DAYANANDA SAGAR COLLEGE OF ENGINEERING

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

ENGINEERING ECONOMICS
(18HS6ICEEM)

Faculty in charge:

Bindu Bhargavi S M
Asst. Professor, Dept. of ISE, DSCE

SYLLABUS

- **Depreciation:** Meaning of depreciation, Causes of Depreciation, methods of computing depreciation, Straight line method of depreciation, Declining balance method, Sum of year's digits method and Sinking fund method.

- **Breakeven analysis**: Introduction to breakeven analysis, calculation of BEQ, BEP, Numerical Exercises.

DEPRICIATION

- Depreciation is an accounting method of allocating the cost of a tangible or physical asset over its useful life or life expectancy.

- Depreciation represents how much of an asset's value has been used up.

- Depreciating assets helps companies earn revenue from an asset while expensing a portion of its cost each year the asset is in use.

- Depreciation allows a portion of the cost of a fixed asset to the revenue generated by the fixed asset

- Book Value

- Inputs required:
  - Useful life
  - Salvage value
  - Cost of the asset

- Importance of depreciation
  - **Depreciation** allows for companies to recover the cost of an asset when it was purchased.
  - The process allows for companies to cover the total cost of an asset over it's lifespan instead of immediately recovering the purchase cost
  - This allows companies to replace future assets using the appropriate amount of revenue.

- Causes
  - Internal
  - External

CAUSES OF DEPRECIATION

- Internal causes
  - Wear and tear
  - Depletion

- External causes
  - Obsolescence
  - Efflux of Time
  - Accident

- Other causes
  - Physical depreciation
  - Functional depreciation
  - Technological depreciation
  - Sudden failure
  - Depletion
  - Monetary depreciation

HOW DOES THE CAR VALUE DEPRECIATE OVER YEARS

100% The sharpest dip in the car value is in the first year of purchase

71%

65%

60%

55%

50%

45%

YEAR 0 YEAR 1 YEAR 2 YEAR 3 YEAR 4 YEAR 5 YEAR 6

METHODS OF DEPRECIATION

- Straight line method of depreciation

- Declining balance method of depreciation

- Sum of the years—digits method of depreciation

- Sinking-fund method of depreciation

- Service output method of depreciation

STRAIGHT LINE METHOD OF DEPRECIATION

- Straight line depreciation - common, simplest, method of calculating depreciation expense.

- Here the expense amount is the same every year over the useful life of the asset.

- A fixed sum is charged as the depreciation amount throughout the lifetime of an asset such that the accumulated sum at the end of the life of the asset is exactly equal to the purchase value of the asset.
  - *P = first cost of the asset,*
  - *F = salvage value of the asset,*
  - *n = life of the asset,*
  - *B_t = book value of the asset at the end of the period t,*
  - *D_t = depreciation amount for the period t.*
  - *$D_t = (P - F)/n$*
  - *$B_t = B_{t-1} - D_t = P - t \ [(P - F)/n]$*

A company has purchased an equipment whose first cost is Rs. 1,00,000 with an estimated life of eight years. The estimated salvage value of the equipment at the end of its lifetime is Rs. 20,000. Determine the depreciation charge and book value at the end of various years using the straight line method of depreciation.

- P = Rs. 1,00,000
- F = Rs. 20,000
- n = 8 years
- $D_t = (P - F)/n$
- = (1,00,000 – 20,000)/8
- = Rs. 10,000
- Here the value of D_t *is the same for all the years.*

End of year (t)	Depreciation (D_t)	Book value ($B_t = B_{t-1} - D_t$)
0		1,00,000
1	10,000	90,000
2	10,000	80,000
3	10,000	70,000
4	10,000	60,000
5	10,000	50,000
6	10,000	40,000
7	10,000	30,000
8	10,000	20,000

DECLINING BALANCE METHOD OF DEPRECIATION

- A constant percentage of the book value of the previous period of the asset will be charged as the depreciation amount for the current period.
- The book value at the end of the life of the asset may not be exactly equal to the salvage value of the asset
  - *P = first cost of the asset,*
  - *F = salvage value of the asset,*
  - *n = life of the asset,*
  - *B_t = book value of the asset at the end of the period t,*
  - *D_t = depreciation amount for the period t.*
  - *K = a fixed percentage*
  - *$K = 1 - (S/P)^{(1/N)}$*

