5. MARGINAL COSTING

PROBLEM NO: 1

(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 = (FC + 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, $\dfrac{Rs.1,70,000}{P/V\,RATIO} = \dfrac{Rs.1,70,000}{50\%}$ = Rs. 3,40,000

PROBLEM NO: 2

(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: 3

	Sales	Profit
Year 2013	Rs. 1,20,000	8,000
Year 2014	Rs. 1,40,000	13,000
Difference	Rs. 20,000	5,000

(i) P/V Ratio = $\dfrac{Difference\,in\,profit}{Difference\,in\,Sales}$ X 100 = $\dfrac{5,000}{50,000}$ X 100 = 25%

                                                (Rs.)

Contribution in 2013 (1,20,000 x 25%)   30,000

Less: Profit   8,000

Fixed Cost*   22,000

*Contribution   = Fixed cost + Profit

∴ Fixed cost   = Contribution- Profit

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

(iii) Profit when sales are Rs. 1,80,000   Rs.

         Contribution (Rs. 1,80,000 x 25%)   45,000

         Less: Fixed cost   22,000

         Profit   23,000

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

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

(v) Margin of safety in 2014 –

         Margin of safety   = Actual sales – Break – even sales

                            = 1,40,000 - 88,000   = Rs. 52,000

PROBLEM NO: 4

P/V ratio = $\dfrac{S - V}{S}$ = $\dfrac{10 - 8}{10}$ = 20%

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

PROBLEM NO: 5

P/V ratio   = $\dfrac{Contribution}{Sales}$ x 100

                 = [(15-12) / 15] x 100

                 = (3/15) x 100 = 20%

Marginal of Safety   = (Profit) / (P/V Ratio)

                 = 50,000/20% = Rs. 2,50,000

PROBLEM NO : 6

Variable Cost   = 100 - P/V Ratio

                 = 100 – 60 = 40

If Variable cost is 40, then selling price   = 100

If Variable cost is 20, then selling price   = (100 / 40) x 20 = Rs. 50

PROBLEM NO :7

Revised Sales Value = $\dfrac{Desired\,Contribution}{Revised\,P\,/\,V\,Ratio\,*}$ = $\dfrac{0.40}{0.25}$ = 1.6

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

*Revised P/V Ratio = $\dfrac{Revised\,Contribution}{Revised\,Selling\,Price}$ = $\dfrac{0.80 - 0.60}{0.80}$ = 0.25

Required Sale Quantity = $\dfrac{Desired\,Contribution}{Revised\,P\,/\,V\,Ratio\,*\,x\,\,Revised\,Selling\,Price}$ = $\dfrac{0.40}{0.25\,x\,0.80}$ = 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 Rs. 10 and sales quantity is 100 units.

Data before change in selling price:

	(Rs.)
Sales (Rs. 10 x 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 Rs. 8 per unit. Since, We have to maintain the earlier contribution margin i.e Rs. 400 by increasing the sales quantity only. Therefore, the target contribution will be Rs. 400.

The new P/V Ratio will be

	(Rs.)
Sales	8.00
Variable cost	6.00
Contribution per unit	2.00
P/V Ratio	25%

Sales Value = $\dfrac{\text{Desired Contribution}}{\text{Revised P/V Ratio}} = \dfrac{\text{Rs.400}}{0.25} =$ Rs. 1,600

Sales quantity = $\dfrac{\text{Sales value}}{\text{Selling price per unit}} = \dfrac{\text{Rs.1,600}}{\text{Rs.8}} = 200$ units

PROBLEM NO: 8

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.)   = $\dfrac{\text{Profit}}{\text{P/v Ratio}}$

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

Profit   = Rs. 20,000

PROBLEM NO: 9

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

B.E. Point = $\dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{40,00,000}{\text{Rs.100}} = 40,000$ 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 = $\dfrac{40,00,000}{\text{Rs.80}} = 50,000$ units

PROBLEM NO: 10

Sales	Cumulative Sales		Variable	Contribution	Cumulative Contribution	Cumulative Profit
	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
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 NO: 11

