

## UNIT - R : PRODUCTION, COST AND BREAK EVEN ANALYSIS

### \* Production

→ Any kind of activity making something is called Production.

### \* Production Function

→ The relationship b/w physical inputs & outputs is called Production Function.

$$Q = f(N, L, K, M, T, O)$$

N = Natural Resources

L = Labours

K = Capital

M = Machinery

T = Technology

O = organization structure.

### \* Law of Production

→ Some variables are changeable in short time & some are in long period.

→ Here Labours & capital changes. Remaining are changes in long period.

### \* Assumptions

→ Natural resources, organization structure are constant.

→ Technology changes will be constant.

### \* Types of production functions

→ Based on Time period.

(1) short run production function.

(2) Long run production function.

① short-run :- [Law of variable proportions].

→ In short period, Labours and capital are changeable.

② long-run :- [Law of Returns to scale].

→ In long period, all production factors will be changeable.

→ Based on substitution.

① cobb-douglas.

② Leontiff.

③ C-E-S.

④ cobb-douglas :-

→ developed by American Economists cobb & douglas in 1929.

→ In short period all input variables are not changeable. (Except Labours & Capital).

→ They observed that 25% changed by capital variable & 75% changed by Labours.

→ otherwise called Linear Homogeneous Prod' Function

$$Q_p(L, K) = f(AX^{\alpha} L^{\alpha} K^{\beta})$$

A = Total production

L = Labour variable.

K = Capital variable.

other than changes in Labour & K

$\alpha, \beta$  = constant variables.

② Leontiff :-

→ by Leontiff

→ also called fixed proportion production function.

$$Q_p = z_1/\alpha + z_2/\beta$$

Here,  $z_1$  &  $z_2$  are fixed components.

### ③ constant Elasticity of substitutability

Ex: 10 Acres

Paddy; wheat, Sugarcane  
5 Acr. 2 Acr. 3 Acr.

#### \* Law of variable proportions

→ It is applicable in short period.

→ When changes in labour variable then it changes in production.

① Total    ② Additional/Marginal    ③ Average

→ The Total production ↑ then marginal is ↑ ~~↓~~.

→ In short period only one variable is changeable [Labour].

→ Total & marginal is +ve.

#### \* Assumptions of Law of variable proportions

① It is applicable in shot period

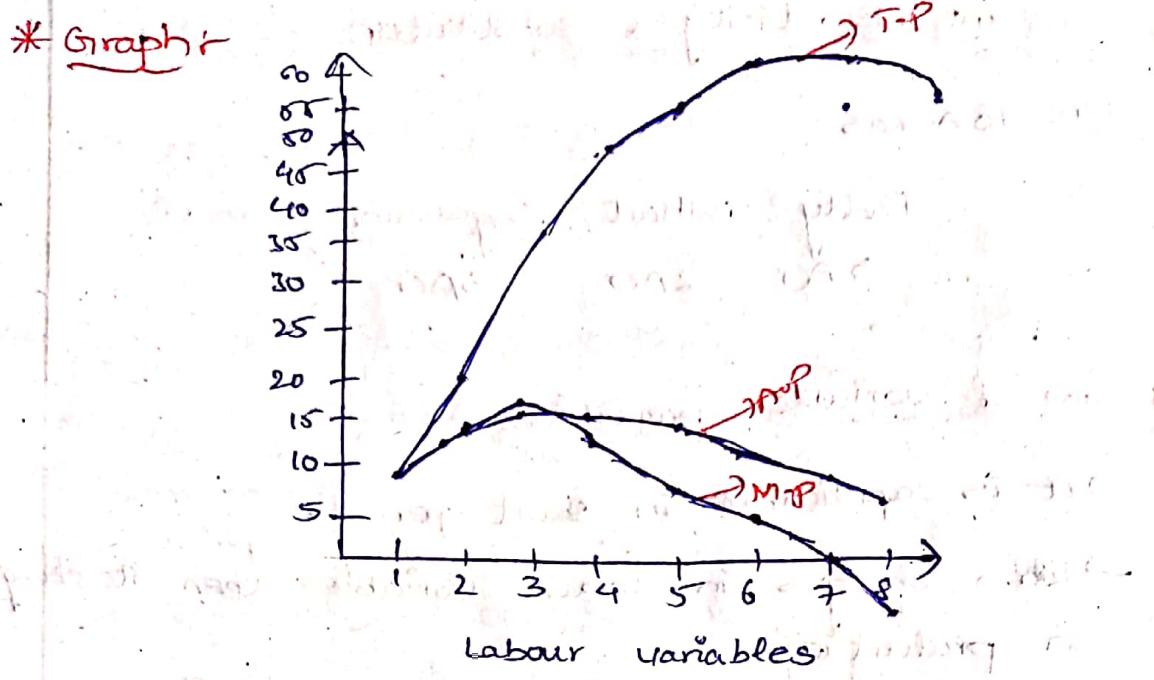
② Applicable in Agricultural sector.

③ It is based on cardinal utility analysis.

④ All labours are Homogeneous

#### \* Table:

| Labour | Production (Units) |      |      | Trend      |
|--------|--------------------|------|------|------------|
|        | T.P.               | M.P. | A.P. |            |
| 1      | 8                  | 8    | 8    |            |
| 2      | 20                 | 12   | 10   |            |
| 3      | 36                 | 16   | 12   | Increasing |
| 4      | 48                 | 12   | 12   |            |
| 5      | 55                 | 7    | 11   |            |
| 6      | 60                 | 5    | 10   |            |
| 7      | 60                 | 0    | 8.5  |            |
| 8      | 56                 | -4   | 7    | Negative   |

