6. MARGINAL COSTING

PROBLEM NO: 1

Item no.	P/V Ratio	Reason
(i)	Will not change	
(ii)	Will not change	
(iii)	Will increase	
(iv)	Will decrease	
(v)	Will increase	
(vi)	Will not change	
(vii)	Will not change	Reasoning 1
(viii)	Will increase	Reasoning 2
(ix)	Will decrease	Reasoning 3
(x)	Will increase	Reasoning 4

A 10%increase in both selling price and variable cost per unit.

Reasoning 1. Assumptions: a) Variable cost is less than selling price.

b) Selling price Rs100 variable cost Rs 90 per unit.

c) P/V ratio = $\dfrac{100-90}{100}$ = 10%

10% increase in S.P. = Rs110

10% increase in variable cost = Rs99

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

Reasoning 2. Increase or decrease in physical sales volume will not change P/v ratio. Hence 10% increase in selling price per unit will increase P/V ratio.

Reasoning 3. Increase or decrease in fixed cost will not change P/V ratio. Hence 50% increase in the variable cost per unit will decrease P/V ratio.

Reasoning 4. Angle of incidence is the angle at which sales line cuts the total cost line. If it is large, it indicates that the profits are being made at higher rate. Hence increase in the angle of incidence will increase the P/V ratio.

PROBLEM NO: 2

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

PV Ratio= $\dfrac{Contribution}{Sales}$ x100

PROBLEM NO: 3

a) P/v ratio $= \dfrac{\text{Change in profit}}{\text{Change in sales}} \times 100$

$= \dfrac{Rs7,00,000 - (-Rs3,00,000)}{(Rs57,00,000 - Rs32,00,000)} \times \dfrac{Rs10,00,000}{Rs25,00,000} \times 100 = 40\%$

b) Total fixed cost
    = Total Contribution - Profit

    = (sales x p/v ratio) – profit

    = (Rs57,00,000 x 40%) = Rs7,00,000

    = Rs22,80,000 – Rs7,00,000

    = Rs 15,80,000

c) Contribution required to earn a profit of Rs12, 00,000

    = Total fixed cost + Profit required

    = Rs15, 80,000 + Rs12, 00,000 = Rs27, 80,000

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

PROBLEM NO: 4

Workings:

Profit in year 2012-13   = Rs 25,00,000 × 10% = Rs 2,50,000

Profit in year 2013-14   = Rs 20,00,000 × 8% = Rs 1,60,000

So, P/V Ratio $= \dfrac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$

$= \dfrac{Rs\,2,50,000 - Rs1,60,000}{Rs25,00,000 - Rs20,00,000} \times 100 = \dfrac{Rs90,000}{Rs5,00,000} \times 100 = 18\%$

i) Fixed Cost   = Contribution (in year 2012-13) – Profit (in year 2012-13)

    = (Sales × P/V Ratio) – Rs2,50,000

    = (Rs 25,00,000 × 18%) – Rs 2,50,000

    = Rs4,50,000 – Rs 2,50,000

    = Rs 2,00,000

ii) Break-even Point (in Sales) $= \dfrac{\text{Fixed Cost}}{\text{P/V Ratio}} = \dfrac{Rs2,00,000}{18\%} = Rs\ 11,11,111$ (Approx)

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

Profit   = Contribution – Fixed Cost

    = (Sales × P/V Ratio) – Fixed Cost

    = (Rs 30,00,000 × 18%) - Rs 2,00,000

    = Rs 5,40,000 – Rs 2,00,000

    = Rs3,40,000

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

Contribution Required   = Desired Profit + Fixed Cost

    = Rs 4,75,000 + Rs 2,00,000

= Rs 6,75,000

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

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

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

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

PROBLEM NO: 5

Total Sales = $2,40,000 \times \dfrac{100}{40}$ = Rs6,00,000

Contribution = 6,00,000 × 30% = Rs1,80,000

Profit = M/S × P/V ratio = 2,40,000 × 30% = Rs72,000

Fixed cost = Contribution – Profit

= 1,80,000 – 72,000 = Rs1,08,000

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

(2) Profit = (Sales × P/V ratio) – Fixed cost

= (9,00,000 × 30%) – 1,08,000 = Rs1,62,000

PROBLEM NO: 6

P/V ratio = $\dfrac{\text{Contribution}}{\text{Sales}}$ 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: 7

