

There are three options —

- i) cost
- ii) volume
- iii) profit analysis

\nwarrow Fix \rightarrow variable

Now, measurement —

- i) Profit:

$$\begin{aligned} P &= S - TC \\ &= S - V.C - FC \\ &= S - V - F \end{aligned}$$

$$\left| \begin{array}{l} S = \text{Sale} \\ TC = \text{total cost} \\ V.C = \text{variable cost} = V \\ FC = \text{fixed cost} = F \\ TC = V.C + F.C \end{array} \right.$$

- ii) contribution: Difference between sales and variable cost.

$$C = S - V \quad | \quad P = S - V - F$$

$$\therefore P = C - F$$

$$\Rightarrow C = P + F$$

- iii) Profit-volume ratio: It shows the relation between sales and contribution.

$$P/V \text{ ratio} = C/S \times 100\%$$

- iv) Break-even point: Break even point is the point at which total sales revenue are equal to total cost. Here there no profit and no loss.

$$S = TC = V + F$$

$$P = S - V - F = S - S = 0$$

$$BEP \text{ in unit} = \frac{F}{S-V \text{ (per unit)}} = \frac{F}{C}$$

$$BEP \text{ sales volume} = \frac{F \times S}{S-V} = \frac{F}{P/V \text{ ratio}}$$

y) Desired sales / Target sales:

$$P.S = \frac{(F+P)S}{S-V} = \frac{(F+P)S}{P/V \text{ ratio}}$$

* The following information is available for the year ended 31st of December \rightarrow 2000

Sales 600 units @ Tk 100/-	
(x) Fixed cost - 10,000/-	(y) Fixed cost = 10,000/- P/V ratio = 60%

calculate the followings -

- (i) The break even sales
- (ii) what would be the profit if sales were 800 units.
- (iii) what would be the break even sales if the price was increased by 20%.
- (iv) what would be the selling price.
- (v) what sales volume would be needed to earn a profit Tk 250

⇒ Solution for (X) is given below:

(1)

$$\text{BES} = \frac{F \times S}{S - V}$$

$$= \frac{10,000 \times 60000}{60000 - 36000}$$

$$= 25000,00/-$$

Here
 $F = 10,000/-$
 $S = 600 \times 100$
 $= 60000/-$
 $V = S - F - P$
 $= 60000 - 10,000 - 14000$
 $= 36000/-$

(2)

$$P = S - F - V$$

$$= 80000 - 10000 - 48000$$

$$= 22000/-$$

$$S = 800 \times 100$$

$$= 80000/-$$

$$V = \frac{36000 \times 800}{600}$$

$$= 48000/-$$

Q2,

(3)

$$P = C - F$$

$$= 32000 - 10000$$

$$= 22000/-$$

$$C = S - V$$

$$C_{per\ unit} = 29000/-$$

$$C_{per\ 8000u} = 32000/-$$

(4)

$$\text{BES} = \frac{F \times S}{S - V}$$

$$= \frac{10,000 \times 120}{120 - 60}$$

$$= 20000/-$$

$$F = 10,000/-$$

$$S = 100 + 20 \text{ (unit)}$$

$$= 120$$

$$V = 60 \text{ per unit}$$

(5)

$$\text{BEP in unit} = \frac{F}{S - V \text{ (per unit)}}$$

$$\Rightarrow S = 80 \text{ per unit}$$

$$F = 10000/-$$

$$V = 60 \text{ per unit}$$

$$\text{BEP in unit} = 500$$

$$v) \text{ Desired sales} = \frac{(F+P)S}{S - V}$$

$$= 87500/-$$

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* Break-even chart: In the different situations, a chart is prepared with income, expences and profit (amount) is called break-even chart.

* P/V ratio: The profit/volume ratio properly known as the P/V ratio express the relationship between contribution and sales. This also known as Marginal income ratio.

Therefore,

$$P/V \text{ ratio} = \frac{C}{S} = \frac{S-V}{S}$$

* what is mean by Break even point? Explain the method of ascertaining break even point.