$$D_t = K \times B_{t\text{-}1}$$

$$B_t = B_{t-1} - D_t = B_{t-1} - K \times B_{t-1}$$

$$= (1 - K) \times B_{t-1}$$

$$D_t = K(1 - K)^{t-1} \times P$$

$$B_t = (1 - K)^t \times P$$

End of year (n)	Depreciation (D_t)	Book value (B_t)
0		1,00,000.00
1	20,000.00	80,000.00
2	16,000.00	64,000.00
3	12,800.00	51,200.00
4	10,240.00	40,960.00
5	8,192.00	32,768.00
6	6,553.60	26,214.40
7	5,242.88	20,971.52
8	4,194.30	16,777.22

$$D_t = K(1 - K)^{t-1} \times P$$

$$D_5 = 0.2(1 - 0.2)^4 \times 1,00,000$$

$$= \text{Rs. } 8,192$$

SUM-OF-THE-YEARS-DIGITS METHOD OF DEPRECIATION

- It is assumed that the book value of the asset decreases at a decreasing rate.
- The rate of depreciation charge for the first year is assumed as the highest and then it decreases
- $D_t = Rate* (P – F)$
- $B_t = B_{t–1} – D_t$

$$D_t = \frac{n - t + 1}{n(n + 1)/2} (P - F)$$

$$B_t = (P - F) \frac{(n - t)}{n} \frac{(n - t + 1)}{(n + 1)} + F$$

P = Rs. 1,00,000

F = Rs. 20,000

n = 8 years

Sum = *n(n + 1)/2 = 8 9/2 = 36*

The rates for years 1–8, are respectively 8/36, 7/36, 6/36, 5/36, 4/36, 3/36, 2/36 and 1/36.

$$D_t = \text{Rate} \times (P - F)$$

$$B_t = B_{t-1} - D_t$$

End of year (n)	Depreciation (D_t)	Book value (B_t)
0		1,00,000.00
1	17,777.77	82,222.23
2	15,555.55	66,666.68
3	13,333.33	53,333.35
4	11,111.11	42,222.24
5	8,888.88	33,333.36
6	6,666.66	26,666.70
7	4,444.44	22,222.26
8	2,222.22	20,000.04

$D_t = \text{Rate} \times (P - F)$

$B_t = B_{t-1} - D_t$

SINKING FUND METHOD OF DEPRECIATION

- The book value decreases at increasing rates with respect to the life of the asset.

P = first cost of the asset,

F = salvage value of the asset

n = life of the asset,

i = rate of return compounded annually,

A = the annual equivalent amount,

B_t = the book value of the asset at the end of the period t, and

D_t = the depreciation amount at the end of the period t.

- The loss in value of the asset (P − F) is made available an the form of cumulative depreciation amount at the end of the life of the asset by setting up an equal depreciation amount (A) at the end of each period during the lifetime of the asset.

- A = (P − F) * [A/F, i, n]

- The fixed sum depreciated at the end of every time period earns an interest at the rate of i% compounded annually, and hence the actual depreciation amount will be in the increasing manner with respect to the time period

$$D_t = (P - F) \times (A/F, i, n) \times (F/P, i, t - 1) \qquad\qquad B_t = P - (P - F)\,(A/F, i, n)\,(F/A, i, t)$$

P = Rs. 1,00,000

F = Rs. 20,000

n = 8 years

i = 12%

A = (P – F) * [A/F, 12%, 8]

= (1,00,000 – 20,000) 0.0813

= Rs. 6,504

Depreciation at the end of year 1 (*D1) = Rs. 6,504.*

Depreciation at the end of year 2 (*D2) = 6,504 + 6,504 * 0.12*

= Rs. 7,284.48

Depreciation at the end of the year 3 (*D3)*

= 6,504 + (6,504 + 7,284.48) * .12

= Rs. 8,158.62

Depreciation at the end of year 4 (*D4)*

= 6,504 + (6,504 + 7,284.48 + 8,158.62) * 0.12

= Rs. 9,137.65

End of year t	Fixed depreciation (Rs.)	Net depreciation D_t (Rs.)	Book value B_t (Rs.)
0	6,504	–	1,00,000.00
1	6,504	6,504.00	93,496.00
2	6,504	7,284.48	86,211.52
3	6,504	8,158.62	78,052.90
4	6,504	9,137.65	68,915.25
5	6,504	10,234.17	58,681.08
6	6,504	11,462.27	47,218.81
7	6,504	12,837.74	34,381.07
8	6,504	14,378.27	20,002.80

$$B_t = B_{t-1} - D_t$$

BREAK EVEN ANALYSIS

- A break-even analysis is a financial tool which helps a company to determine the stage at which the company, or a new service or a product, will be profitable.