Selling price per unit = Rs.50

Variable cost per unit = Rs.35

Contribution per unit (50 – 35) = Rs.15

Fixed cost = Rs.12, 00,000

P/V ratio = $\dfrac{\text{Contribution Per Unit}}{\text{Selling price per unit}} \times 100 = \dfrac{15}{50} \times 100 = 30\%$

Break even sales = $\dfrac{\text{Fixed Cost}}{\text{P/V Ratio}} = \dfrac{12,00,000}{0.3} = $ Rs.40,00,000

1. New variable cost per unit = Rs.38

   Selling price per unit = Rs.50

   Contribution per unit = 12

   New P/V Ratio = $\dfrac{12}{50} \times 100 = 24\%$

   New Break even sales = $\dfrac{\text{Fixed cost}}{\text{New P/V Ratio}}$

   $= \dfrac{12,00,000}{0.24}$

   = Rs.50,00,000

2. Desired sales (in Rs.) = ?

   Desired profit = 2,40,000

   Desired sales (in Rs.) = $\dfrac{\text{Fixed cost} + \text{profit}}{\text{P/V Ratio}}$

   $= \dfrac{12,00,000 + 2,40,000}{0.3}$

   = Rs. 48,00,000

   Increase in sales (in Rs.) = 48,00,000 – 40,00,000

   = Rs. 8,00,000

3.

   (a)

   Variable cost per unit = 38

   Selling price per unit = 50

   Desired profit = nil

   Desired sales = $\dfrac{F + P}{\text{Contribution per unit}}$

   $= \dfrac{12,00,000 + \text{Nil}}{12}$

   = 1,00,000 Units.

   Present sales volume = $\dfrac{40,00,000}{50}$

   Increase in sales volume (in units) = 1,00,000 – 80,000

   = 20,000 Units.

   Increase in sales volume (in Units) = $\dfrac{20,000}{80,000} \times 100 = 25\%$ increase

(b)

Desired profit = nil

New selling price per unit   = 55

Variable cost per unit   = 35

Contribution per unit   = 20/-

Desired sales (in units)   = $\dfrac{F + P}{\text{Contribution per unit}}$

= $\dfrac{12,00,000 + \text{Nil}}{20}$

= 60,000 units.

Decrease in sales volume (in units) = 80,000 – 60,000 = 20,000 Units

Decrease in sales volume (in %)   = $\dfrac{20,000}{80,000} \times 100$

= 25%

4. New sales (in Rs.)   = 40,00,000 + 1,20,000

= Rs.41,20,000

Desired profit   = nil

Desired sales (in Rs.)   = $\dfrac{\text{Fixed cost} + \text{Profit}}{\text{P / V Ratio}}$

41,20,000   = $\dfrac{\text{Fixed cost} + \text{Nil}}{0.3}$

Fixed cost   = Rs. 12,36,000

Permissable Advertisement Expenses   = 12,36,000 – 12,00,000

= 36,000

PROBLEM NO: 12

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) = $\dfrac{\text{Fixed cost}}{\text{Contribution}}$	$\dfrac{2,00,000}{10}$ = 20,000 units	$\dfrac{3,00,000}{15}$ = 20,000 units

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

= 40,000 Units

PROBLEM NO: 13

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

= 75%

Total Sales   = $\dfrac{\text{Rs.1,87,500}}{0.75}$

= Rs.2,50,000

     = Total Sales – Total Cost

     = Rs.2,50,000 – Rs.1,93,750

     = Rs.56,250

P/V Ratio $= \dfrac{Profit}{Margin\,of\,safety\,(Rs.)} \times 100$

     $= \dfrac{Rs.56,250}{Rs.1,87,500} \times 100$

     = 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

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

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

Break Even point $= \dfrac{Fixed\,cost}{Profit\,Volume\,Ratio} = \dfrac{30,000}{40\%} = 75,000$

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 (60,000X 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 (30,000X 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: 15

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 x 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

$$= \frac{Total Fixed Cost}{Contribution per unit} = \frac{Rs.1,80,00,000}{Rs.510} = 35,294.12 \text{ or } 35,294 \text{ units}$$

ii) Margin of safety in units

= Sales units – Break even sales in units = 55,000 – 35,294 = 19,706 units.