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: 8

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 : 9

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: 10

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

B.E. Point $= \dfrac{\text{Fixed cost}}{\text{Contribution per unit}} = \dfrac{40,00,000}{Rs.100} = 40,000$ units.
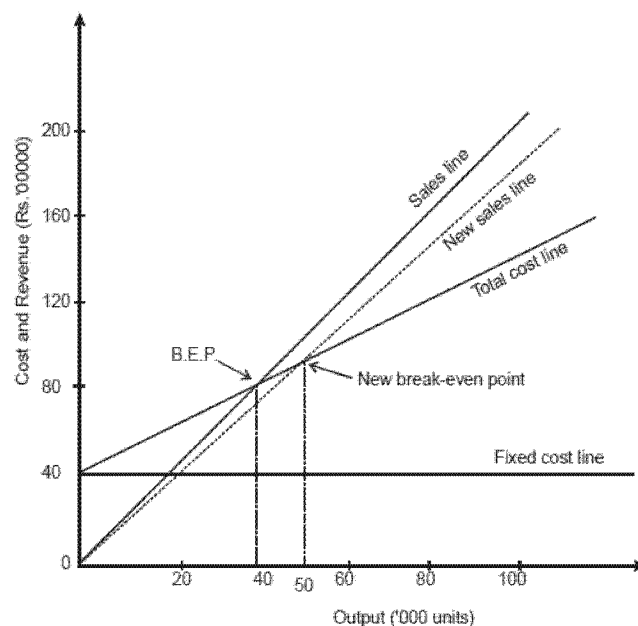
b) When selling price is reduced

New selling price = Rs. 180

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

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

The break-even chart is shown below:

PROBLEM NO: 11

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) $= \dfrac{\text{Fixed Cost - Depreciation}}{\text{Contribution per unit}}$

Factory A $= \dfrac{Rs3,60,000 - Rs60,000}{Rs15} = 20,000$ packets

Factory B $= \dfrac{Rs3,00,000 - Rs30,000}{Rs12} = 22,500$ packets

iii) **Computation of Combined Break-even Point (units)**

$= \dfrac{\text{Combined Fixed Cost}}{\text{Combined Contribution per unit}}$

$= \dfrac{Rs\,3,60,000 + Rs3,00,000}{Rs15\dfrac{2}{5} + Rs12\dfrac{3}{5}}$

$= Rs\,6,60,000 \,/\, Rs13.20 = 50,000$ packets

PROBLEM NO: 12

Let   4x = No. of units of J

Then   3x = no. of units of K

BEP in x units $= \left(\dfrac{\text{Fixed Cost}}{\text{Contribution}}\right) = \dfrac{Rs6,16,000}{(4x \times Rs40) + 3x \times Rs20)}$

Or   x   =   Rs 6,16,000 / 220 = 2,800 units

Break- even point of Product J   = 4 × 2,800 = 11,200 units

Break even point of Product K   = 3 × 2,800 = 8,400 units

PROBLEM NO: 13

P/V ratio $= \dfrac{\text{Contribution}}{\text{Sales}} X100 = \left(\dfrac{1,50,000}{3,00,000} X100\right) = 50\%$

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

Contribution   = Fixed Cost - Profit

= Rs. 90,000 – Rs. 30,000 (as it is a loss)

= Rs. 60,000.