- It is the financial calculation for determining the number of products or services a company should sell or provide to cover its costs – fixed assets

- Break-even analysis is useful in studying the relation between the variable cost, fixed cost and revenue

- Analyzing different price levels relating to various levels of demand, the break-even analysis determines what level of sales are necessary to cover the company's total fixed costs

- **Break-Even Quantity** = Fixed Costs / (Sales Price Per Unit – Variable Costs Per Unit)

IMPORTANCE OF BREAKEVEN ANALYSIS

- Manages the size of units to be sold

- Budgeting and setting targets

- Manage the margin of safety

- Monitors and controls cost

- Helps to design pricing strategy

COMPONENTS OF BREAK-EVEN ANALYSIS

- Fixed costs
  - Also called as overhead costs
  - Includes interest, taxes, salaries, rent, depreciation costs, labour costs, energy costs.

- Variable costs
  - Increases or decreases in direct relation with the production volume
  - Includes cost of raw materials, packaging cost, fuel and other costs

ASSUMPTIONS OF BREAK EVEN ANALYSIS

- The total costs may be classified into fixed and variable costs. It ignores semi-variable cost.

- The cost and revenue functions remain linear

- The price of the product is assumed to be constant.

- The volume of sales and volume of production are equal

- The fixed costs remain constant over the volume under consideration.

- It assumes constant rate of increase in variable cost.

- It assumes constant technology and no improvement in labour efficiency

- The price of the product is assumed to be constant

- Changes in input prices are ruled out

LIMITATIONS OF BREAK EVEN ANALYSIS

- Everything is considered constant.

- Projecting the future with the help of past functions.

- assumption that the cost-revenue-output relationship is linear - over a small range of output – not useful for long range use

- Profits are a function of not only output, but also of other factors like technological change, improvement in the art of management

- Selling costs are specially difficult to handle break-even analysis.

- The simple form of a break-even chart makes no provisions for taxes, particularly corporate income tax

- Because of so many restrictive assumptions underlying the technique, computation of a breakeven point is considered an approximation rather than a reality

APPLICATIONS OF BREAK EVEN ANALYSIS

- Starting a new business

- Creating a new product

- Changing the business model

# ADVANTAGES OF BREAKEVEN ANALYSIS

- It helps to determine remaining/unused capacity of the company once the breakeven is reached

- It helps to determine the impact on profit on changing to automation from manual

- It helps to determine the change in profits if the price of a product is altered.

- It helps to determine the amount of losses that could be sustained if there is a sales downturn.

BENEFITS OF BREAKEVEN ANALYSIS

- Catch missing expenses

- Set revenue targets

- Make smarter decisions

- Fund your business

- Better pricing

- Cover fixed costs

BREAKEVEN POINT (BEP)

- The breakeven point is the level of production at which the costs of production equal the revenues for a product

- In investing, the breakeven point is said to be achieved when the market price of an asset is the same as its original cost

- Breakeven point is the production level at which total revenues for a product equal total expenses.

