{650}{40\%}$ )	250 ( $\frac{50}{20\%}$ )	318 ( $\frac{175}{55\%}$ )	

$$\text{Combined P/V Ratio} = \frac{\text{Total Contribution}}{\text{Total sales}}$$

$$= \frac{1275}{3500} \times 100 = 36\%$$

$$\text{Total BEP} = \frac{\text{Total Fixed Cost}}{\text{Combined P/v Ratio}} = \frac{875}{36\%} = 243\%$$

Fixed cost=North=650, East=50, South=175

Break-even point= North=1625, East=250, South=18

**PROBLEM NO: 6**

	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

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

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

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

$$\text{ii) Profit at 75\% Capacity in 2014.} = (2,00,000 \text{ units} \times 75\%) \times \text{Contribution per unit} - \text{Fixed Cost}$$

$$= 1,50,000 \text{ units} \times \text{Rs 12} - \text{Rs 12,00,000} = \text{Rs 6,00,000.}$$

**PROBLEM NO: 7**

$$\text{i) Contribution per unit} = \text{Selling price} - \text{Variable cost} = \text{Rs.40} - \text{Rs.16} = \text{Rs.24}$$

$$\text{Break-even Point} = 4,80,000 / 24 = 20,000 \text{ units}$$

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

$$\text{Or, } 60\% = \text{Actual Sales} - 20,000 \text{ units} / \text{Actual Sales}$$

$$\text{Actual Sales} = 50,000 \text{ units}$$

Particulars	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	4,32,000

$$\text{Rate of Net Return on Sales} = \text{Rs.4,32,000} / 20,00,000 \times 100 = 21.6\%$$

**ii) Products**

Particulars	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)

$$\text{Contribution Margin (X \& Y): } 60\% \times 7/10 + 80\% \times 3/10 = 66\%$$

$$\text{Break-even Sales} = \text{Rs.10,10,000} \times (6,66,600/66\%)$$

**Break-even Sales Mix:**

$$\text{X} - 70\% \text{ of } 10,10,000 = \text{Rs.7,07,000 i.e.17,675 units.}$$

$$\text{Y} - 30\% \text{ of } 10,10,000 = \text{Rs.3,03,000 i.e. 6,060 units.}$$

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**PROBLEM NO: 8**

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 x 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

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

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

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

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: 9**

(i) We know that: B.E. Sales x P/V Ratio = Fixed Cost

$$\text{or Rs. } 1,60,000 \times \text{P/V ratio} = \text{Rs. } 40,000$$

$$\text{P/V ratio} = 25\%$$

We also know that Sales x P/V Ratio = Fixed Cost + Profit

$$\text{or Rs. } 2,00,000 \times 0.25 = \text{Rs. } 40,000 + \text{Profit}$$

$$\text{or Profit} = \text{Rs. } 10,000$$

(ii) Again B.E. Sales x P/V ratio = Fixed Cost

$$\text{or Rs. } 40,000 \times \text{P/V Ratio} = \text{Rs. } 20,000$$

$$\text{or P/V ratio} = 50\%$$

We also know that: Sales x P/V ratio = Fixed Cost + Profit

$$\text{or Sales} \times 0.50 = \text{Rs. } 20,000 + \text{Rs. } 10,000$$

$$\text{or Sales} = \text{Rs. } 60,000$$

**Problem no: 10**

a) i)

$$\text{Break-even sales} = \left[ \frac{\text{fixed cost}}{\text{p/v ratio}} \right]$$

$$\text{P/V Ratio} = \left[ \frac{\text{change in profit}}{\text{change in sales}} \times 100 \right] \text{ OR } \left[ \frac{37,50,000}{7,80,60,000 - 5,93,10,000} \times 100 \right]$$

$$= \left[ \frac{37,50,000}{1,87,50,000} \times 100 \right]$$

$$= 20\%$$

$$\text{Break-even sales} = \left[ \frac{98,50,000}{20\%} \right] = 4,92,50,000$$

$$\begin{aligned} \text{II) Profit/ loss} &= \text{Contribution} - \text{Fixed Cost} \\ &= \text{Rs. } 8,20,00,000 \times 20\% - \text{Rs. } 98,50,000 \\ &= \text{Rs. } 1,64,00,000 - \text{Rs. } 98,50,000 = \text{Rs. } 65,50,000 \end{aligned}$$

III) To earn same amount of profit in 20X8-X9 as was in 20X7-X8, it has to earn the same amount of contribution as in 20X7-X8.