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

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

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

Alternative solution of this part:

Break-even Sales $= \dfrac{Fixed\ Cost}{PV\ Ratio} = \dfrac{Rs90,000}{50\%} = Rs\ 1,80,000$

Sales at profit of Rs 90,000 $= \dfrac{Fixed\ Cost + Profit}{PV\ Ratio} = \dfrac{Rs90,000 + Rs90,000}{50\%} = \dfrac{Rs1,80,000}{50\%} = Rs3,60,000$

Margin of Safety $= $ Sales – Break-even Sales

$= 3,60,000 - 1,80,000 = Rs\ 1,80,000$

PROBLEM NO: 14

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

Rs. 18 x – [(Rs.8 × 1.10) + Rs. 3.5 + (Rs. 2.5 × 1.05)] x   = Rs. 56,000

Rs. 18 x – (Rs. 8.8 + Rs. 3.5 + Rs. 2.625) x   = Rs. 56,000

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

ii) Margin of Safety

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

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.

Or

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

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

$$\text{No of units to be sold} = \frac{Required contribution}{Revised contribution per unit}$$

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

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

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

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

= 40,000 Units

PROBLEM NO: 17

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 $= \frac{Contribution}{Sales} = \frac{40,000}{1,00,000} = 40\%$

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

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: 18

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

$= 75\%$

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

$= Rs.\,2{,}50{,}000$

$=$ 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 %]

$= Rs.\,2{,}50{,}000 \times 0.25$

$= Rs.\,62{,}500$

Fixed Cost $=$ Sales x P/V Ratio – Profit

$= Rs.\,2{,}50{,}000 \times 0.30 - Rs.\,56{,}250$

$= Rs.\,18{,}750$

PROBLEM NO: 19

Working Note:

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

   No. of units = Rs9,45,000/Rs30 = 31,500 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	(Rs)
Semi-variable cost	2,10,000
Less: Variable cost (31,500 units × Rs4.25)	1,33,875
Fixed Cost	76,125
Add: Fixed cost upto 90% level	94,500
Total Fixed Cost	1,70,625

2. Present Profit:

Contribution (31,500 units at Rs 9.75)	3,07,125	
Less: Fixed cost	1,70,625	
Profit	1,36,500	

i) Break-even point = Total Fixed Cost /Contribution per unit

   = Rs1,70,625/ Rs 9.75 = 17,500 Units

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

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

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

   10% of sales = 10% of Rs 30 = Rs 3 per unit profit.

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

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

   Or, 9.75 S = 1,70,625+3S

   Or, S = 1,70,625 ÷ 6.75 = 25,278 units.

iii) Sales (units) $= \dfrac{\text{Rs}1,70,625 + 1,41,375}{\text{Rs}9.75}$

   = Rs3,12,000 ÷ Rs 9.75 = 32,000 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.

Then, S = Rs3,27,000 / Rs9.75 = 33,538 units   i.e. $\dfrac{33,538}{35,000}$ x100 = 95.82% activity level.

PROBLEM NO: 20

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 = $\dfrac{\text{Sales} - \text{BEP}}{\text{Sales}}$ x100

40   = $\dfrac{5,00,000 - \text{BEP}}{5,00,000}$ x100

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

Let the Sales be x

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

Thus -

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

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)   = $\dfrac{\text{Rs.3,75,000}}{\text{Rs.1,000}}$ =   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   = $\dfrac{\text{Profit}}{\text{P/V Ratio}}$

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

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

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

(**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: 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

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

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

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

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: 22

P/V ratio   = 28%

Quarterly fixed Cost = Rs.2,80,000

Desired Profit   = Rs.70,000

Sales revenue required to achieve desired profit

$= \dfrac{\text{Fixed cost} + \text{Desired profit}}{\text{p/v ratio}} = \dfrac{2{,}80{,}000 + 70{,}000}{28\%} = \text{Rs. } 12{,}50{,}000$

PROBLEM NO: 23

i) Total Fixed Cost $= \text{Rs}6{,}00{,}000 + \text{Rs}20{,}00{,}000 + \text{Rs}8{,}00{,}000 + \text{Rs}2{,}00{,}000$

$= \text{Rs}36{,}00{,}000$

Contribution per unit $= \text{Rs}600 - \text{Rs}470 = \text{Rs}130$

P/V Ratio $= \dfrac{\text{Contribution per unit}}{\text{Selling Price}} \times 100 = \dfrac{\text{Rs}130}{\text{Rs}600} \times 100 = 21.67\%$