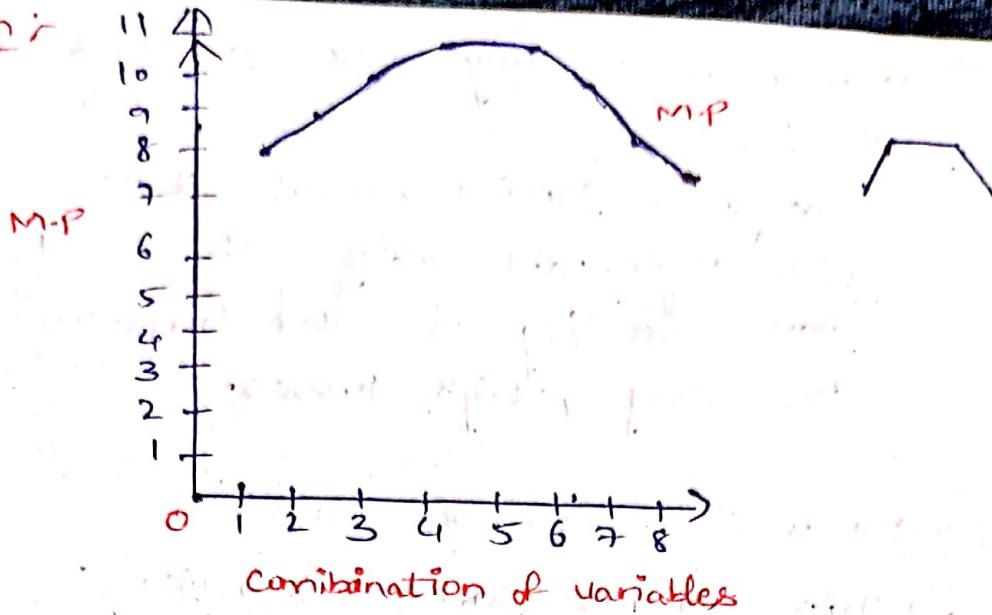


### \* Law of returns to scale:

- ① It is applicable in long period
  - ② It is based on cardinal utility analysis
  - ③ Labourers/ workers are works with Technology & Machinery
  - ④ In long period all <sup>input</sup> variables are changeable  
But
  - ⑤ We consider only 2 variables.
  - ⑥ It is of three types:
- ① Increasing
  - ② Constant
  - ③ Decreasing

| Combinations | Combination of Variables.  | M.P | stage      |
|--------------|----------------------------|-----|------------|
| 1            | 1 labour + 2 units capital | 8   |            |
| 2            | 2 " + 4 "                  | 9   | Increasing |
| 3            | 3 " + 6 "                  | 10  |            |
| 4            | 4 " + 8 "                  | 9   |            |
| 5            | 5 " + 10 "                 | 8   | constant   |
| 6            | 6 " + 12 "                 | 10  |            |
| 7            | 7 " + 14 "                 | 9   |            |
| 8            | 8 " + 16 "                 | 8   | Decreasing |

### \* Graph i



### \* Economies of scale

- Higher productivity with lower cost
- is called 'cost advantage' (or) Economies of scale.
- classified into two types:
  - ① Internal Economies of scale.
  - ② External Economies of scale.

#### ① Internal Economies of scale

- Bulk Buying Economy.
- Financial Economy.
- Marketing Economy.
- Managerial Economy.
- When compared Big organization with small organization Bulk Buying (or) Bargaining results increase in Economies of scale.

- When compared Big organization with small organization Financial Economy also results in increase of Economies of scale.

- Exchange of goods between sellers & buyers is called Marketing and it results increase of Economies of scale.

→ Managerial Economy also increases Economies of scale.

Ex: An institution recruit skilled labourers with high paid salary with low loss rather than recruiting unskilled labourers with low salary & high losses.

## ② External Economies of scale:

→ This contains some factors like-

① I.T [Information Technology]

② R&D [Research & development].

③ concentration.

④ specialization.

### ① I.T

→ A single organization can't bare the Information Technology. but group of organizations can do.

### ② Research & Development:

→ A single organization is unable to do Researches and developments. but group of organizations can do them.

### ③ Concentration:

→ Group of organizations focus on particular activity is called concentration.

Ex: Automobiles focused on Electric Vehicles

### ④ Specialization:

→ A single organization (or) different organization focus on particular activity is called Specialization.

Ex: Bajaj → Electric vehicles → especially focus on 3-wheelers.

## \* cost classification:

→ cost means simply an expenditure to produce a product.

→ It is classified into following:

① Accounting purposes

② Analytical purposes

### ① Accounting purposes:

→ It is further divided into the following:

i) Opportunity vs Actual.

ii) Business vs Full

iii) Implicit vs Explicit

iv) Out-pocket vs Book (in-pocket)

#### i) Opportunity vs Actual:

→ we sacrificing some kind and acquiring some benefits is called opportunity cost.

→ Two alternatives are available. But we need to sacrifice one kind.

Ex Joining of in one job and leaving another.

→ Joining in a company at same date.

we need to join in one job and leaving another [opportunity cost].

→ contributing actual amount rather than extra amount is called Actual cost.

#### ii) Business vs Full: Bus cost for needs of business

→ Full cost including all ~~fixed~~ costs

Ex cultivation (Production) → storing [in godowns]

Sales ← Advertise ← Branding ← Packaging ←

- (iii) Implicit vs Explicit
- Any expenditure paid by owner himself is called Implicit cost.
  - A owner paid money to outsiders like bankers, suppliers is called Explicit cost.

(iv) Outpocket vs Book

- current cost (or) immediate cost is referred to as Outpocket cost / Book cost [original cost].
- Outpocket cost not referred to Immediate cost paying / current cost payments.

(2) Analytical purposes

→ These are as follows:

i) Fixed cost vs variable cost

ii) shortrun vs longrun

iii) Historical vs Replacement

iv) Incremental vs sunk

v) Private vs social

(i) Fixed vs Variable

→ Fixed cost refers to cannot vary with level of production.

Ex: salary of employee.

→ variable cost refers to vary with level of production.

### (ii) short run vs long run:

→ Wages, Electricity bills like day to day business activities refers to short run.

→ one expenditure leads to profit for long time is called long run cost.

Ex: Purchasing a Machine.

### (iii) Historical vs. Replacement:

→ continuing an organization for long period is referred to Historical cost.

→ Any cost can be replaceable by another cost is called replacement cost. [Substituent players in cricket example]

### (iv) Incremental vs sunk:

→ Any cost can be altered with level of production is called Incremental cost.

Ex: If business organization is expands then additional raw materials are required.

② Betterment fee.

→ Any cost can't be altered with level of production is called sunk cost.

Ex: Rental house [whether he uses or not].

### (v) Private vs social:

→ Private/ individual/ owner cost is referred to any owner spent his own/personal costs.