Sales – Variable cost = Contribution equal to 20X7-X8 contribution

$$\begin{aligned} \text{Contribution in 20X7-X8} &= \text{Sales in 20X7-X8} \times \text{P/V Ratio in 20X7-X8} \\ &= \text{Rs. } 5,93,10,000 \times 20\% = \text{Rs. } 1,18,62,000 \end{aligned}$$

Let the number of units to be sold in 20X8-X9 = X

Sales in 20X8-X9 – Variable cost in 20X8-X9 = Desired Contribution

$$90X - 80X = \text{Rs. } 1,18,62,000$$

$$\text{Or, } 10X = 1,18,62,000$$

$$\text{Or, } X = 11,86,200 \text{ units}$$

Therefore, Sales amount required to earn a profit equals to 20X7-X8 profit

$$= \text{Rs. } 90 \times 11,86,200 \text{ units} = \text{Rs. } 10,67,58,000$$

### **PROBLEM NO: 11**

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

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: 12**

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: 13**

Margin of safety (%)	= $\frac{3,750\text{units}}{3,750\text{units}+1,250\text{units}}$ = 75%
Total Sales	= $\frac{\text{Rs.1,87,500}}{0.75}$ = Rs.2,50,000
	= Total Sales - Total Cost = Rs.2,50,000 - Rs.1,93,750 = Rs.56,250
P/V Ratio	= $\frac{\text{Profit}}{\text{Margin of safety(Rs.)}} \times 100 = \frac{\text{Rs.56,250}}{\text{Rs.1,87,500}} \times 100 = 30\%$
Break even Sales	= Total Sales x [100 - Margin of Safety %] = Rs.2,50,000 x 0.25 = Rs.62,500
Fixed Cost	= Sales x P/V Ratio - Profit = Rs.2,50,000 x 0.30 - Rs.56,250 = Rs.18,750

**PROBLEM NO: 14**

Contribution per unit	= Selling price*p/v Ratio
	= 275=40%
	= 110
Variable cost per unit	= Selling price- contribution per unit
	= 275-110
	= 165

Variable cost per unit = Direct material cost + direct wages+ variable overhead +variable over portion of semi- variable overheads 165 = 96+42+18+variable portion of semi – variable overheads

Variable portion of semi – variable overheads	= 7,32,000 – (36,000*9)
	= 7,32,000 – 3,24,000
	= 4,08,000

No. of units at 75% capacity = Sales/ Selling price =	$\frac{99,00,000}{275}$
	= 36,000 units

**Total fixed cost:-**

Up to 80% Capacity ( $\leq$ 38,400 units) = 2881000 + 4080000	38, 400 units) = 2881000 + 408000 + 238500
	= 35,27,500

i) Break even point (in Units) = Fixed cost/Contribution per unit

$$= \frac{32,89,000}{110}$$

$$= 29900 \text{ units}$$

Activity level at break-even point = 62.3% [75%-36000] [29900 – 2990]

ii) Let x be the No. of units to be sold to earn desired profit

Sales = Variable cost + Fixed cost + Profit

$$X \times 275 = x \times 165 + 35,27,500 + x \times 25$$

$$275x - 165x - 25x = 35,27,500$$

$$85x = 35,27,500$$

$$x = 35,27,500/85$$

$$x = 41,500$$

### **PROBLEM NO: 15**

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} = \frac{2,00,000}{8,00,000} = 25\%$$

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

**Alternatively:**

$$\text{Fixed cost} = \text{Contribution} - \text{Profit} = \text{Rs } 2,00,000 - \text{Rs } 1,50,000 = \text{Rs } 50,000$$

$$\text{B.E. Point} = \text{Rs } 50,000 \div 25\% = \text{Rs } 2,00,000$$

$$\text{Margin of Safety} = \text{Actual sales} - \text{B.E. sales} = 8,00,000 - 2,00,000 = 6,00,000$$

### **PROBLEM NO:16**

$$\text{No. of units} = 1000 \times 70\% = 700 \text{ Units}$$

i) Marginal cost statements(700 Units)

