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Problems on marginal costing

1The following data is given:

Fixed cost = ₹12000

Selling price = ₹12 per unit

Variable cost = ₹ 9 per unit

- i) What will be the profit when sales are a) ₹ 60000 b) ₹ 100000?
- ii) What will be the amount of sales at desired to earn a profit of c) 6000; d) 15000?

Solution:

$$\frac{p}{v} \text{ ratio} = \frac{\text{contribution}}{\text{salee}} = \frac{3}{12} = 25\%$$

a) When sales = ₹60000

$$\begin{aligned} \text{contribution} &= \text{sales} \times \frac{P}{V} \text{ ratio} \\ &= ₹60000 \times 25\% = ₹15000 \end{aligned}$$

$$\begin{aligned} \text{Profit} &= \text{Contribution} - \text{Fixed Cost} \\ &= 15000 - 12000 = 3000 \end{aligned}$$

b) When sales = 100000

$$\begin{aligned} \text{Contribution} &= 100000 \times 25\% = 25000 \\ \text{Profit} &= 25000 - 12000 = 13000 \end{aligned}$$

c) When Sales for desired Profit = $\frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{Profit Volume Ratio}}$

$$\text{When Sales for desired Profit} = \frac{12000 + 6000}{25\%} = 72000$$

d) When Sales for desired Profit = $\frac{12000 + 15000}{25\%} = 108000$

Calculation of missing figures

Example

Given:

$$\begin{aligned} \text{Break - even point} &= 30000 \\ \text{Profit} &= 1500 \\ \text{Fixed Cost} &= 6000 \end{aligned}$$

What is the amount of variable cost?

Solution:

$$\text{Contribution} = \text{Fixed Cost} \times \text{Profit}$$

$$\text{Contribution} = 6000 \times 1500 = 7500$$

$$\text{Break – even point} = \frac{\text{Fixed Cost}}{\text{Contribution}} \times \text{Sales}$$

$$30000 = \frac{6000}{7500} \times \text{Sales}$$

$$\text{Sales} = \frac{6000}{7500} \times 30000 = 37500$$

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

$$\text{Profit Volume Ratio} = \frac{7500}{37500} \times 100 = 20\%$$

$$\text{Variable Cost} = 100 - \text{Profit Volume Ratio}$$

$$\text{Variable Cost} = 100 - 20\% = 80\%(\text{Sales})$$

$$\text{Variable Cost } 80\%(\text{Sales}) = 37500 \times 80\% = 30000$$

$$\text{Variable Cost at break – even sales} = 30000 \times 80\% = 24000$$

$$\text{Also, Variable Cost at break – even sales} = 30000 - \text{Fixed Cost}$$

$$\text{Also, Variable Cost at break – even sales} = 30000 - 6000 = 24000$$

Example:

$$\text{Sales} = 4000 \text{ units @ ₹10 per unit}$$

$$\text{Break – even point} = 1500 \text{ units}$$

$$\text{Fixed Cost} = ₹3000$$

What is the amount of a) variable cost and b) profit?

Solution:

$$\text{Break – even point (in units)} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

$$1500 = \frac{3000}{\text{Contribution per unit}} = ₹2$$

$$\text{a) Variable Cos} = \text{Sales price} - \text{Contribution}$$

$$\text{Variable Cost} = 10 - 2 = 8 \text{ per unit}$$

$$\text{Contribution at sales of 4000 units} = 4000 \text{ units} \times 2 = 8000$$

$$\begin{aligned} \text{b) } &= \text{Contribution} - \text{Fixed Cost} \\ &= 8000 - 3000 = 5000 \end{aligned}$$

Example

Given:

Fixed cost ₹ 8000

Profit earned ₹2000

Break even sales ₹40000

What is the actual sales?

Solution:

Contribution of break even point is equal to fixed cost.

Thus,

$$\begin{aligned} \text{Profit Volume Ratio} &= \frac{\text{Contribution}}{\text{sales}} = \frac{8000}{40000} = 20\% \\ \text{Actual Sales} &= \frac{\text{Fixed Cost} + \text{Profit}}{\text{Profit Volume Ratio}} \\ &= \frac{8000 + 2000}{20\%} = \frac{10000}{20\%} = 50000 \end{aligned}$$

Example

Selling price ₹ 150 per unit; variable cost ₹ 90 per unit; fixed cost ₹ 600000 (total).

What is the break even point?

What is the selling price per unit if break even point is 12000 units?

Solution:

$$\text{Break – even point} = \frac{\text{Fixed cost}}{\text{Contribution per unit}} = \frac{600000}{150 - 90} = \frac{600000}{60} = 10000 \text{ units}$$

When break even point is 12000 units, contribution is calculated as under:

$$12000 = \frac{600000}{\text{Contribution}}$$

$$\text{Contribution} = \frac{600000}{12000 \text{ units}} = ₹ 50$$

$$\text{Contribution} = \text{Sales} - \text{Variable Cost}$$

$$50 = \text{Sales} - 90$$

$$\text{Sales} = 50 + 90$$

$$\text{Sales} = 140$$

Thus, selling price is ₹ 140 when break- even point is 12000 units.