Ex: cash withdrawal for brother's marriage.

→ social cost is useful to do services to the public.

Ex: TATA trust for children's education, ESI etc.

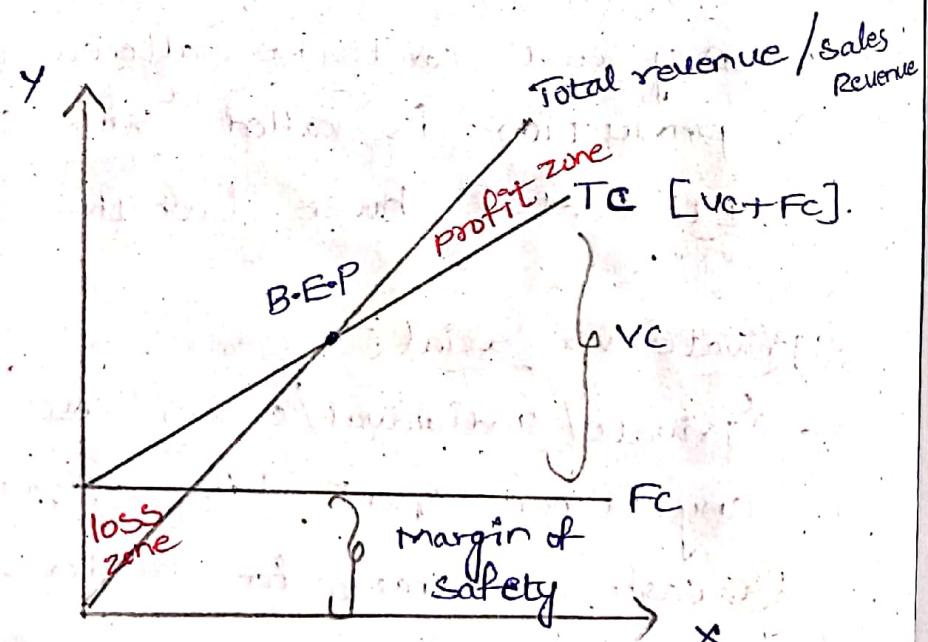
## \* Break Even profit Analysis / [cost volume profit]

- The difference b/w total revenue and total cost is called profit / loss.
- Break Even point is the point where there is no profit / no loss.

### Assumptions of BEA / CVP

- ① cost can be classified into two as follows:
  - i) Fixed cost
  - ii) Variable cost
- ② Fixed cost cannot vary with level of production.
- ③ variable cost is varies with level of production.
- ④ There is no change in sales mix - [Discount, offers].  
→ Sales mix means cost is impacted based on volume of sales and volume is on profit.
- ⑤ There is no closing stock (or) opening stock (or) unsold goods.
- ⑥ There is no changes in operational efficiency.

### Graph 1



## \* Formulas for B.E.P

- ① contribution (c) = sales (s) - variable cost (vc).  
(or)  
Fixed cost (Fc) + profit.  
(or)  
sales x profit volume (PV) ratio.

② Profit volume (PV) ratio =  $\frac{\text{contribution}(c)}{\text{Sales}(s)} \times 100$   
(or)  
 $\frac{\text{change in profit}}{\text{change in sales}} \times 100$ .

- ③ B.E.P [Break Even point]

a) BEP [in units/in volume] =  $\frac{\text{Fixed cost (Fc)}}{\text{Contribution}(c)}$

b) BEP [in sales/in value/in Rupees] =  $\frac{\text{Fixed cost (Fc)}}{\text{PV ratio}}$

- ④ Margin of safety (mos) = Real sales - BEP sales

(or)

$$\frac{\text{Profit (P)}}{\text{PV ratio}} \quad (\text{or})$$

Sales x % of mos.

- ⑤ desired sales / Desired profit / Required sales. (s).

$$s = \frac{\text{Fixed(Fc)} \text{ cost} + \text{Profit}(P)}{\text{either contribution}(c) \text{ or PV ratio}}$$

either contribution(c) or PV ratio

- ⑥ Actual sales for the year,

$$A.S = \frac{\text{BEP Sales} \times 100}{100 - \% \text{ of mos}}$$

## Model - I Problems

1] Determine BEP if Fixed cost is Rs. 10.00 lakhs, contribution margin per unit is Rs. 20/-?

A)  $BEP = \frac{F_c}{C} = \frac{10,00,000}{20} = 50,000 \text{ units}$

2] A company makes a single product with sales price of Rs 10, variable cost of Rs. 6 and fixed cost of Rs. 60,000.

Find @ No. of units to break even.

@ sales at Break even.

③ contribution to sales ratio [pu ratio].

A) Given, SP = Rs 10.

$$VC = \text{Rs } 6. \quad \therefore C = SP - VC = 10 - 6 = 4$$

$$Fc = \text{Rs. } 60,000.$$

④ BEP (in units) =  $\frac{Fc}{C} = \frac{60,000}{4} = 15,000 \text{ units.}$

⑤ sales at BEP =  $\frac{Fc}{pu} = \frac{60,000}{40\%} = \frac{60,000}{40/100} = \text{Rs. } 1,50,000$

⑥ pu ratio =  $\frac{C}{S} = \frac{4}{10} = 0.40 \text{ (or) } 40\%.$

3] A firm has a fixed cost of Rs. 600000/- selling price per unit is Rs. 600/- and variable cost per unit is Rs. 350/- present level of production is 42000 units, calculate BEP in terms of volume & sales value?

A) Given,  $Fc = \text{Rs. } 600,000$

$$SP = \text{Rs. } 600$$

$$VC = \text{Rs. } 350$$

$$\text{Production} = 42000 \text{ units.}$$

$$\text{Now, } C = SP - VC = 600 - 350 = 250$$

$$\text{pu ratio} = \frac{C}{S} = \frac{250}{600} = 0.25/25\% = 0.417$$

$$\therefore BEP \text{ (in volume)} = Fc/C = 6,00,000/250 = 24000 \text{ units.}$$

$$\therefore \text{BEP} [\text{in sales}] = \frac{F+C}{P-V} = \frac{600,000}{0.417} = \text{Rs} 14,3,884.9$$

4] XYZ company has a fixed cost of Rs. 24,000/- selling price per unit at Rs. 12/- and variable cost per unit is Rs. 8/-.