Sales (700) × (2000+200)	15,40,000
(-) Variable cost:-	
Direct material	(3,50,000) $\left(\frac{5,00,000}{1,000} \times 700\right)$
Direct wages	(2,80,000) $\left(\frac{4,00,000}{1,000} \times 700\right)$
Over heads	(2,10,000) $\left(\frac{5,00,000 \times 60\%}{1,000} \times 700\right)$
<b>Contribution</b>	<b>7,00,000</b>
(-) Fixed Cost	(2,00,000) $(5,00,000 \times 40\%)$
<b>Profit</b>	<b>5,00,000</b>

It is advised not to increase selling price, because, it decrease the profit by 1,00,000 (6,00,000-5,00,000)



ii)

Selling price		2,000
(-) Variable cost:-		
Direct Material cost	(500)	$(\frac{5,00,000}{1,000})$
Direct wages	(400)	$(\frac{4,00,000}{1,000})$
Variable over heads	(300)	$(\frac{5,00,000 \times 60\%}{1,000})$
Tie Pin		(10)
<b>Contribution per unit</b>		<b>790</b>

$$\text{Sales required to earn desired profit} = \frac{\text{Fixed cost} + \text{Desired profit}}{\text{PV Ratio}}$$

$$\text{PV Ratio} = \frac{790}{200} \times 100 = 39.5\%$$

$$\text{Sales} = \frac{2,00,000 + 30\% \text{ on sales}}{39.5\%}$$

$$0.395x = 2,00,000 + 0.3x$$

$$0.095x = 2,00,000$$

$$X = 21,05,263$$

**Problem no:17**

$$\text{Selling price} = 37.5$$

$$\text{Less: variable cost} = 17.5$$

$$\text{Cost per unit} = 20.0$$

$$\text{Breakeven point (in units)} = \frac{\text{Fixed cost}}{\text{Cost per unit}} = \frac{35,00,000}{20} = 1,75,000 \text{ units}$$

$$\begin{aligned} \text{Cash Depreciation} &= \text{Fixed Cost} - \text{Depreciation} \\ &= 35,00,000 - 15,00,000 \Rightarrow 20,00,000 \end{aligned}$$

$$\begin{aligned} \text{Cash BEP (in units)} &= \frac{\text{Cash fixed cost}}{\text{Cost per unit}} = 1,00,000 \text{ units} \\ &= \frac{20,00,000}{20} \end{aligned}$$

**PROBLEM NO:18**

$$\text{i) Contribution} = 300 - 200 = 100$$

$$\begin{aligned} \text{Break even sales quantity} &= \frac{\text{Fixed cost}}{\text{Contribution per unit}} \\ &= \frac{3,00,00,000}{100} \\ &= 3,00,000 \text{ Units} \end{aligned}$$

$$\begin{aligned}\text{Each break even sales quantity} &= \frac{\text{Cash Fixed cost}}{\text{Contribution per unit}} \\ &= \frac{1,50,00,000}{100} = 1,50,000 \text{ Units}\end{aligned}$$

$$\text{ii) P/v Ratio} = \frac{\text{Contribution}}{\text{Selling price}} \times 100 = \frac{100}{300} \times 100 = 33\%$$

iii) No. of units that must be sold to earn income of 30,00,000

$$\begin{aligned}&\frac{\text{Fixed cost} + \text{Desired EBIT level}}{\text{Contribution Margin per unit}} \\ &= \frac{3,00,00,000 + 30,00,000}{100} = 3,30,000\end{aligned}$$

iv) After Tax Income = 20,00,000

Tax Rate = 50%

$$\text{Desired level of profit before Tax} = \frac{20,00,000}{50} \times 100 = 40,00,000$$

$$\begin{aligned}\text{Estimated Sales Level} &= \frac{\text{Fixed cost} + \text{Desired Profit}}{\text{P/v Ratio}} \\ &= \frac{3,00,00,000 + 40,00,000}{33\%} \\ &= 10,30,30,303\end{aligned}$$

### **PROBLEM NO: 19**

Particulars	Product BLACK	Product WHITE
a) Present S.P.P.U Sales strategy:	Rs. 20	Rs. 30
b) Revised S.P.P.U	Rs. 18	Rs. 24
c) Budgeted sales (int)	81,00,000	54,00,000
d) Budgeted sales volume (in Unit) = $\frac{\text{budgeted sales}}{\text{Revised S.P.P.U}}$	3,15,000 units	1,57,500 units
e) Desired Profit / Target Profit. (in Rs.)	8,26,200	7,45,200