⇒ Break even point is the point at which total sales just equal to the total costs. That means this is the point where no profit, no loss.

⇒ The BEP can be ascertained from a break even curve as follows-

$$\textcircled{1} \quad BEP (\text{units}) = \frac{\text{Total Fixed cost}}{\text{Unit contribution}}$$

$$\textcircled{2} \quad BEP (\text{sales value}) = \frac{\text{Total Fixed cost}}{P/V \text{ ratio}}$$

Therefore, when P/V ratio is calculated using unit contribution and unit selling price, we can write.

$$BEP = \frac{\text{Total Fixed cost}}{\text{Unit contribution}} \times \text{Unit selling price}$$

But if we taking total sales and total contribution,

$$\text{Then, } BEP = \frac{\text{Total Fixed cost}}{\text{Total contribution}} \times \text{Total sales}$$

* Graphical Representation of Break Even chart

Let,

$$\text{Sales} = 3000 \text{ units}$$

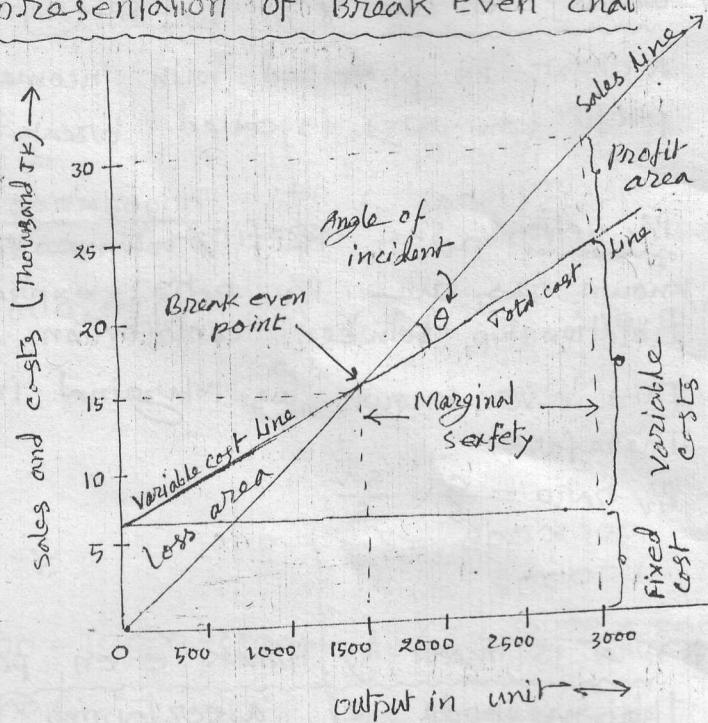
$$\text{Sale price} = \text{TK } 10 \text{ per unit}$$

$$\text{F.C} = \text{TK } 6000$$

$$\text{V.C} = \text{TK } 6 \text{ per unit}$$

$$\text{BEP (units)} = \frac{6000}{10-6} \\ = 1500 \text{ (unit)}$$

$$\text{BES} = 15000 \text{ TK}$$



* Marginal safety / Margin of safety: Margin of safety is an area which indicates excess sales over the break even point. This area is called by M/S area.

$$\therefore M/S = \frac{P}{c/s} = \frac{PS}{C} = \frac{P}{MVR}$$

On the other hand, we can write

$$\text{Margin of safety} = \text{Total sales} - \text{Break even sales}$$

* Angle of incidence: Angle of incidence means angle between sales and total cost line. This angle is an indicator of profit earning capacity.

* How do the following reflect on a break even point - increase in total physical sales?

→ With the increase in total physical sales, there is no change in break even point.

Let. $s = \underline{600 \text{ unit}} @ 100\%$

$v = 60 \text{ per unit}$

$F = 6000 \text{ per unit}$

$$\text{BEP in unit} = \frac{6000}{100-60} = 150 \text{ unit}$$

when total physical sale increase 10%

$s = 660 \text{ units} @ 100\%$

$$\therefore \text{BEP in unit} = \frac{6000}{100-60} = 150 \text{ unit}$$

So, Increase in total physical sales does not change break even point.