Find @ BEP [in volume] and [in value]

⑥ Margin of safety at 18000 units of production?

A) Given,  $F_C = \text{Rs} 24,000$

$$SP = \text{Rs} 12$$

$$VC = \text{Rs} 8$$

$$\text{Now, } C = SP - VC = 4, \text{ PV ratio} = \frac{C}{S} = \frac{4}{12} = 0.33$$

$$@ \text{BEP} [\text{in volume}] = \frac{FC}{C} = \frac{24,000}{4} = 6000 \text{ units}$$

$$\text{BEP} [\text{in value}] = \frac{FC}{PV} = \frac{24,000}{0.33} = \text{Rs. } 72,727$$

⑥ M.O.S = Real sales - BEP sales.

$$\text{Now, Real sales} = \text{production (units)} \times SP$$

$$= 18000 \times 12$$

$$\therefore M.O.S = (18000 \times 12) - 72,727$$

$$= \text{Rs. } 1,43,273$$

5] ABC firm has a fixed cost of Rs. 50000/- selling price per unit is Rs. 500/- and variable cost per unit is Rs. 250/- present level of production is 35000 units, calculate BEP in terms of volume and sales value and also margin of safety?

A) Given,  $FC = \text{Rs} 500,000$

$$SP = \text{Rs. } 500$$

$$VC = \text{Rs. } 250$$

$$\text{Production} = 35000 \text{ units}$$

$$C = SP - VC = 250$$

$$P.V = \frac{C}{S} = \frac{250}{500} = 0.5$$

$$\therefore \text{BEP} [\text{in volume}] = FC/C = 500000/250 = 2000 \text{ units}$$

$$\text{BEP} [\text{in sales}] = FC/PV = 500000/0.5 = \text{Rs. } 1,000,000$$

$$\therefore M.O.S = \text{Real sales} - \text{BEP sales} = (35000 \times 500) - 1,000,000 = \text{Rs. } 16,500,000$$

6) consider the following data of a company.

$$\text{Sales} = \text{RS. } 40,000$$

$$\text{Fixed cost} = \text{RS. } 7500$$

$$\text{Variable cost} = \text{RS. } 17,500$$

Find (a) contribution, (b) profit, (c) BEP (d) M.S.

A) (a) contribution,  $c = SP - VC$

$$c = 40,000 - 17,500 = 22,500$$

(b) Profit:

We have,

$$\text{contribution} = FC + \text{profit}$$

$$\therefore \text{profit} = c - FC = 22,500 - 7500 = 15,000$$

(c) B.E.P.

$$\text{BEP [in volume]} = FC/c = 7500 / 22,500 = 0.333 \text{ units}$$

$$\text{BEP [in sales]} = FC/PV = 7500 / 0.56 = 13,392 \text{ RS.}$$

$$PV = \frac{c}{s} = \frac{22,500}{40,000} = 0.56$$

(d) M.S. = Real sales - BEP sales

$$= (\text{Production} \times SP) - \text{BEP sales}$$

$$\text{but we have also, M.S.} = \frac{\text{Profit}}{PV} = \frac{15,000}{0.56} = 26,785 \text{ units}$$

7) calculate from the following data.

| Particulars    | 2019 (RS) | 2020 (RS) |
|----------------|-----------|-----------|
| Sales          | 5,00,000  | 7,50,000  |
| Fixed costs    | 1,00,000  | 1,25,000  |
| Variable costs | 2,75,000  | 4,50,000  |

Find out (a) P/V ratio (b) BEP (c) Margin of safety.

A) (a) P/V ratio  $= \frac{c}{s} = \frac{2,25,000}{5,00,000} = 0.45$

$$c = s - vc = 5,00,000 - 2,75,000 = 2,25,000$$

(b) BEP  $= \frac{FC}{c} = \frac{1,00,000}{2,25,000} = 0.444 \text{ units}$

$$\text{BEP [IN SALES]} = \frac{FC}{PV} = \frac{1,00,000}{0.45} = \text{RS. } 222,222$$

(c) M.S.  $= \frac{\text{Profit}}{PV} = \frac{c - FC}{PV} = \frac{1,25,000}{0.45} = 2,77,777 \text{ units}$

Model - II

8] Determine PU ratio %, Fixed cost and BEP with the help of following information.

| Description | 2014-15   | 2015-16   |
|-------------|-----------|-----------|
| Sales (Rs)  | 10,00,000 | 40,00,000 |
| Profit (Rs) | 300,000   | 12,00,000 |

A) PU Ratio =  $\frac{\text{change in profit}}{\text{change in sales}} \times 100$

$$= \frac{10,00,000}{30,00,000} \times 100 = 0.33 \times 100$$

$$C = S \times PV = (10,00,000) \times 0.33 = \text{Rs. } 3,30,000$$

② FC = C - Profit  $(2014-15)$

$$= 3,30,000 - 300,000 = 1,30,000$$

③ BEP =  $\frac{FC}{PV} = \frac{1,30,000}{0.33} = \text{Rs. } 3,93,939$

9) Determine Margin of safety for two periods and BEP with following information.

| Description | 2014-15   | 2015-16   |
|-------------|-----------|-----------|
| Sales (Rs)  | 20,00,000 | 80,00,000 |
| Profit (Rs) | 5,00,000  | 20,00,000 |

A) ① PV =  $\frac{\text{change in profit}}{\text{change in sales}} = \frac{15,00,000}{60,00,000} = 0.25$

$$C = S \times PV = 20,000 \times 0.25 = \text{Rs. } 5,00,000$$

$$FC = C - \text{Profit} = 5,00,000 - 5,00,000 = 0$$

Now, 2015-16.

$$C = S \times PV$$

$$= 80,00,000 \times 0.25 = \text{Rs } 20,00,000.$$

$$FC = C - \text{Profit}$$

$$= 20,00,000 - 20,00,000 = 0.$$

$$\textcircled{2} \quad \text{BEP} = \frac{FC}{PV} = \frac{0}{0.25} = 0.$$

$$\textcircled{1} \quad M.S = \text{Real Sales} - \text{BEP Sales} \cdot (\text{or}) \quad \frac{\text{Profit}}{\text{PV ratio}}$$

For 2014-15,

$$\Rightarrow \frac{P}{PV} = \frac{5,00,000}{0.25} = \text{Rs. } 20,00,000.$$

For 2015-16,

$$\Rightarrow \frac{P}{PV} = \frac{20,00,000}{0.25} = \text{Rs. } 80,00,000.$$

- 10] Following records are available from accounting records of Prajeen Ltd.

| Year | Sales (Rs) | Profit / Loss (Rs) |
|------|------------|--------------------|
| 2019 | 25,000     | 5000 (Loss)        |
| 2020 | 75,000     | 5000 (Profit)      |

Find

@ P/V ratio

B) Fixed cost

C) Marginal cost for 2019 & 2020

D) B.E.P

E) Margin of safety for profit of Rs. 10,000?

