

- Q1 From the following data calculate
- B.E.P in Sale
  - No. of units that must be sold to earn a profit of 60000 per year.

SP per unit Re 20

VC per unit Rs 11

VC selling per unit Rs 3

Fixed factory overhead Rs 5,40,000

Fixed selling costs Rs 2,52,000  
(per year)

$$FC = 5,40,000 + 2,52,000 = 792000$$

$$\text{B.E.P (amount)} = \frac{FC}{\text{P/V ratio}}$$

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sale}}$$

$$\text{Contribution} = (20 - 11) = 9$$

$$\therefore \frac{9}{20} = 0.45$$

$$\text{B.E.P} = \frac{FC}{\text{P/V ratio}} = \frac{792000}{0.45}$$

$$= \underline{\underline{2,640,000 \text{ Ans}}}$$

Desired sales volume to earn a profit of  
Rs 60000

$$= 792000 + 60000 = 852,000$$

Contribution  $\rightarrow 6$  Ans

Per unit = 1,42,000 units

Q2 On investigation it was found that VC in X42 Ltd is 80% of SP. If FC = 10000, calculate the B.E.P. sales of the company.

Another firm IMN Company Ltd, having same amount of fixed expenses has its BEP at a lower figure than that of X42 Ltd. Comment on the cause.

Solution

$$\text{B.E.P.} = \frac{\text{Contribution}}{\text{P/V ratio}}$$

$$\text{Contribution} = 10000$$

VC is 80% of Sales

$\therefore$  P/V ratio is 20% of Sales

$$= \frac{10000}{0.20} = 50000 \text{ Rs}$$

The lower B.E.P. of IMN Ltd vis-a-vis X42 Ltd is due to its lower

variable expenses volume ratio which in turn may be due to its

lower VC per unit or higher SP per unit, eventually yielding higher contribution

per unit.

Q3 Two businesses, AB Ltd and CD Ltd, sell the same type of product in the same type of market. Their budgeted profit and loss account for the current year ending March 31, are as follows.

	AB Ltd	CD Ltd
Sales	150,000	150,000
Less VC	120,000	100,000
FC	15,000	35,000
Net Budgeted Profit	15,000	15,000

You are required to

1. calculate the Break-even points of each Business
2. State which business is likely to earn greater profits in conditions of
  - (a) heavy demand for the product
  - (b) low demand for the product.

Solution

$$\text{B.E.P} = \frac{\text{FC}}{\text{P.V.ratio}}, \text{ P.V.} = \frac{\text{Contribution}}{\text{Sales}} = \frac{30000}{150000}$$

$$\text{B.E.P. (AB Ltd)} = 15000 / 0.20 = 75000$$

$$\text{P.V.ratio (CD Ltd)} = 35000 / 150000 = 33.33\%$$

$$\text{B.E.P. (CD Ltd)} = 35000 / 0.3333 = 105,000$$

3. CD Ltd is likely to earn large profit in conditions of heavy demand because P.V.ratio is high than AB Ltd.  
But when demand is low AB Ltd will earn more

Q8 During the current year, AB Ltd showed a profit of Rs 180,000 on a sale of Rs 30,00,000. The variable expenses were Rs 21,00,000. You are required to work out

1. B.E.P sales at present
2. B.E.B. if VC increase by 5%
3. B.E.P sales to maintain the profit as at present. if selling price is reduced by 5%.

### Solution

$$(1) \text{ Sales} = \text{Rs } 30,00,000$$

$$\text{VC} = \underline{21,00,000}$$

$$\text{Contribution} = \underline{9,00,000}$$

$$\text{FC} = ?$$

$$\text{Since profit} = 1,80,000$$

$$\text{FC} = \text{Contribution} - \cancel{\text{Profit}}$$

$$\text{FC} = 7,20,000$$

$$\cancel{\text{P/V}} \quad \cancel{0.30} \quad \cancel{\frac{720,000}{30,00,000}}$$

$$\text{P/V} = \frac{\text{Contribution}}{\text{Sale}} = \frac{9,00,000}{30,00,000}$$

$$= 0.30$$

$$\text{B.E.P} = \frac{\text{FC}}{\text{P/v ratio}} = \frac{\text{₹}20,000}{0.30} = \text{₹}24,00,000$$