* How do the following reflect on a Break Even point - increase in P/V ratio.

→ when P/V ratio increases, the BEP decreases.

Let $s = 100 \text{ per unit}$ $F = 6000$ $P/V\text{ratio} = 0.4$

$$\therefore \text{BEP} = \frac{F/s}{P/V\text{ratio}} = \frac{60}{0.4} = 150 \text{ units}$$

when $P/V\text{ratio} = 0.6$

$$\text{BEP in unit} = \frac{60}{0.6} = 100 \text{ unit}$$

So, Increases in P/V ratio, decrease in BEP.

* What is the effect on the break even point if price of sales is increased (Sale price)?

→ Increasing the sales price decreases the break even point. This statement can be proved by the following example-

$$S = 100 \text{ per unit}$$

$$V = 60$$

$$F = 6000$$

$$\text{BEP in unit} = \frac{6000}{100 - 60} = 150 \text{ unit}$$

Now, consider the sales increased by 20% then we find-

$$\text{BEP in unit} = \frac{6000}{120 - 60} = \frac{6000}{60} = 100 \text{ unit}$$

Therefore we can write increases the sales decreases the BEP.

* Increases the variable cost increases the BEP - prove the statement.

→ Increases the variable cost increase the BEP. This statement proved by the following example.

Suppose, $S = 100$ per unit

$$V = 60$$

$$F = 6000$$

$$\text{BEP in unit} = \frac{6000}{100 - 60} = 150 \text{ unit}$$

Now variable cost increased by 20%, then

$$\text{BEP} = \frac{6000}{100 - 80} = 300 \text{ unit}$$

Therefore it is proved that increases the variable cost increases the BEP

Sales - 2400 units	@ 100 per unit.
P/V ratio - 40%.	Other m/s = 30%
Fixed cost - TK 67200	FC = 24,00

Required:

- I) BES
- II) profit if sales are 3000 unit
- III) sales volume to earn a profit of TK 50000
- IV) marginal safety if P/V ratio is 35%
- V) BES if the price increased by 10%

Working:

$$P/V \text{ ratio} = \frac{C}{S}$$

$$\Rightarrow C = 0.4 \times 100 \\ = 40$$

$$F = 67200$$

$$P/V = 40\%$$

S = 100 per unit

$$\therefore V = S - C = 100 - 40 = 60 \text{ TK per unit}$$

$$\text{I) BES} = \frac{F}{P/V \text{ ratio}} \\ = \frac{67200}{0.4} \\ = 168000 \text{ TK}$$

$$\frac{F \times S}{S - V} \\ = \frac{67200 \times 100}{100 - 60} \\ = 168000 \text{ TK}$$

$$\text{II) } P = S - F - V$$

$$= 300000 - 67200 - 60 \times 3000$$

| Sales 3000 unit

$$P = 52800 \text{ TK}$$

$$\text{OR } C = 40 \text{ per unit}$$

$$P = C - F \\ = 40 \times 3000 - 67200 \\ = 52800 \text{ TK}$$

$$\text{III) Desired sales} = \frac{F + P}{P/V \text{ ratio}}$$

$$= \frac{67200 + 50000}{0.4} \\ = 293,000$$

$$iv) \text{ m/s} = \frac{P}{P/V \text{ ratio}} = \frac{52800}{0.35} = 150857.1429 \text{ Tk}$$

$$v) \text{ BE sales} = \frac{F}{s-v} = \frac{67200}{110-60} = 1344$$

Other

$$\% \text{ profit of sales} = \text{m/s} \times P/V \text{ ratio} \\ = 0.40 \times 30\% \\ = 12\%$$

$$P = 12\% \times 24000 \times 100$$

$$= 28800$$

$$P = s - v - F$$

$$\Rightarrow F = 24000 \times 100 - 60 \times 3000 - 28800 \\ = 31200$$