Break-even Point $= \dfrac{\text{Total Fixed Cost}}{\text{Contribution per unit}} \times 100 = \dfrac{\text{Rs}36{,}00{,}000}{\text{Rs}130} = 27{,}692.31 \text{ or } 27{,}693 \text{ units}$

Break-even Sales $= \dfrac{\text{Total Fixed Cost}}{\text{P/V Ratio}} = \dfrac{\text{Rs}36{,}00{,}000}{21.67\%} = \text{Rs}1{,}66{,}12{,}829$

Calculation of Profit/ (loss):

Total Contribution (Rs130 × 35,000 units)   = Rs45,50,000

Less: Fixed Cost   = Rs36,00,000

Profit   = Rs 9,50,000

ii) Revised Selling Price   = Rs600 – 5% of Rs600 = Rs570

Revised Variable cost   = Rs410

Revised Contribution   = Rs570 – Rs410 = Rs160

Break-even Point $= \dfrac{Rs36,00,000 + Rs9,00,000}{Rs160} = 28,125$ units

iii) Revised Selling Price   = Rs600 + 5% of Rs600 = Rs630

      Revised Variable cost   = Rs470 + Rs5 = Rs475

      Revised Contribution   = Rs630 – Rs475 = Rs155

      Break-even Point   = Rs36,00,000 / Rs155 = 23,225.81 or 23,226 units

PROBLEM NO: 24

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

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

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: 25

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 Ratio $= \dfrac{Change\ in\ profit}{Change\ in\ sales\ value} \times 100 = \dfrac{Rs3,20,000 - (-Rs1,60,000)}{Rs12,00,000 - Rs4,80,000} \times 100 = \dfrac{Rs4,80,000}{Rs7,20,000} \times 100$

         = 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 $= \dfrac{Fixed\ Cost}{P/V\ Ratio} = \dfrac{Rs4,80,000}{66.67\%} = Rs\ 7,20,000$

ii)   If sales volume is 50,000 units, then profit   = Sales Value × P/V Ratio – Fixed Cost

                                       = (50,000 units×Rs 30×66.67% - Rs 4,80,000)

                                       = 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:

$$= \frac{\text{Avoidable fixed cost}}{\text{Contribution per unit}} = \frac{\text{Total fixed cost - Unavoidable Fixed cost}}{\text{Contribution per unit}}$$

$$= \frac{\text{Rs4,80,000} - \text{Rs1,50,000}}{\text{Rs30} \times 66.67\%} = \frac{\text{Rs3,30,000}}{\text{Rs20}} = 16,500 \text{ units.}$$

At production level of ≥ 16,500 units, company needs not to close the production.

PROBLEM NO: 26

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: 27

Let Cx be the Contribution per unit of Product X.

Therefore, Contribution per unit of Product Y =Cy=4/5Cx = 0.8Cx

Given F1 + F2 = 1,50,000,

F1 = 1,800Cx (Break even Volume × Contribution per unit)

Therefore, F2 = 1,50,000 − 1,800Cx.

3,000Cx −F1 =3,000 × 0.8Cx − F2 or 3,000Cx − F1 =2,400 Cx-F2 (Indifference Point)

i.e., 3,000Cx − 1,800Cx = 2,400Cx − 1,50,000 + 1,800Cx

i.e., 3,000Cx = 1,50,000, Therefore, Cx = Rs 50/- (1,50,000 / 3,000)

Therefore, Contribution per unit of X = Rs 50

Fixed Cost of X = F1 = Rs 90,000 (1,800 × 50)

Therefore, Contribution per unit of Y is Rs 50 × 0.8 = Rs 40 and

Fixed Cost of Y = F2 = Rs 60,000 (1,50,000 − 90,000)

The Value of F1 = Rs 90,000, F2 = Rs 60,000 and X = Rs 50 and Y =Rs 40

PROBLEM NO: 28

i)   **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	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   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 [(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

PROBLEM NO: 29

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 = $\dfrac{Rs.60,00,000}{60,000\,units}$	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.

THE END