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

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

$$\text{No of units to be sold} = \frac{Re quired contribution}{Re vised contribution per unit}$$

$$= \frac{Rs.3,00,50,000}{Rs.221} = 1,35,972.85 \text{ or } 1,35,973 \text{ units}$$

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: 16

(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)

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

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

    BEP (in sales)   = Rs. 3,00,000

    BEP (in Unit)   = Rs. 3,00,000 + Rs. 1,000 = 300 units

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

    Sales $= \dfrac{Fixed Cost + Desired Pr ofit}{P / V Ratio}$

    Let the Sales be x

    Profit   = 10% of x i.e. 0.1 x

Thus -

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

Or, x   = 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

Thus –

Sales (in units) $= \dfrac{Rs.3,75,000}{Rs.1,000}$ = 375 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

   Margin of Safety $= \dfrac{Pr\,ofit}{P\,/\,V\,Ratio}$

   Margin of Safety   = 40% of Rs. 5,00,000 = Rs. 2,00,000

   Rs. 2,00,000 $= \dfrac{Pr\,ofit}{50\%}$

   Profit   = Rs. 1,00,000
4. Fixed Cost   = (Sales x P/V Ratio) – Profit

   = (Rs. 5,00,000 x 50%- Rs. 1,00,000=Rs. 1,50,000

PROBLEM NO: 17

(i) Variable Cost per unit $= \dfrac{Change\ in\ total\ cos\,t}{Change\ in\ sales\ volume}$

$$= \frac{Rs.\,45,60,000 - Rs.34,40,000}{1,20,000\ units - 80,000\ units}$$

$$= \frac{Rs.11,20,000}{40,000\ units} = Rs.28$$

(ii) Profit Volume Ratio $= \dfrac{Contributi\,on\ per\ unit}{Selling\ per\ unit} \times 100$

$$= \frac{Rs.\,40 - Rs.28}{Rs.\,40} \times 100 \; = 30\%$$

(iii) Break- Even Point (in units) $= \dfrac{Fixed\ cos\,t}{Contributin\ per\ unit}$

Fixed Cost   = Total Cost in 2013 – Total Variable Cost in 2013

   = Rs. 34,40,000 – (Rs. 28x80,000 units)

   = Rs. 34,40,000 - Rs. 22,40,000

   = Rs. 12,00,000

Therefore, Break – Even Point $= \dfrac{Rs.12,00,000}{Rs.12}$ = 1,00,000 units

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

Number of units to be produced and sold = 2,00,000 units x 75% = 1,50,000 Units

Profit	= Total contribution – Fixed Cost
Or,	= Rs. 12x 1,50,000 units – Rs. 12,00,000
Or,	= Rs. 18,00,000 - Rs. 12,00,000
Or, Profit	= Rs. 6,00,000

PROBLEM NO: 18

	(Rs.)
Suppose sales	100
Variable cost	60
Contribution	40
P/V ratio	40%
Fixed cost	= Rs. 80,000

i)   Break-even point = Fixed Cost + P/V ratio = 80,000 + 40%   or Rs. 2,00,000

ii) 15% return on Rs. 2,00,000   30,000

Fixed Cost   80,000

Contribution required   1,10,000

Sales volume required = Rs. 1,10,000 + 40% or Rs. 2,75,000

iii) Avoidable fixed cost if business is locked kup = Rs. 80,000 – Rs. 25,000 = Rs. 55,000

Minimum sales required to meet this cost: Rs. 55,000 + 40% or Rs. 1,37,500

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

PROBLEM NO: 19

1. Calculation of contribution per unit, Total Fixed Cost and Break Even Point:

Particulars	Capital intensive	Labour intensive
Selling price	30	30
Less: variable Cost		
Direct Material	5	5.60
Direct Labour	6	7.20
Variable Overhead	3	4.80
Variable Selling price	2	2
Contribution per unit	14	10.40

2. Calculation of total Fixed Cost:

Particulars	Capital intensive	Labour intensive
Manufacturing Fixed Cost	24,40,000	13,20,000
Selling Fixed Expenses	5,00,000	5,00,000
Total Fixed Cost	29,40,000	18,20,000
Break Even Point = $\dfrac{\text{Total Fixed Cost}}{\text{Contribution per unit}}$	$\dfrac{29,40,000}{14}$ = 2,10,000 units	$\dfrac{18,20,000}{10.4}$ = 1,75,000 Units