- the breakeven point is calculated by dividing the fixed costs of production by the price per unit minus the variable costs of production.
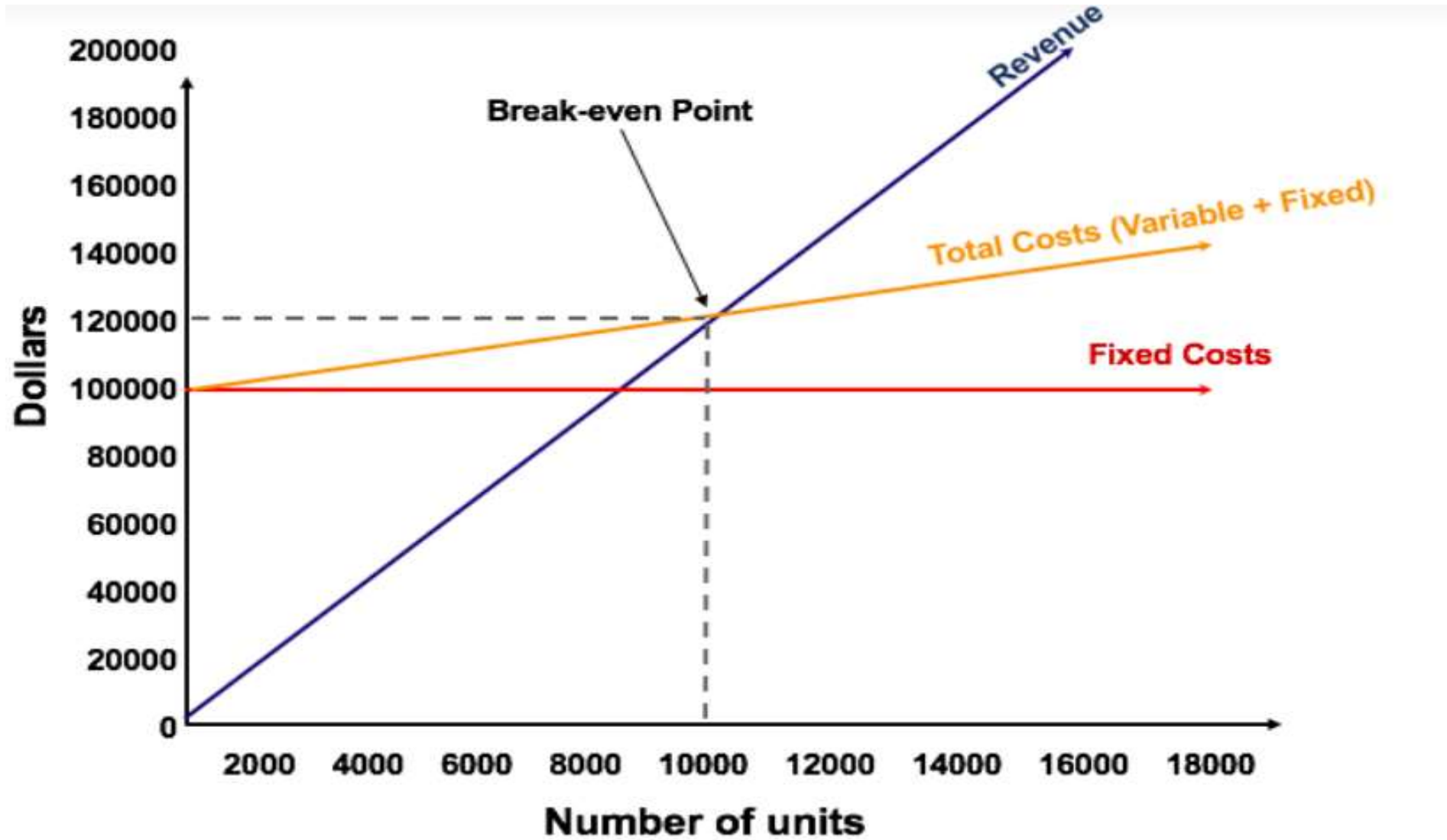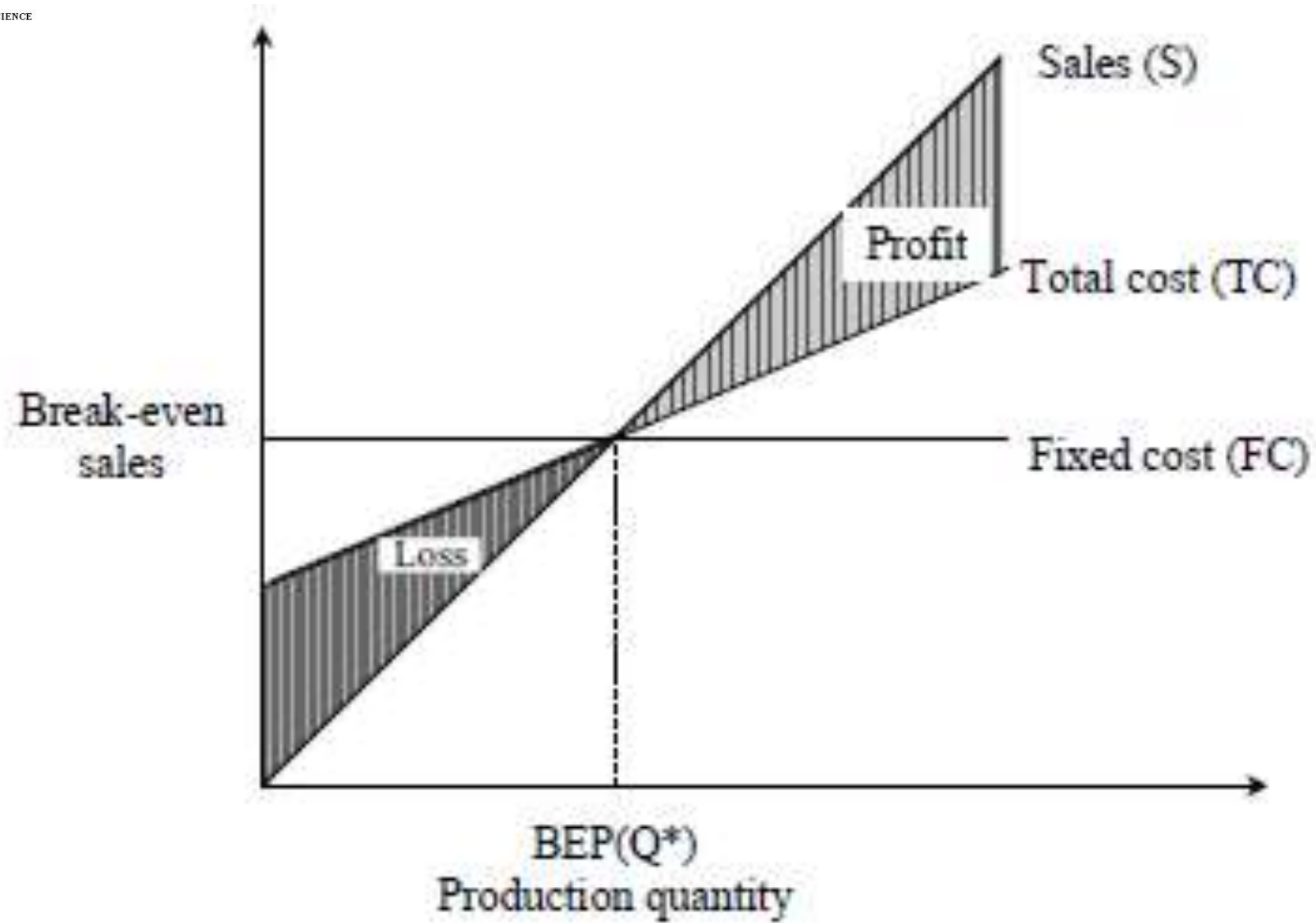
Let