A)

$$\textcircled{a} \text{ PU} = \frac{\text{change in profit}}{\text{change in sales}} = \frac{10,000}{50,000} = 0.20$$

$$\textcircled{b} \text{ FC} = c - \text{profit}$$

$$\text{Here } c = s \times \text{PU}$$

$$= 25,000 \times 0.20$$

$$\therefore c = 5,000$$

$$\Rightarrow FC = 5,000 - (5,000)$$

$$\Rightarrow FC = 0,000$$

$$\text{Here } c = s \times \text{PU}$$

$$= 25,000 \times 0.20$$

$$c = 5,000$$

$$\Rightarrow FC = 15,000 - (15,000)$$

$$\Rightarrow FC = 0,000$$

**c) Marginal cost / variable cost.**

2019

$$c = s - VC$$

$$\Rightarrow VC = s - c$$

$$\Rightarrow VC = 25,000 - 5,000$$

$$\Rightarrow VC = 20,000$$

2020

$$c = s - VC$$

$$\Rightarrow VC = s - c$$

$$\Rightarrow VC = 25,000 - 15,000$$

$$\Rightarrow VC = 10,000$$

**d) B.E.P. [in sales].**

$$\Rightarrow B.E.P. = \frac{FC}{PU} = \frac{10,000}{0.20} = \text{Rs. } 50,000$$

$$\textcircled{e} M.S = \frac{\text{Profit}}{\text{PU}} = \frac{10,000}{0.20} = \text{Rs. } 50,000$$

**ii) A company reported the following results for two periods.**

| Period | Sales<br>(Rs) | Profit<br>(Rs) |
|--------|---------------|----------------|
| I      | 20,00,000     | 2,00,000       |
| II     | 25,00,000     | 3,00,000       |

Ascertain : B.E.P., P/V ratio, Fixed cost and Margin of safety?

$$A) @ P/V \text{ ratio} = \frac{\text{change in profit}}{\text{change in sales}} = \frac{1,00,000}{5,00,000} = 0.20$$

$$\text{Now, } C = S \times P/V = 4,00,000.$$

$$B) FC = C - \text{profit} = 4,00,000 - 2,00,000 = 2,00,000.$$

$$C) \text{BEP [in units]} = \frac{FC}{P/V} = \frac{2,00,000}{0.20} = 10,000 \text{ units}$$

$$\text{BEP [in sales]} = \frac{FC}{P/V} = \frac{2,00,000}{0.20} = 10,00,000.$$

$$D) \text{Margin of safety} = \frac{\text{Profit}}{P/V}$$

$$\text{Now, profit} = E - FC.$$

$$= 4,00,000 - 2,00,000 = 2,00,000.$$

$$\therefore MS = \frac{2,00,000}{0.20} = 10,00,000.$$

### Model-II

Q] If sales are 20,000 units & selling price is RS. 12 per unit, variable cost RS. 7 per unit and fixed cost is RS. 90,000. Find BEP in units & sales revenue. What should be the sales for earning a profit of RS. 50,000/-?

A) Given, sales = 20,000 units

$$SP = RS. 12$$

$$V.C = RS. 7$$

$$FC = RS. 90,000$$

$$\text{Now, } C = S - VC = 12 - 7 = RS. 5.$$

$$P/V = \frac{C}{S} = \frac{5}{12} = 0.417$$

$$① B.E.P = \frac{FC}{P/V} = \frac{90,000}{0.417} = 18,000 \text{ units.}$$

$$B.E.P (\text{In sales}) = \frac{90,000}{P/V} = \frac{90,000}{0.417} = RS. 2,15,827.$$

$$② \text{Required Sales} = \frac{FC + \text{Profit}}{P/V} = \frac{90,000 + 50,000}{0.417} = RS. 3,35,778$$

$$\frac{FC + P}{C} = \frac{(or) 90,000 + 50,000}{5} = 28,000 \text{ units} \quad (or)$$

13) ABC company has supplied the following data:

No. of units sold 20,000 units

Fixed cost : RS. 2,00,000

variable cost per unit RS. 10

Selling price per unit RS. 20

Find out:

(a) BEP in units

(b) Margin of safety

(c) Sales to get profit of RS. 1,00,000

(d) Verify the results in all above cases.

a) Given S = 20,000

$$VC = 10$$

$$SP = 20$$

$$C = SP - VC = 20 - 10 = 10$$

$$FC = 2,00,000$$

$$\text{(a) BEP [in units]} = \frac{FC}{C} = \frac{2,00,000}{10} = 20,000 \text{ units}$$

$$\text{BEP [in volume]} = \frac{FC}{PV}$$

$$\text{Now, } PV = \frac{C}{SP} = \frac{10}{20} = 0.50$$

$$\Rightarrow \text{BEP [in volume]} = \frac{FC}{PV} = \frac{2,00,000}{0.50} = 4,00,000$$

(b) MS = Real sales - BEP sales

$$= ((\text{production}) \text{ in units}) - \text{BEP sales}$$

$$= (20,000 \times 20) - 4,00,000$$

$$= 4,00,000 - 4,00,000 = 0$$

$$\text{(c) } S = \frac{FC + P}{PV} = \frac{(2,00,000) + (1,00,000)}{0.50} = 6,00,000$$

$$\text{(d) BEP [in units]} = 20,000 \text{ units}$$

$$\text{BEP [in sales]} = RS. 4,00,000$$

$$M.S = 0$$

$$S = 6,00,000$$

14) Information regarding Sanjeev Ltd. are as follows:

| Particulars         | Amount<br>(in Rs) |
|---------------------|-------------------|
| Sales               | 6,00,000          |
| Less: Variable cost | 4,50,000          |
| contribution        | 1,50,000          |
| Less: Fixed cost    | 90,000            |
| Profit              | 60,000            |

calculate:

- ① P/V ratio
- ② BEP in sales revenue
- ③ Margin of safety
- ④ Profit on the sales of Rs. 9,00,000
- ⑤ Required sales to earn a net profit of Rs. 90,000.

$$A) @ P/V \text{ ratio} = \frac{C}{S} = \frac{1,50,000}{6,00,000} = 0.25$$

$$B) \text{BEP [in sales]} = \frac{FC}{P/V} = \frac{90,000}{0.25} = \text{Rs. } 3,60,000$$

$$C) M.S = \text{Real sales} - \text{BEP sales} \quad (\text{or}) \quad \frac{\text{Profit}}{P/V}$$

$$\geq \frac{P}{P/V} = \frac{60,000}{0.25} = 240,000$$

D) Profit on sales of Rs. 9,00,000 is:

$$\text{We have } S = \frac{FC + P}{P/V}$$

$$\Rightarrow P = S * P/V - FC = (9,00,000) * (0.25) - 90,000$$

$$\Rightarrow P = 1,35,000$$

$$E) S = \frac{FC + P}{P/V} = \frac{(90,000) + (90,000)}{0.25} = 7,20,000$$

15) From the following data calculate the Break-even volume:

Fixed cost Rs. 10,000

Selling price Rs. 7 per unit

variable cost, Rs. 3 per unit

Suppose the price reduces by Rs. 2 per unit,  
what would you say about Break-even position?

$$A) BEP \text{ [in volume]} = \frac{Fc}{C} = \frac{Fc}{Sp - Vc} = \frac{10,000}{7-3} = 2500$$

BEP after reducing the price RS. 2 per unit

$$\Rightarrow BEP \text{ [in volume]} = \frac{Fc}{C} = \frac{Fc}{Sp - Vc} = \frac{10,000}{5-3} = 5000.$$

$$\Rightarrow BEP \text{ [in sales]} = \frac{Fc}{PV} = \frac{10,000}{0.5} = 20,000 \text{ Rs.}$$

$$\Rightarrow \text{New BEP} = \frac{Fc}{PV} = \frac{10,000}{0.4} = 25000.$$

- 16) Rahim sells 500 kg of sweets per hour at a rate of RS. 100 per kg. The fixed overhead is RS. 7000 and the variable cost is RS. 25 per kg. There is a proposal to reduce the price by 10%. Calculate the present PV and present BEP both in units and in Rupees; present level of profit and future PV ratio and BEP both in units and in Rupees. How many kilograms must be sold to earn present level of profit?

A) Given, Sp = RS. 100.

$$Fc = 7000$$

$$V.C = RS. 25$$

$$\text{Now, } PV = \frac{C}{S} = \frac{100-25}{100} = \frac{75}{100} = 0.75$$

$$BEP \text{ [in units]} = \frac{Fc}{C} = \frac{7000}{75} = 93.33 \text{ kgs}$$

$$BEP \text{ [in sales]} = \frac{Fc}{PV} = \frac{7000}{0.75} = 9,333$$

$$\text{Profit} = C - Fc = (500) \times 75 - 7000 = 37500 - 7000 = 30,500$$

Now, reducing price by 10%.

$$Sp = 100 - (100 - 10\%) = 100 - 10 = 90$$

$$PV = \frac{C}{S} = \frac{90-25}{90} = 0.833 \frac{65}{90} = 0.722$$

$$BEP \text{ [in units]} = \frac{Fc}{C} = \frac{7000}{65} = 107.69 \text{ kgs.}$$

$$BEP \text{ [in sales]} = \frac{Fc}{PV} = \frac{7000}{0.72} = RS. 9,722$$

$$\text{Profit} = C - Fc = (65) (500) - 7000 = 25,500.$$

17) A company produces a single article and sells it at Rs. 10 each. The marginal cost of production is Rs. 6 each & total fixed cost of concern is Rs. 400 per annum?

Find ① Break even point

② Margin of safety at sale of Rs. 1500

③ Increase in selling price if break-even point is reduced to 80 units?

A) Given SP = Rs 10.

$$C = SP - VC = 4$$

$$VC = RS. 6$$

$$P/V = \frac{C}{S} = \frac{4}{10} = 0.40$$

$$FC = RS. 400.$$

$$\textcircled{i} B.E.P [\text{In units}] = \frac{FC}{C} = \frac{400}{4} = 100 \text{ units.}$$

$$B.E.P [\text{In sales}] = \frac{FC}{P/V} = \frac{400}{0.4} = 1000 \text{ RS.}$$

② Margin of safety = Real sales - BEP sales.

$$= 1500 - 1000 = 500$$

$$\textcircled{ii} B.E.P = \frac{FC}{C}$$

$$\Rightarrow 80 = \frac{400}{C} \Rightarrow C = \frac{400}{80} = RS. 5$$

Now,  $C = SP - VC$

$$\Rightarrow SP = C + VC = 5 + 6 = RS. 11$$

18) The following information are available.

Fixed Expenses - Rs. 50,000.

Variable Expenses - Rs. 40 per unit

Selling price - RS. 60 per unit

calculate.

① BEP ② sales volume to earn a profit of RS. 50,000

③ what additional units would be necessary to increase profit by 5,000?

$$A) C = SP - VC = 60 - 40 = 20 \quad \& \quad P/V = \frac{C}{S} = \frac{20}{60} = 0.33$$

$$\textcircled{a} B.E.P [\text{Units}] = \frac{FC}{C} = \frac{50,000}{20} = 25,000$$

$$B.E.P [\text{Sales}] = \frac{FC}{P/V} = \frac{50,000}{0.33} = RS. 1,50,000$$

$$\textcircled{B} \quad S = \frac{FC + P}{c} = \frac{50,000 + 50,000}{20} = 5000 \text{ units}$$

$$\textcircled{C} \quad S = \frac{Fc + P}{c} = \frac{50,000 + 5000}{20} = 2,750 \text{ units}$$

19] Pepsi company produces a single article. Following cost data is given about its product selling price per unit. RS. 40, Marginal cost per unit RS. 24, Fixed cost per annum RS. 16,000.

calculate

@ Plu ratio

⑥ Break even sales

⑦ Sales to earn a profit of RS. 2,000.