3. Calculation of Indifference point: Let 'X' be the number of units at IDP

$$\text{Indifference point} = \frac{\text{Change in fixed cost}}{\text{Change in contribution per unit}} = \frac{29,40,000 - 18,20,000}{14 - 10.4}$$

$$= \frac{11,20,000}{3.6} = 3,11,111 \text{ Units}$$

Selection of Technology:

a) If production and sales are less than indifference point – low Fixed Cost i.e. labour intensive is best.

b) If production and sales are more than indifference point – low variable Cost i.e. capital intensive best.

PROBLEM NO: 20

	Particulars	Rs.
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 = Rs. 200 per unit During the first quarter, the fixed production Cost absorbed by ZEST would be (220 units x Rs. 200)	44,000
b)	**Under / over –recovery of overheads during the period:**	
	Actual fixed production overhead (1/4 of Rs. 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 x Rs. 2,000) : (A)	3,20,000
	Less: Production costs	
	Variable (220 units x Rs. 800	1,76,000
	Fixed overheads absorbed (220 units x Rs. 200)	44,000
	Total (220 units x Rs. 1,000)	2,20,000
	Less: Closing stock (60 units x Rs. 1,000)	60,000
	Production cost of 160 units	1,60,000
	Variable sales& Admn. Costs (160 units x Rs. 400)	64,000
	Fixed selling & Admn. Costs (1/4 of Rs. 2,40,000)	60,000
	Total cost of sales of 160 units: (B)	2,84,000
	Unadjusted profit: {(A) – (B)}	36,000
	Add: Overheads over absorbed	4,000
	Actual profit	40,000
d)	**Profit for the Quarter (Marginal Costing)**	
	Sales revenue (160 units x Rs. 2,000) : (A)	3,20,000
	Variable production costs (220 units x Rs. 800)	1,76,000
	Less: Closing stock (60 units x Rs. 800)	(48,000)
	Variable production cost of 160 units	1,28,000
	Add: Variable selling & Admn. Costs	64,000
	Total variable cost of sales of 160 units: (B)	1,92,000
	Contribution : {(A) – (B)}	1,28,000
	Less: Fixed production cost incurred	40,000	
	Fixed selling & Admn. Costs incurred	60,000	1,00,000
	Actual profit	28,000

PROBLEM NO: 21

(i)   **Statement of Cost and Profit under Marginal Costing**

for the year ending 31ˢᵗ March, 2014

Particulars	Amount (Rs.)	Amount (Rs.)
Sales: 3,10,000 units @ Rs. 80		
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	16,00,000	
	1,44,00,000	

Less: Closing Stock $\left(\dfrac{Rs.1,44,000}{3,60,000\,units} \times 50,000\,units * \right)$	(20,00,000)	
Variable cost of production of 3,10,000 units	1,24,00,000	
Add: Variable selling expenses @ Rs. 12 per unit	37,20,000	1,61,20,000
Contribution (sales-variable cost)		86,80,000
Less: Fixed production cost	24,00,000	
Fixed selling expenses	16,00,000	(40,00,000)
Actual profit under marginal costing		46,80,000

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

(ii)   **Statement of Cost and Profit under Marginal Costing**

for the year ending 31st March, 2014

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 [1]	19,20,000	
	1,47,20,000	
Add: Opening Stock : $\left(\dfrac{Rs.1,47,20,000}{3,20,000} \times 40,000 \right)$	18,40,000	
	1,65,60,000	
Less: Closing Stock: $\left(\dfrac{Rs.1,65,60,000}{3,60,000} \times 50,000 \right)$	(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]	4,80,000	
Cost of Goods Sold	1,47,40,000	
Selling expenses:		
Variable: Rs. 12 x 3,10,000 units	37,20,000	
Fixed	16,00,000	(2,00,60,000)
Actual profit under absorption costing		47,40,000

Workings:

1. Absorption rate for fixed cost of production = $\dfrac{Rs.24,00,000}{4,00,000\,units} = Rs.6$ per unit

2. Fixed production overhead under absorbed = Rs.(24,00,000 − 19,20,000) = Rs. 4,80,000

THE END