s = selling price per unit

v = variable cost per unit

FC = fixed cost per period

Q = volume of production

The total sales revenue (*S) of the firm is given by*

$$S = s * Q$$

The total cost of the firm for a given production volume is given as

TC = Total variable cost + Fixed cost

$$= v * Q + FC$$

Profit = Sales – (Fixed cost + Variable costs)

$$= s * Q - (FC + v * Q)$$

The formulae to find the break-even quantity and break-even sales quantity

$$\text{Break-even quantity} = \frac{\text{Fixed cost}}{\text{Selling price/unit} - \text{Variable cost/unit}}$$

$$= \frac{FC}{s - v} \text{ (in units)}$$

$$\text{Break-even sales} = \frac{\text{Fixed cost}}{\text{Selling price/unit} - \text{Variable cost/unit}} \times \text{Selling price/unit}$$

$$= \frac{FC}{s - v} \times s \text{ (Rs.)}$$

The contribution is the difference between the sales and the variable costs. The margin of safety (M.S.) is the sales over and above the break-even sales. The formulae to compute these values are

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

$$\text{Contribution/unit} = \text{Selling price/unit} - \text{Variable cost/unit}$$

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

$$= \frac{\text{Profit}}{\text{Contribution}} \times \text{sales}$$

$$\text{M.S. as a per cent of sales} = (\text{M.S./Sales}) \times 100$$

- Alpha Associates has the following details:

Fixed cost = Rs. 20,00,000

Variable cost per unit = Rs. 100

Selling price per unit = Rs. 200

Find

(a) The break-even sales quantity,

(b) The break-even sales

(c) If the actual production quantity is 60,000, find (i) contribution; and

(ii) margin of safety by all methods.

- *Solution*

Fixed cost (*FC*) = Rs. 20,00,000

Variable cost per unit (*v*) = Rs. 100

Selling price per unit (*s*) = Rs. 200

(a) Break-even quantity $= \dfrac{FC}{s-v} = \dfrac{20,00,000}{200-100}$

$= 20,00,000/100 = 20,000$ units

(b) Break-even sales $= \dfrac{FC}{s-v} \times s$ (Rs.)