(2) B.E.P (Revised) ve increase by 5%

Sales 30,00,000

VC 220,500 → increased by 5%

Contribution 7,95,000

FC ₹20,000

Profit 75,000

$$\text{P/v ratio} = 7,95,000 / 30,00,000 = 0.265$$

$$\text{B.E.P (revised)} = 7,20,000 / 0.265 = 27,16,981$$

(3) Revised P/v ratio with reduction in Price

Sales reduced by 5%

$$\text{Sales} = 30,00,000 - 150,000 = 285,000$$

$$\text{VC} = \underline{\underline{21,00,000}}$$

$$\text{Contribution} = \underline{\underline{7,50,000}}$$

$$\text{P/v ratio} = 7,50,000 / 28,50,000 = 26.316\%$$

Desired Sales volume = 90000

✓

FC + Desired profit

$$900,000 / 26.316\% = 34,19,973$$

Q5

(i)

Calculate from the following data  
the value of output at which

(ii)

the Business breaks even and  
% of Capacity at which it breaks even

Particular	Budget Based on 100% Capacity	Shutdown Expenditure
<del>Direct expenses</del>		
Direct wage	Rs. 9,09,964	<del>Rs. 9,09,964</del>
Direct material	Rs. 2,44,552	<del>Rs. 4,108</del>
Works Expenses	Rs. 88,292	<del>Rs. 93,528</del>
Selling & distribution	21000	<del>Rs. 6,180</del>
Admin Exps	9,492	<del>Rs. 20,508</del>
Net Sales	Rs. 40,000	

SolutionDetermination of PV ratio

Sales	Rs. 40,000
- Direct wages	<del>9,09,964</del> 9,44,552
- Direct material	<del>88,292</del> 21000
- Works Expense	<del>21000</del>

Sale      Rs. 40,000

- Variable Cost

(I) Direct wages	2,09,964
(II) Direct material	2,44,552
(III) Works Expense	88,292
(IV) Selling & Distribution	21000
(V) Admin Exps	9,492
	<u>573,300</u>

$$\text{Contribution} = 8,40,000 - 5,73,300 \\ = 2,66,766$$

$$\text{P/V ratio} = \frac{2,66,766}{84,000} = 31.75$$

Shut down expenditure = Fixed cost

$$\therefore FC = 93,528 + 40,108 + 20,508 \\ = 154,224$$

~~$$\text{Ratio} = \frac{FC}{S}$$~~

$$\text{B.E.P} = \frac{FC}{\text{P.V.Ratio}} = \frac{154,224}{0.3175} \\ = 4,85,744.88$$

When Plant is running at 100% capacity sales is Rs 840,000

if Plant will do only B.E.P Sales then it will run at a capacity

$$\frac{\text{Break even sales}}{\text{Sales at 100% capacity}} = \frac{4,85,744.88}{8,40,000} \\ = 57.83\%$$

$\therefore$  if Plant will run at a capacity of 57.83% then it will earn B.E.P sales.

Q 6 The following data are obtained from the records of a factory

Sales (4000 units @ 25 each) = 100,000

Variable Cost

(i) Material Consumed 40,000

(ii) Labour charges 20,000

(iii) Variable overhead 10,000

It is not  $\rightarrow$  (iv) Fixed overhead 18,000  
variable cost 8,000

Net profit 12000

(1) Calculate Number of units by selling which the company will break even.

$\therefore$  Sales 100,000

VC  $- (40,000 + 20,000 + 10,000)$

Contribution 30000

~~Since~~ we need to find B.E.P in units

$\therefore$  Contribution per unit =  $\frac{30000}{4000}$

= 7.5

BEP = FC = 18000  
Contribution per unit 7.50

2400 units.