⑧ Profit at sales of RS. 60,000.

⑨ New break even sales, if price is reduced by 10%.

A) Given,  $Sp = 40$ ,  $c = Sp - uc = 16$ ,  
 $uc = RS. 24$ ,  $FC = RS. 16,000$

② Plu =  $\frac{c}{s} = \frac{16}{40} = 0.40$

③ B.E.P [sales] =  $\frac{Fc}{Plu} = \frac{16,000}{0.4} = 40,000$ .

④  $S = \frac{Fc + \text{Profit}}{Plu} = \frac{16,000 + 2,000}{0.40} = 45,000$

⑤  $S = \frac{Fc + \text{Profit}}{Plu}$

$\Rightarrow \text{Profit} = (S \times Plu) - Fc$

$= (60,000 \times 0.40) - 16,000$

$= 24,000 - 16,000 = 8,000$

⑥  $SP = 40 - (40 \times 10\%) = 32$

⑦  $uc = 24$

⑧  $Fc = RS. 16,000$

$c = Sp - uc = RS. 8$

$Plu = \frac{c}{s} = \frac{8}{32} = 0.25$

$\therefore \text{BEP} [\text{in sales}] = \frac{Fc}{Plu} = \frac{16,000}{0.25} = RS. 64,000$

Q1] Raw & Co. has supplied you the following information. Fixed cost Rs. 2,40,000; Variable cost per unit Rs. 15; selling price per unit Rs. 30.

Find (a) BEP units (b) BEP in Rupees

(c) Margin of safety at a sales of Rs. 6,00,000

(d) Sales to get a profit of Rs. 2,00,000.

A) Given,  $FC = Rs. 2,40,000$

$$VC = Rs. 15$$

$$SP = Rs. 30$$

$$\text{Now, } C = SP - VC = 15$$

$$PV = \frac{C}{S} = \frac{15}{30} = 0.50$$

$$(a) BEP [\text{in units}] = \frac{FC}{C} = \frac{2,40,000}{15} = 16,000 \text{ units}$$

$$(b) BEP [\text{in Rupees}] = \frac{FC}{PV} = \frac{2,40,000}{0.50} = 4,80,000 \text{ Rs.}$$

$$(c) M.S = \text{Real sales} - \text{BEP sales}$$

$$= 6,00,000 - 4,80,000$$

$$= Rs. 1,20,000$$

$$(d) S = \frac{FC + \text{Profit}}{PV} = \frac{2,40,000 + 2,00,000}{0.50} = Rs. 8,80,000$$

Q2] If sales are 10,000 units & selling price is Rs. 15 per unit, variable cost is Rs. 8 per unit and fixed cost is Rs. 70,000. Find out BEP in terms of Rupees & units. What is the profit earned? What should be the sales for earning a profit of Rs. 50,000?

A) Given,  $SP = Rs. 15$

$$VC = Rs. 8$$

$$S = 10,000 \text{ units}$$

$$FC = Rs. 70,000$$

$$C = SP - VC = 7$$

$$PV = \frac{C}{SP} = \frac{7}{15} = 0.4667$$

$$\text{BEP [\text{in Rupees}]} = \frac{FC}{PV} = \frac{70,000}{0.4667} = Rs. 1,49,989.$$

$$\text{BEP [\text{in units}]} = \frac{FC}{C} = \frac{70,000}{7} = 10,000 \text{ units}$$

We have,  $c = FC + \text{Profit}$   
 $\Rightarrow \text{Profit} = c - FC = 7 - 70,000 = 70,000 - 70,000 = 0.$

Now, desired sales,

$$S = \frac{FC + \text{Profit}}{PV} = \frac{70,000 + 50,000}{0.4667} = \text{Rs. } 1,77,135.$$

Q2] A manufacturer sells his product at Rs. 5 each. Variable costs are Rs. 2 per unit & the fixed costs amount to Rs. 60,000.

- (i) calculate the break-even point
- (ii) what would be the profit if the firm sells 30,000 units?
- (iii) what would be the BEP if the firm spends Rs. 3000 on advertising?
- (iv) How much should be the manufacturer sell to make a profit of Rs. 30,000 after spending Rs. 3,000 for advertisement?

A) Given,  $S \cdot P = \text{Rs. } 5$

$$VC = \text{Rs. } 2$$

$$FC = \text{Rs. } 60,000$$

$$\text{Now, } C = SP - VC = 3$$

$$PV = \frac{C}{SP} = \frac{3}{5} = 0.60$$

$$(i) \text{a) BEP [in units]} = \frac{FC}{C} = \frac{60,000}{3} = 20,000 \text{ units}$$

$$(b) \text{BEP [in sales]} = \frac{FC}{PV} = \frac{60,000}{0.60} = \text{Rs. } 1,00,000$$

$$(ii) S = \frac{FC + \text{Profit}}{C}$$

$$\Rightarrow \text{Profit} = S \times C - FC = (30,000)(3) - 60,000 = 30,000$$

$$(iii) \text{BEP} = \frac{FC}{PV} = \frac{60,000 + 3000}{0.60} = \text{Rs. } 1,05,000$$

$$(iv) \text{Desired sales, } S = \frac{FC + \text{Profit}}{PV} = \frac{(60,000) + (3000) + 30,000}{0.60}$$
$$\therefore S = \text{Rs. } 1,55,000$$

Q3) An enterprise has a fixed cost of Rs. 63,000. Selling price per unit is Rs. 60 and variable cost per unit is Rs. 30. The present level of output is 4000 units.

(i) Find BEP in terms of volume and value.

(ii) calculate margin of safety.

(iii) what is the change in BEP if margin of safety is fixed cost increases to Rs. 72,000?