$= \dfrac{20,00,000}{200-100} \times 200$

$= \dfrac{20,00,000}{100} \times 200 = $ Rs. 40,00,000

(c)   (i) Contribution $=$ Sales $-$ Variable cost

$= s \times Q - v \times Q$

$= 200 \times 60,000 - 100 \times 60,000$

$= 1,20,00,000 - 60,00,000$

$= $ Rs. 60,00,000

(ii) Margin of safety

METHOD I

M.S. = Sales − Break-even sales

$$= 60,000 \times 200 - 40,00,000$$

$$= 1,20,00,000 - 40,00,000 = Rs.\ 80,00,000$$

METHOD II

$$M.S. = \frac{Profit}{Contribution} \times Sales$$

$$Profit = Sales - (FC + v \times Q)$$

$$= 60,000 \times 200 - (20,00,000 + 100 \times 60,000)$$

$$= 1,20,00,000 - 80,00,000$$

$$= Rs.\ 40,00,000$$

$$M.S. = \frac{40,00,000}{60,00,000} \times 1,20,00,000 = Rs.\ 80,00,000$$

$$M.S.\ \text{as a per cent of sales} = \frac{80,00,000}{1,20,00,000} \times 100 = 67\%$$

Calculate Break-Even Point from the following particulars.

Fixed expenses Rs.1, 50,000

Variable cost per unit Rs.10

Selling price per unit Rs.15

Solution:

$$B.E.P\,(in\ units) = \frac{Fixed\ expenses}{Contribution\ per\ unit}$$

Contribution per unit =   Selling price per unit. − Variable cost per unit
$$=Rs.15 - Rs.10 = Rs.5$$

$$B.E.P\,(in\ units) = \frac{Rs\ 1,50,000}{Rs\ 5} = 30,000\ Units$$

B.E.P. (Rs) = B.E.P. in units x Selling price per unit
            = 30,000 x Rs.15
            = Rs.4, 50,000

Calculate Break-even point:

	Rs.
Sales	6, 00,000
Fixed expenses	1, 50,000
Variable costs:	
Direct Material	2, 00,000
Direct Labour	1, 20,000
Other Variable expenses	80,000

Solution:

$$B.E.P\,(in\ units) = \frac{Fixed\ expenses}{Contribution\ per\ unit}\,x\ Sales$$

Contribution = Sales − Variable cost

= Rs.6, 00,000 − Rs.4, 00,000 = Rs.2, 00,000

$$= \frac{Rs\ 1,50,000}{Rs\ 2,00,000}\,x\ 6,00,000 = Rs\ 4,50,000$$

From the following particulars find out the B.E.P. What will be the selling price per unit if B.E.P. is to be brought down to 9,000 units?

	Rs.
Variable cost per unit	75
Fixed expenses	2, 70,000
Selling price per unit	100

Solution:

$$B.E.P(in\ units) = \frac{Fixed\ expenses}{Contribution\ per\ unit}$$

Contribution = Selling price per unit. – Variable cost per unit.

$$= Rs.100 - Rs.75 = Rs.25$$

$$B.E.P(in\ units) = \frac{Rs\ 2,70,000}{Rs\ 25} = 10,800\ Units$$

If break-even point is brought down to 9,000 units, fixed expenses are to be recovered from 9,000 units to have no profit and no loss.

$$Fixed\ expenses\ per\ unit = \frac{Fixed\ expenses}{Number\ of\ units}$$

$$= \frac{Rs\ 2,70,000}{9,000} = Rs\ 30$$

When B.E.P. is 9,000 units, selling price per unit is calculated as follows:

Selling price = Fixed expenses + Variable expenses per unit.

$$= \quad Rs.30 \quad + \quad Rs.75 \quad = \quad Rs.105$$

Krishna Company Ltd. has the following details:

Fixed cost = Rs. 40,00,000

Variable cost per unit = Rs. 300

Selling price per unit = Rs. 500

Find

(a) The break-even sales quantity

(b) The break-even sales

(c) If the actual production quantity is 1,20,000, find the following:

      (i) Contribution

      (ii) Margin of safety by all methods

Consider the following data of a company for the year 1998

Sales = Rs. 2,40,000

Fixed cost = Rs. 50,000

Variable cost = Rs. 75,000

Find the following:

(a) Contribution

(b) Profit

(c) BEP

(d) Margin of safety

Consider the following data of a company for the year 1997

Sales = Rs. 1,20,000

Fixed cost = Rs. 25,000

Variable cost = Rs. 45,000

Find the following:

(a) Contribution

(b) Profit

(c) BEP

(d) M.S.

From the following information relating to Quick Standard Ltd., you are required to find out

(a) P.V. ratio

(b) Break even point

(c) Profit

(d) Margin of safety

Total Fixed Costs	Rs. 4,500
Total Variable cost	Rs7,500
Total sales	Rs15,000

(e) Also Calculate the Volume of sales to earn profit of Rs.6, 000.