(2.) Sales needed to earn a profit of 20% on sales.

$$\text{Sales revenue} = \cancel{\text{Total cost + profit}} + \text{Profit}$$

$$\text{Total cost} = \text{FC} + \text{VC}$$

VC will vary in direct proportion to SR

$$SR = FC + VC(SR) + TP(SR)$$

$$\text{Suppose } SR = 100\%$$

$$TC = 80\%$$

$$TP = 20\%$$

$$VC = \cancel{70000} / 100000 = 70\%$$

$$\therefore FC = \text{Rs } 18000 \quad \downarrow \begin{matrix} VC \\ TP \end{matrix}$$

$$100\% SR = \text{Rs } 18000 + 0.70SR + 0.20SR$$

$$0.10SR = \text{Rs } 18000$$

$$SR = \frac{18000}{0.10} = 180,000$$

(3.) Extra units which should be sold to obtain the present profit if it is proposed to reduce the selling price by 20% and 25%.

Revised contribution margin is required to be calculated and additional units required to maintain profit of Rs 12000

	original SP = 25	20%	25%
[SP]	<u>20</u>	<u>18.75</u>	<u>18.75</u>
VC ( $0.70 \times R_{25}$ )	<u>17.50</u>	<u>17.50</u>	<u>17.50</u>
Contribution	<u>2.50</u>	<u>1.25</u>	<u>1.25</u>
Desired sales (FC + NP) / CM	<u>30000 / 2.50</u>	<u>30000 / 1.25</u>	<u>30000 / 1.25</u>
No. of units required	<u>12000</u>	<u>24000</u>	<u>24000</u>
Less: Existing units sold	<u>4000</u>	<u>4000</u>	<u>4000</u>
Extra units to be sold	<u>8000</u>	<u>20000</u>	<u>20000</u>
to maintain a profit of 12000		Aus	Aus.

- (4) Selling price to be fixed to bring down its break even point to 600 units under present condition

$$BEP = \frac{FC}{\text{Contribution Per unit}}$$

$$\therefore \text{Contribution per unit} = \frac{FC}{BEP}$$

$$= \frac{18000}{600}$$

$$= Rs 30$$

$$\begin{aligned} \text{Sale} &= \text{Contribution} + VC \\ &= 30 + 17.50 \\ &= 47.5. \end{aligned}$$

Q7 Calculate B.E.P of the following information

$$SP = \text{Rs } 3 \text{ per unit}$$

$$VC = \text{Rs } 2 \text{ per unit}$$

$$FC = \text{Rs } 90000$$

Estimated Sales for the period = 100,000 units  
or Rs 300,000

### Solution

Suppose the units at B.E.P = Q

$$\text{Sales} - VC = \text{Contribution} = FC$$

$$3Q - 2Q = 90000$$

$$Q = 90,000 \text{ units}$$

∴ if we produce 90000 units the

Sales is 2,70,000 ( $90000 \times 3$ )

and total cost = 270,000 ( $2 \times 90000$   
+ FC Rs 90000)

OR

$$B.E.P = \frac{FC}{\text{Contribution}} = \frac{90000}{3-2} = 90000 \text{ units.}$$

Q8

X42 Ltd is manufacturing and selling four types of products A, B, C and D. The sales mix and variable costs are as follows.

Product	Sales per Month	VC Ratio
A	2,00,000	50%
B	1,50,000	50%
C	1,00,000	75%
D	2,50,000	40%

Fixed Costs = 1,50,000 per month.

Calculate B.E.P

$$\text{VC Ratio} = \frac{\text{VC}}{\text{Sales}}$$

Solution → Calculate VC and Contribution first

Particular	A	B	C	D	Total
Sales	2 Lac	1.5 Lac	1 Lac	2.5 Lac	7 Lac
VC	1 Lac	75000	75000	1 Lac	3.5 Lac
Contri	1 Lac	75000	25000	1.5 Lac	3.5 Lac
FC	-	-	-	-	1.5 Lac
Profit	-	-	-	-	2 Lac

$$\begin{aligned} P/V \text{ ratio} &= \frac{\text{Rs } 3,50,000}{\text{Rs } 700,000} \\ &= 0.50 (\text{ie } 50\%) \end{aligned}$$

$$\text{B.E.P} = \frac{FC}{\text{P/V ratio}} = \frac{150000}{0.50} = 3,00,000 \text{ Rs}$$

Q9 The ratio of VC to sales is 70%. The B.E.P occurs at 60% of the capacity. Find the B.E.P at sales when FC = Rs 90000. Also compute profit at 75% of the capacity sales.