2. The following information is given:

Sales = ₹200000; variable cost= ₹120000; Fixed cost = ₹30000

Calculate a) break-even point

b) New break-even point if selling price is reduced by 10%

c) New break-even point if variable cost increases by 10%

d) New break-even point if fixed cost increases by 10%

Solution:

$$\text{Profit Volume Ratio} = \frac{\text{Sales} - \text{Variable}}{\text{Sales}} = \frac{200000 - 120000}{200000} = \frac{80000}{200000} \times 100 = 40\%$$

$$\text{a) } = \frac{\text{Fixed Cost}}{\text{Profit volume ratio}} = \frac{30000}{40\%} = 75000$$

b) When selling price is reduced by 10% new sales $200000 - 10\% = ₹180000$

$$\text{New Profit volume ratio} = \frac{180000 - 120000}{180000} = \frac{60000}{180000} = \frac{1}{3}$$

$$\text{New Break - even point} = \frac{\text{Fixed Cost}}{\text{Profit volume ratio}} = \frac{30000}{33.33\%} = 90000$$

c) When variable cost increases 10%, new variable cost $= 120000 + 10\% = 132000$

$$\text{New Profit Volume Ratio} = \frac{200000 - 132000}{200000} = \frac{68000}{200000} \times 100 = 34\%$$

$$\text{New Break - even point} = \frac{30000}{34\%} = 88235(\text{Approx})$$

d) If fixed cost increases by 10%, new fixed cost $= 30000 + 10\% = 33000$

Profit volume ratio remains unaffected at 40%

$$\text{New Break - even point} = \frac{33000}{40\%} = 82500$$

3. From the following particulars, find out the selling price per unit if break even point is to be brought down to 9000 units:

Variable cost per unit = ₹75

Fixed expenses = ₹270000

Selling price per unit = ₹100

Solution:

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

$$₹30000 = \frac{270000}{\text{Contribution per unit}}$$

$$\text{Contribution per unit} = \frac{270000}{9000} = ₹30$$

Note: at present contribution is ₹25(100 - 75). In order to bring break even point at 9000 units, contribution should be brought to ₹30. This means that selling price to be increased by ₹ 5. The new selling price should be ₹100+5 = ₹105.

Margin of safety (M/S):

Margin of safety may be defined as the difference between actual sales and sales at break even point. In other words, it is the amount by which actual volume of sales exceeds the break-even point. Margin of safety may be expressed in absolute money terms or as percentage of sales. Thus,

$M/S = \text{Actual sales} - \text{Break-even point}$

4.

- a) A company has fixed expenses of ₹90000 with sales at ₹300000 and a profit of ₹60000. Calculate the profit volume ratio. If in the next period the company suffered a loss of ₹30000, calculate the sales volume.
- b) What is the margin of safety for a profit of ₹60000 in (a) above?

Solution:

a) $\text{Contribution} = \text{Fixed cost} + \text{Profit} = ₹90000 + 60000 = 150000$

$$\text{Profit Volume Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{150000}{300000} \times 100 = 50\%$$

In the next period, Contribution = Fixed cost – Loss = ₹90000 – 30000 = 60000

$$\text{Profit volume ratio} = \frac{60000}{\text{sales}} \times 50\%$$

$$\text{Sales} = \frac{60000}{50\%} = 120000$$

Thus at sales of ₹120000, there will be a loss of ₹30000.

b) $\text{Margin of safety} = \frac{\text{Profit}}{\text{Profit volume ratio}} = \frac{60000}{50\%} = 120000$

Alternatively, Margin of safety = sales – break even point

$$300000 - \left[\frac{\text{Fixed cost}}{\text{Profit volume}} \right] = 300000 - \left[\frac{90000}{50\%} \right] = ₹120000$$

5. a) if margin of safety is ₹ 240000 (40% of sales) and profit volume ratio is 30% of XY Limited, calculate its i) break even point and ii) amount of profit on sales of ₹ 900000.
- b) X limited has earned a contribution of ₹ 200000 and net profit of ₹ 150000 on sales of ₹ 800000. What is its margin of safety?
- c) the ratio of variable cost to sales is 70%. The break even point occurs at 60% of the capacity sales. Find the capacity sales when fixed costs are ₹90000. Also compute profit at 75% of the capacity sales.

Solution:

a) $\text{Total sales} = 240000 \div 40\% = 600000$

$$\text{Contribution} = 600000 \times 30\% = 180000$$

$$\text{Profit} = \text{Margin of safety} \times \text{Profit volume \%} = 240000 \times 30\% = ₹ 72000$$

$$\text{Fixed cost} = \text{Contribution} - \text{Profit} = 180000 - 72000 = ₹ 108000$$

i)

$$\text{Break even point} = \frac{\text{Fixed cost}}{\text{Profit volume ratio}} = \frac{108000}{30\%} = 360000$$

ii)

$$\begin{aligned} \text{when sales are 900000, Profit} &= (\text{Sales} \times \text{Profit volume ratio}) - \text{Fixed cost} \\ &= (900000 \times 30\%) - 108000 = 162000 \end{aligned}$$

b)

$$\text{Profit volume ratio} = \frac{\text{Contribution}}{\text{Sales}} = \frac{200000}{800000} = 25\%$$

$$\text{Margin of safety} = \frac{\text{Profit}}{\text{Profit volume ratio}} = \frac{150000}{25\%} = 600000$$

c)

$$\text{Profit Volume ratio} = 100 - 70 = 30\%$$

$$\text{Break even point} = \frac{\text{Fixed cost}}{\text{Profit volume ratio}} = \frac{90000}{30\%} = 300000$$

$$\text{When break even point at 60\% is 300000, capacity sales} = \frac{300000}{60\%} = 500000$$

$$\begin{aligned} \text{Profit} &= (\text{Sales} \times \text{Profit volume ratio}) - \text{Fixed cost} \\ &= (375000 \times 30\%) - 90000 = 22500 \end{aligned}$$