BREAK-EVEN ANALYSIS

The main objective of break-even analysis is to find the cut-off production volume from where a firm will make profit. Let

s = selling price per unit
v = variable cost per unit
FC = fixed cost per period
Q = volume of production

The total sales revenue (S) of the firm is given by the following formula:

$$S = s \times Q$$

The total cost of the firm for a given production volume is given as

$$TC = \text{Total variable cost} + \text{Fixed cost}$$
$$= v \times Q + FC$$

The linear plots of the above two equations are shown in Fig. 1.3. The intersection point of the total sales revenue line and the total cost line is called
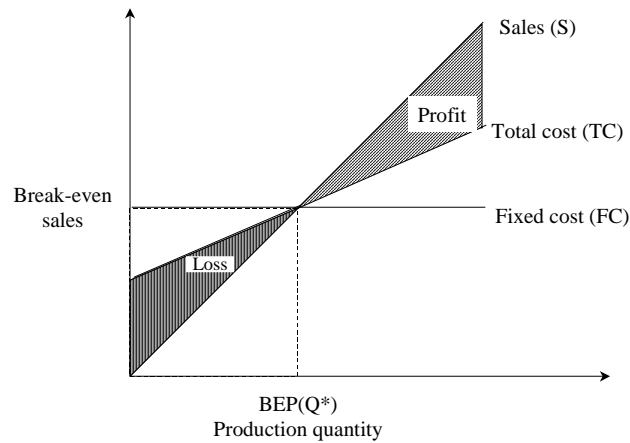

Fig. 1.3   Break-even chart.

the break-even point. The corresponding volume of production on the *X*-axis is known as the break-even sales quantity. At the intersection point, the total cost is equal to the total revenue. This point is also called the no-loss or no-gain situation. For any production quantity which is less than the break-even quantity, the total cost is more than the total revenue. Hence, the firm will be making loss.

For any production quantity which is more than the break-even quantity, the total revenue will be more than the total cost. Hence, the firm will be making profit.

$$\text{Profit} = \text{Sales} - (\text{Fixed cost} + \text{Variable costs})$$
$$= s \times Q - (FC + v \times Q)$$

The formulae to find the break-even quantity and break-even sales quantity

$$\text{Break-even quantity} = \frac{\text{Fixed cost}}{\text{Selling price/unit} - \text{Variable cost/unit}}$$

$$= \frac{FC}{s - v} \text{ (in units)}$$

$$\text{Break-even sales} = \frac{\text{Fixed cost}}{\text{Selling price/unit} - \text{Variable cost/unit}} \times \text{Selling price/unit}$$

$$= \frac{FC}{s - v} \times s \text{ (Rs.)}$$

The contribution is the difference between the sales and the variable costs. The margin of safety (M.S.) is the sales over and above the break-even sales. The formulae to compute these values are

$$\text{Contribution} = \text{Sales} - \text{Variable costs}$$
$$\text{Contribution/unit} = \text{Selling price/unit} - \text{Variable cost/unit}$$
$$\text{M.S.} = \text{Actual sales} - \text{Break-even sales}$$
$$= \frac{\text{Profit}}{\text{Contribution}} \times \text{sales}$$

$$\text{M.S. as a per cent of sales} = (\text{M.S./Sales}) \times 100$$

EXAMPLE 1.1 Alpha Associates has the following details:

Fixed cost = Rs. 20,00,000
Variable cost per unit = Rs. 100
Selling price per unit = Rs. 200

Find
(a) The break-even sales quantity,
(b) The break-even sales
(c) If the actual production quantity is 60,000, find (i) contribution; and (ii) margin of safety by all methods.

Solution
Fixed cost (FC) = Rs. 20,00,000
Variable cost per unit (v) = Rs. 100
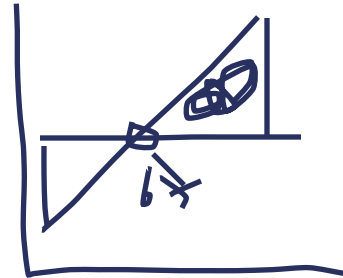Selling price per unit (s) = Rs. 200

(a) Break-even quantity $= \dfrac{FC}{s-v} = \dfrac{20,00,000}{200-100}$

$= 20,00,000/100 = 20,000$ units

(b) Break-even sales $= \dfrac{FC}{s-v} \times s$ (Rs.)