Solution

Variable Cost to Sales ratio = 70%.

$$\text{P/V ratio} = 1 - \frac{\text{VC}}{\text{Sales}} = 1 - 0.70 = 0.30$$

$$\text{BEP} = \frac{\text{Fixed Cost}}{\text{P/V ratio}} = \frac{90000}{0.30} = \text{Rs } 3,00,000$$

Since at B.E.P profit = 0  $\therefore$  Sales = Rs 300000  
we can apply unitary method or proportion

$$\text{B.E.P at } 75\% \text{ utilization} \\ X = \frac{\text{Rs } 3,00,000 \times 75}{60} = \text{Rs } 3,75000$$

Now we can compute contribution earned when sales is Rs, 3,75000

$$\begin{aligned} \text{Contribution} &= \text{Sales} \times \text{P/V ratio} \\ &= 3,75,000 \times 30\% \\ &= \text{Rs } 1,12,500 \end{aligned}$$

$$\therefore \text{Profit} = \text{Contribution} - \text{FC}$$

$$= \text{Rs } 1,12,500 - \text{Rs } 90,000$$

$$\text{Rs } 22,500$$

### IMPACT OF CHANGES IN SALES PRICE VOLUME, VARIABLE COSTS AND FIXED COSTS ON PROFITS.

(Q10) Sales volume of X42 Ltd is 1,00,000 units selling at a price Rs 3 per unit. The variable cost is Rs 2 per unit, Fixed Cost is Rs 90,000. The Capital investment is Rs 1,00,000. Let us study the impact of change in price on profit under two conditions i.e. increase in price by 5% and 10% and (ii) decrease in price by 5% and 10%.

#### Solution

$$\text{SP} = 3 \text{ Rs}$$

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

$$\text{FC} = 90,000$$

$$\text{Units} = 100,000$$

$$\text{Investment} = \text{Rs } 100,000$$

$$\frac{\text{Return on Investment}}{\text{Investment}} = \frac{\text{Profit}}{\text{Investment}}$$

## Impact of change in Sales Price on Profit

Particular	Decrease in Price		Normal Volume	Increase in Price	
	10%	5%		5%	10%
Output (units)	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
Sale (Rs)	2,70,000	2,85,000	3,00,000	3,15,000	3,30,000
VC (Rs)	2,00,000	2,00,000	2,00,000	2,00,000	2,00,000
Contribution (Rs)	70,000	85,000	1,00,000	1,15,000	1,30,000
FE (Rs)	90000	90000	90000	90000	90000
Operating Profit	(20,000)	(5000)	10000	25,000	40,000
% change in Profit	-300%	-150%	—	150%	300%
BEP (units)	1,20,571	1,05,882	90,000	78,261	69,231
P/V ratio	0.2592	0.2982	0.333	0.3651	0.393
ROI	-20%	-5%	10.00	25.00	40%

A small change in Sales volume brings a wide fluctuation in profit.

$$\text{Operating Leverage or operating Elasticity} \\ = \frac{\% \text{ Change in Profit}}{\% \text{ Change in Price}} = \frac{100\%}{10\%} = 10$$

There is no change in BEP or P/V ratio with change in sales.

Q11 A Company producing a single product and sells it at Rs 10 per unit.  $VC = \text{Rs } 6$  per unit and  $FC = 40000$  per annum. Calculate B.E.P.

(b) Sales volume required to earn a profit of Rs 60000 per Annum.