1. Calculation of break even volume during the financial year 2019-2020.

B.E.P (in units) = 70% of the total sales

For Product Black: 70% of 3,15,000 = 2,20,500 (units)

#### **For Product White**

B.E.P (in unit) = 70% of 157500 = 1,10,250 (unit)

2. Calculation of amount of reduction in fixed cost

#### **For Product Black**

Let amount of fixed cost = Rs.x

To achieve desired profit

Budgeted sales (in Rs.) = 81,00,000

M.O.S. (in Rs.) = 30% of 81,00,000 = 24,30,000

$$\text{Desired profit} = \text{Rs. } 8,26,200$$

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

$$\begin{aligned} \text{P/V Ratio} &= \frac{\text{Profit}}{\text{M.O.S. (in Rs.)}} \times 100 \\ &= \frac{826200}{24,30,000} \times 100 = 34\% \end{aligned}$$

$$3. \text{ Desired sales (in Rs.)} = \frac{\text{Fixed cost} + \text{Profit}}{\text{PV Ratio}}$$

$$81,00,000 = \frac{x + 8,26,200}{\text{p/v Ratio}} \times 100$$

$$27,54,000 - 8,26,200 = x$$

$$x = 19,27,800$$

**For Product white:**

$$\text{Let amount of fixed cost to achieve desired profit} = \text{Rs. } y$$

$$\text{Budget sales (in Rs.)} = 54,00,000$$

$$\text{M.O.S (in Rs.)} = 30\% \text{ of } 54,00,000$$

$$\text{Desired profit} = \text{Rs. } 7,45,200$$

$$\text{P/v Ratio} = \frac{745200}{1620000} \times 100$$

$$\text{Desired sales (in Rs.)} = \frac{y + 745200}{1620000} \times 100 = 46\%$$

$$54,00,000 \times 0.46 - 7,45,200 = y$$

$$y = 17,38,800$$

$$\text{Amount of Reduction in fixed cost to achieved desired profit} = 20,00,000 - 17,38,800 = \text{Rs. } 2,61,200$$

**PROBLEM NO: 20**

	%	Amount
Sales (1,50,000*40)	100	1,00,000
(-) variable cost (1,50,000*28)	(60)	(60,000)
contribution	40	40,000
(-) fixed cost		(30,000)
profit		10,000

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

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} = \frac{40000}{1,00,000} \times 100 = 40\%$$

$$\text{Margin of safety} = \frac{\text{Profit}}{\text{P/V ratio}} = \frac{10,000}{40\%} = 25,000$$

**PROBLEM NO: 21**

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)

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

Total Contribution in case of 40,000 units = Sales Value × P/V Ratio = Rs 12,00,000 × 66.67% = Rs 8,00,000

So, Fixed cost = Contribution - Profit = Rs 8,00,000 - Rs 3,20,000 = Rs 4,80,000

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

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

iii) Minimum level of production where the company needs not to close the production, if unavoidable fixed cost is Rs 1,50,000:  $\frac{\text{Avoidable fixed cost}}{\text{Contribution per unit}} = \frac{\text{Total fixed cost - Unavoidable Fixed cost}}{\text{Contribution per unit}}$

$$= \frac{\text{Rs. } 4,80,000 - \text{Rs. } 1,50,000}{\text{Rs. } 30 \times 66.67\%} = \frac{\text{Rs. } 3,30,000}{\text{Rs. } 20} = 16,500 \text{ units.}$$

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

**Problem no: 22**

a) Marginal cost statement:

particulars		Machine A		Machine B
sales	10	1,00,000 (10,000 × 10)	10	1,00,000 (10,000 × 10)
(-) variable cost	4	40,000	6	60,000
contribution	6	60,000	4	40,000
(-) fixed cost		(30,000)		(18,000)
profit		30,000		22,000
p/v ratio $\left[ \frac{\text{contribution}}{\text{sales}} \right]$		60% $\left[ \frac{60,000}{1,00,000} \right]$		40% $\left[ \frac{40,000}{1,00,000} \right]$
BEP (in units)		5,000 units $\left[ \frac{30,000}{6} \right]$		4500 unit $\left[ \frac{18,000}{4} \right]$
BEP (in Rs.) $\left[ \frac{\text{fixed cost}}{\text{p/v ratio}} \right]$		50,000 $\left[ \frac{30,000}{60\%} \right]$		45,000 $\left[ \frac{18,000}{40\%} \right]$