$= \dfrac{20,00,000}{200-100} \times 200$

$= \dfrac{20,00,000}{100} \times 200 = $ Rs. 40,00,000

(c) (i) Contribution $=$ Sales $-$ Variable cost

$= s \times Q - v \times Q$

$= 200 \times 60,000 - 100 \times 60,000$

$= 1,20,00,000 - 60,00,000$

$= $ Rs. 60,00,000

(ii) Margin of safety

METHOD I

M.S. $=$ Sales $-$ Break-even sales

$= 60,000 \times 200 - 40,00,000$

$= 1,20,00,000 - 40,00,000 = $ Rs. 80,00,000

METHOD II

M.S. $= \dfrac{\text{Profit}}{\text{Contribution}} \times$ Sales

Profit $=$ Sales $- (FC + v \times Q)$

$= 60,000 \times 200 - (20,00,000 + 100 \times 60,000)$

$= 1,20,00,000 - 80,00,000$

$= $ Rs. 40,00,000

M.S. $= \dfrac{40,00,000}{60,00,000} \times 1,20,00,000 = $ Rs. 80,00,000

M.S. as a per cent of sales $= \dfrac{80,00,000}{1,20,00,000} \times 100 = 67\%$

PROFIT/VOLUME RATIO (*P/V* RATIO)

P/V ratio is a valid ratio which is useful for further analysis. The different formulae for the *P/V* ratio are as follows:

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

The relationship between BEP and *P/V* ratio is as follows:

$$\text{BEP} = \frac{\text{Fixed cost}}{P/V \text{ ratio}}$$

The following formula helps us find the M.S. using the *P/V* ratio:

$$\text{M.S.} = \frac{\text{Profit}}{P/V \text{ ratio}}$$

EXAMPLE 1.2 Consider the following data of a company for the year 1997:

Sales = Rs. 1,20,000

Fixed cost = Rs. 25,000

Variable cost = Rs. 45,000

Find the following:

(a) Contribution
(b) Profit
(c) BEP
(d) M.S.

Solution

(a) Contribution = Sales – Variable costs

= Rs. 1,20,000 – Rs. 45,000

= Rs. 75,000

(b) Profit = Contribution – Fixed cost

= Rs. 75,000 – Rs. 25,000

= Rs. 50,000

(c) BEP

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

$$= \frac{75,000}{1,20,000} \times 100 = 62.50\%$$

$$\text{BEP} = \frac{\text{Fixed cost}}{P/V \text{ ratio}} = \frac{25{,}000}{62.50} \times 100 = \text{Rs. } 40{,}000$$

$$\text{M.S.} = \frac{\text{Profit}}{P/V \text{ ratio}} = \frac{50{,}000}{62.50} \times 100 = \text{Rs. } 80{,}000$$

EXAMPLE 1.3   Consider the following data of a company for the year 1998:

Sales = Rs. 80,000
Fixed cost = Rs. 15,000
Variable cost = 35,000

Find the following:

(a) Contribution
(b) Profit
(c) BEP
(d) M.S.

Solution

(a) Contribution = Sales – Variable costs
    = Rs. 80,000 – Rs. 35,000
    = Rs. 45,000

(b) Profit = Contribution – Fixed cost
    = Rs. 45,000 – Rs. 15,000
    = Rs. 30,000

(c) BEP

$$P/V \text{ ratio} = \frac{\text{Contribution}}{\text{Sales}} = \frac{45{,}000}{80{,}000} \times 100 = 56.25\%$$

$$\text{BEP} = \frac{\text{Fixed cost}}{P/V \text{ ratio}} = \frac{15{,}000}{56.25} \times 100 = \text{Rs. } 26{,}667$$

(d) $\text{M.S.} = \dfrac{\text{Profit}}{P/V \text{ ratio}} = \dfrac{30{,}000}{56.25} \times 100 = \text{Rs. } 53{,}333.33$

1. Krishna Company Ltd. has the following details:

   Fixed cost = Rs. 40,00,000
   Variable cost per unit = Rs. 300
   Selling price per unit = Rs. 500

   Find

   (a) The break-even sales quantity
   (b) The break-even sales
   (c) If the actual production quantity is 1,20,000, find the following:

      (i) Contribution
      (ii) Margin of safety by all methods

2. Consider the following data of a company for the year 1998.

   Sales = Rs. 2,40,000
   Fixed cost = Rs. 50,000
   Variable cost = Rs. 75,000

   Find the following:

   (a) Contribution
   (b) Profit
   (c) BEP
   (d) Margin of safety