A) Given, SP = RS. 60

$$VC = RS. 30$$

present level of output = 4000 unit.

$$\text{Now, } C = SP - VC = 60 - 30 = RS. 30$$

$$PV = \frac{C}{S} = \frac{30}{60} = 0.50$$

i) BEP [in units] =  $\frac{FC}{C} = \frac{63,000}{30} = 2,100 \text{ units}$

BEP [in sales] =  $\frac{FC}{PV} = \frac{63,000}{0.50} = RS. 126,000$

ii) MOS = Real sales - BEP sales

$$= (4000) \times 60 - 78,750 = 1,61,250 RS.$$

iii) BEP [in units] =  $\frac{72,000}{50} = 1,440 \text{ units}$

$$\text{BEP [in sales]} = \frac{72,000}{0.50} = RS. 144,000$$

iv) MOS = Real sales - BEP sales

$$= (4000) \times 60 - 144,000 = 96,000 RS.$$

Q4) The following information are concerned with a company:

(i) margin of safety ratio - 20%.

(ii) P/V ratio - 40%.

(iii) Fixed costs - RS. 1,50,000.

Find

(a) sales at BEP

(b) Actual sale for the year

(c) Profit for year

(d) variable cost for the year.

Given,  $MOS = 20\%$

$$PV = 40.$$

$$FC = \text{Rs. } 1,50,000.$$

$$\textcircled{a} BEP = \frac{FC}{PV} = \frac{1,50,000}{0.40} = \text{Rs. } 3,75,000$$

\textcircled{b} Actual sales,

$$S = \frac{\text{BEP sales} \times 100}{100 - MOS\%} = \frac{3,75,000 \times 100}{100 - 20} = \underline{\underline{\text{Rs. } 3,75,000,00}}$$

$$S = \text{Rs. } 4,68,750.$$

\textcircled{c} Profit

$$\text{we have } MOS = \frac{P}{PV}$$

$$\Rightarrow \text{Profit} = MOS \times PV = (20) \times (40)$$

(or)

$$\text{we have } MOS = \text{Real sales} - \text{BEP sales}$$

$$MOS = 4,68,750 - 3,75,000 = \text{Rs. } 93,750$$

$$\text{we have } MOS = S \times MOS\%$$

$$= 4,68,750 \times 0.20 = \text{Rs. } 93,750.$$

$$\text{Now, } MOS = \frac{P}{PV} \Rightarrow 93,750 = \frac{P}{0.40}$$

$$\Rightarrow P = 93,750 \times 0.40 = \text{Rs. } 37,500$$

\textcircled{d} we have,  $c = FC + P$

$$c = 1,50,000 + 37,500$$

$$c = 1,87,500$$

$$\text{Now, } c = SP - VC$$

$$\Rightarrow VC = SP - c$$

$$= 4,68,750 - 1,87,500$$

$$\therefore VC = \text{Rs. } 2,81,250$$

$$\Rightarrow \text{Rs. } 2,81,250$$

25] The P&L ratio of Bansal Bros. is 40% and percentage of margin of safety is 30%. Find BEP and profit if sales volume is Rs. 4,50,000?

$$A) PV = 40\%$$

$$MOS = 30\%$$

$$\text{Sales} = \text{Rs. } 4,50,000.$$

$$\text{Now, } C = S \times PV$$

$$C = 4,50,000 \times 0.40 = 1,80,000.$$

$$\text{Now, } C = SFC + P$$

$$\Rightarrow FC = C - P = 1,80,000 - P$$

$$\text{We have, } MOS = \frac{\text{Sales}}{\text{Real Sales}} \times 100\% = \frac{\text{Sales}}{\text{BEP Sales}} \times 100\%$$

$$= \frac{4,50,000}{\text{BEP Sales}} \times 100\% = 30\%$$

$$= \text{Rs. } 1,35,000.$$

$$\text{Now, } MOS = \frac{P}{PV}$$

$$\Rightarrow P = (MOS) \times PV = (1,35,000) \times 0.40 = \text{Rs. } 54,000.$$

$$\text{Now, } BS: MOS = \text{Real sales} - BEP \text{ sales}$$

$$\Rightarrow BEP \text{ sales} = \frac{1}{100} \times \text{Real sales} - MOS$$

$$= \frac{1}{100} \times 4,50,000 - \frac{54,000}{0.40} = \text{Rs. } 3,15,000.$$

(or)

$$FC = C - P = 1,80,000 - 54,000 = 1,26,000$$

$$BEP [\text{Sales}] = \frac{FC}{PV} = \frac{1,26,000}{0.40} = \text{Rs. } 3,15,000.$$

26] The P&L Ratio of Matrix Books Ltd is 40% and percentage of margin of safety is 30%. Find BEP & profit if sales volume is Rs. 14,000?

A) Given  $P/V = 40\% = 0.40$

MOS =  $30\% = 0.30$

$BEP = \text{Real sales} - MOS$

Now, real sales = 14000 (given)

$MOS = \text{Sales} \times MOS\%$

$$\Rightarrow MOS = 14000 \times 0.30\% = \text{Rs. } 4,200$$

$$\therefore BEP = 14000 - 4,200 = 9,800 \text{ Rs.}$$

Now,  $MOS = \frac{P}{PV} \Rightarrow P = (MOS) PV = (4,200)(0.40) = \text{Rs. } 1,680$   
(or)

$$BEP = \frac{FC}{PV} = \frac{F + P}{PV} = \frac{(S \times PV) + P}{PV} = \frac{(14000) \times (0.40) + 1,680}{0.40}$$

$$\therefore BEP = 18,200 - 9,800 \text{ Rs.}$$

27] From the following information find out:

- (a) P/V ratio      (b) sales      (c) margin of safety.

Fixed cost = Rs. 40,000

Profit = Rs. 20,000

BEP = Rs. 80,000

A) (a) P/V ratio,

$$BEP = \frac{FC}{PV} \Rightarrow PV = \frac{FC}{BEP} = \frac{40,000}{80,000} = 0.50$$

(b) sales,

$$(c) MOS = \frac{P}{PV} \Rightarrow \frac{20,000}{0.50} = 40,000.$$

(b) sales,

$$mos = \text{Real sales} - BEP \cdot \text{sales}$$

$$\Rightarrow \text{real sales} = mos + BEP \cdot \text{sales}$$

$$= 40,000 + 80,000$$

$$= \text{Rs. } 1,20,000$$