### Solution

$$\text{Contribution} = SP - VC = \text{Rs } 10 - \text{Rs } 6 \\ = \text{Rs } 4 \text{ per unit}$$

$$\text{B.E.P in units} = \frac{FC}{\text{Contribution}}$$

$$= \frac{\text{Rs } 40000}{\text{Rs } 4} = 10000 \text{ units.}$$

$$\text{B.E.P (in value)} = \frac{FC}{P/V \text{ ratio}}$$

$$P/V \text{ ratio} = \frac{\text{Contribution}}{\text{Sales}}$$

$$= \frac{4,00,000}{1,00,000} = 0.40$$

$$\text{BEP (in value)} = \frac{40,000}{0.40} = 100,000$$

Sales volume required to earn a desired profit (in units)

$$= \frac{FC + \text{Desired profit}}{\text{Contribution per unit}}$$

$$= \frac{\text{Rs } 40000 + \text{Rs } 60000}{\text{Rs } 4}$$

$$= \frac{\text{Rs } 1,00,000}{\text{Rs } 4} = 25000 \text{ units}$$

Sales volume required to earn a desired profit (in value)

$$= \frac{FC + \text{Desired profit}}{\text{P/V ratio}}$$

$$= \frac{\text{Rs } 40000 + \text{Rs } 60000}{\text{Rs } 40} = \text{Rs } 250,000$$

Q8 The Cost information Computed by the Cost accountant is as follows.

Sales 1,00,000 units

SP Rs 10 per unit

VC Rs 6 per unit

FC Rs 60000 per annum

Computed the following

- BEP in units and value
- Make a profit of Rs. 40,000
- Make a profit of Rs 2 per unit
- Make a profit of 80% on sales

Solution

$$\text{Contribution per unit} = SP - VC \\ = \text{Rs } 10 - \text{Rs } 6 = \text{Rs } 4 \text{ per unit}$$

$$\text{BEP (in units)} = \frac{\text{FC}}{\text{Contribution Per unit}}$$

$$= \frac{\text{Rs } 60,000}{\text{Rs } 4} = 15,000 \text{ units}$$

BEP (In value)

$$\text{P/V ratio} = \frac{SP - VC}{SP} = \frac{10 - 6}{10} = 0.40$$

$$\text{BEP in value} = \frac{\text{FC}}{\text{P/V ratio}}$$

$$= \frac{\text{Rs } 60,000}{0.40} = 1,50,000$$

b) Sales Vol required to earn a profit of Rs 40,000

$$= \frac{\text{FC} + \text{Desired profit}}{\text{Contribution per unit}}$$

$$= \frac{60000 + 40000}{0.40} = 25000 \text{ units}$$

and

$$= \frac{\text{FC} + \text{Desired profit}}{\text{P/V ratio}}$$

$$= \frac{60000 + 40000}{0.40}$$

$$= \text{Rs } 250000$$

c) Sales Vol required to earn a profit of Rs 2 per unit

~~=  $\frac{\text{FC}}{\text{Contribution per unit}}$~~

$$\text{BEP Units} = \frac{\text{FC}}{\text{Contribution per unit}}$$

$$\therefore \text{Contribution per unit} = \frac{\text{FC}}{\text{BEP units}}$$

$$\text{SP per unit} - \text{VC per unit} = \text{Contri per unit}$$

$$\text{SP per unit} = \text{Contri per unit} + \text{ve per unit}$$

$$\therefore \text{SP per unit} = \frac{\text{FC}}{\text{Desired B.E.P}} + \text{VC}$$

$$\therefore = \frac{\text{FC}}{\text{SP} - (\text{VC} + \text{P})}$$

$$= \frac{60000}{10 - (6+2)} = 30,000 \text{ units}$$

$$\text{Inv value} = \frac{\text{FC}}{1 - (\text{VC} + \text{DP})/\text{SP}}$$

$$= \frac{60000}{1 - (6+2)/10}$$

$$= \frac{60000}{2/10} = 3,00,000$$

- a) Sales volume required to earn a profit of 30% on sales

$$\frac{\text{FC}}{\text{SP} - (\text{VC} + 30\% \text{ of SP})}$$

$$= \frac{60000}{10 - (6+3)} = 60000 \text{ units.}$$

$$\text{In value} = \frac{FC}{1 - (VC + 30\% SP) / SP}$$

$$= \frac{60000}{1 - (6+3)/10} = \text{Rs } 600,000$$