b) Indifference point (IDP) =  $\left[ \frac{\text{change in fixed cost}}{\text{change in variable cost per unit}} \right]$

$$= \left[ \frac{30,000 - 18,000}{6 - 4} \right] = 6000 \text{ units}$$

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c)

i) when no. of units to be produced are less than 6000 units then it is advised to manufacture goods in machine B because it is having less fixed cost,

ii) when no. of units to be produced are more than 6000 units then it is advised to use machine A because it is variable cost is less.

**PROBLEM NO: 23**

		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: 24**

(i)

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

Particulars	Amount (Rs.)	Amount (Rs.)
Sales: 3,10,000 units @ Rs. 80		2,48,00,000
<b>Marginal cost / variable cost:</b>		
Variable cost of production (3,20,000 x Rs. 40)	1,28,00,000	
<b>Add:</b> Opening stock 40,000 units @ Rs. 40	<u>16,00,000</u>	
	1,44,00,000	
<b>Less:</b> Closing Stock $\left( \frac{\text{Rs. 1,44,000}}{3,60,000 \text{ units}} \times 50,000 \text{ units} \right)$	(20,00,000)	
Variable cost of production of 3,10,000 units	1,24,00,000	
<b>Add:</b> 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
<b>Less:</b> 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 31<sup>st</sup> March, 2014

Output = 3,20,000 units

Particulars	Amount (Rs.)	Amount (Rs.)
Sales: 3,10,000 units @ Rs. 80		2,48,00,000
<b>Less:</b> Cost of Goods sold:		
Variable cost of production (3,20,000 @ Rs. 40)	1,28,00,000	
<b>Add:</b> 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: $\left( \frac{\text{Rs. } 1,65,60,000}{3,60,000} \times 50,000 \right)$	<u>(23,00,000)</u>	
Production cost of 3,10,000 units	1,42,60,000	
Adjustment for Over/under-absorption:		
Under absorption of fixed production overheads <sup>(2)</sup>	<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: 25**

Particulars	Amt.	Amt.
Selling price		45
(-) variable cost:		
Direct material	12	
wages	6	
overhead	9	27
Contribution p.u		18

$$\text{P/V RATIO} = \frac{\text{contribution per unit}}{\text{selling price}} = \frac{18}{45} \times 100 = 40\%$$

Particulars	Amt.
Total sales (30000x45)	13,50,000
(-) Margin of sales	(4,12,500)
BEP (in rupees)	9,37,500

$$\text{BEP (in units)} = \frac{\text{BEP (in rupees)}}{\text{selling price}} = \frac{9,37,500}{45} = 20,833 \text{ units}$$

$$\text{BEP (in rupees)} = \frac{\text{fixed cost}}{\text{p/v ratio}} \Rightarrow 9,37,500 = \frac{\text{fixed cost}}{40\%} : \text{Fixed cost} = 3,75,000$$

i) Sales required to earn the desired profit (in rupees)

$$\text{Sales} = \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P/V Ratio}} = \frac{3,75,000 + 20\%x}{40\%} ; 0.40x - 0.20x = 3,75,000$$

$$0.20x = 3,75,000 ; x = 3,75,000 / 0.20 = 18,75,000 \text{ Rs}$$

$$\text{Sales Quantity} = \frac{\text{Sales}}{\text{Selling Price}} = \frac{18,75,000}{45} = 41,667 \text{ units}$$

- ii) Desired Profit = Investment\*Rate of Return = 10,00,000\*20% = 2,00,000/-  
Sales required to earn desired profit (in units)

$$\text{Sales} = \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P/V Ratio}} = \frac{3,75,000 + 2,00,000}{18} = 31,944 \text{ units}$$

- iii) Cost per unit = (Selling Price – Variable Cost) per unit = 44-27 = 17  
Sales required to earn desired profit (in units)

$$\text{Sales} = \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{Contribution per Unit}} = \frac{3,75,000 + 2,00,000}{17} = 33,824 \text{ units}$$

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**THE END**