BREAK EVEN ANALYSIS

INTRODUCTION

- **Break-even analysis** is of vital importance in determining the practical application of cost functions. It is a function of three factors, i.e. sales volume, cost and profit. It aims at classifying the dynamic relationship existing between total cost and sale volume of a company.

- **It** is also used to determine when your business will be able to cover all its expenses and begin to make a profit.

- It is also known as **"cost-volume-profit analysis"**.

- It helps to know the operating condition that exists when a company 'breaks-even', that is when sales reach a point equal to all expenses incurred in attaining that level of sales.

- This concept has been proved highly useful to the company executives in profit forecasting and planning and also in examining the effect of alternative business management decisions.

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1. Break-Even Point

2. Determination of Break-even Point

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BEP

- Break-even point represents that volume of production where total costs equal to total sales revenue resulting into a no-profit no-loss situation.

- If output of any product falls below that point there is loss; and if output exceeds that point there is profit.

- Thus, it is the minimum point of production where total costs are recovered. Therefore, at break-even point.

BEP

- The break-even point (B.E.P.) of a firm can be found out in two ways. It may be determined in terms of **physical units**, i.e., **volume of output** or it may be determined in terms of **money value**, i.e., **value of sales**.

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Output in units	Total Revenue	Total Fixed Cost	Total Variable Cost	Total Cost
0	0	150	0	150
50	200	150	150	300
100	400	150	300	450
150	**600**	**150**	**450**	**600 BEP**
200	800	150	600	750
250	1000	150	750	900
300	1200	150	900	1050

ASSUMPTIONS – UNDERLYING BEA

☐ The break-even analysis is based on certain assumptions.

(i)   All costs can be separated into fixed and variable components,

(ii)   Fixed costs will remain constant at all volumes of output,

(iii) Variable costs will fluctuate in direct proportion to volume of output,

(iv)   Selling price will remain constant,

(v)   Product-mix will remain unchanged,

(vi) The number   of units   of sales   will   coincide   with the units produced so that there is no opening or closing stock,

(vii)   Productivity per worker will remain unchanged,

(viii)   There will be no change in the general price level.

- Some assumptions are made in illustrating the BEP. The price of the commodity is kept constant at Rs. 4 per unit, i.e., perfect competition is assumed. Therefore, the total revenue is increasing proportionately to the output. All the units of the output are sold out. The total fixed cost is kept constant at Rs. 150 at all levels of output.

- The total variable cost is assumed to be increasing by a given amount throughout. From the Table we can see that when the output is zero, the firm incurs only fixed cost. When the output is 50, the total cost is Rs. 300. The total revenue is Rs. 200. The firm incurs a loss of Rs. 100.

- Similarly when the output is 100 the firm incurs a loss of Rs. 50. At the level of output 150 units, the total revenue is equal to the total cost. At this level, the firm is working at a point where there is no profit or loss. From the level of output of 200, the firm is making profit

BREAK – EVEN CHART

- Break-Even charts are being used in recent years by the managerial economists, company executives and government agencies in order to find out the break-even point. In the break-even charts, the concepts like total fixed cost, total variable cost, and the total cost and total revenue are shown separately. The break even chart shows the extent of profit or loss to the firm at different levels of activity. The following Fig. illustrates the typical bre
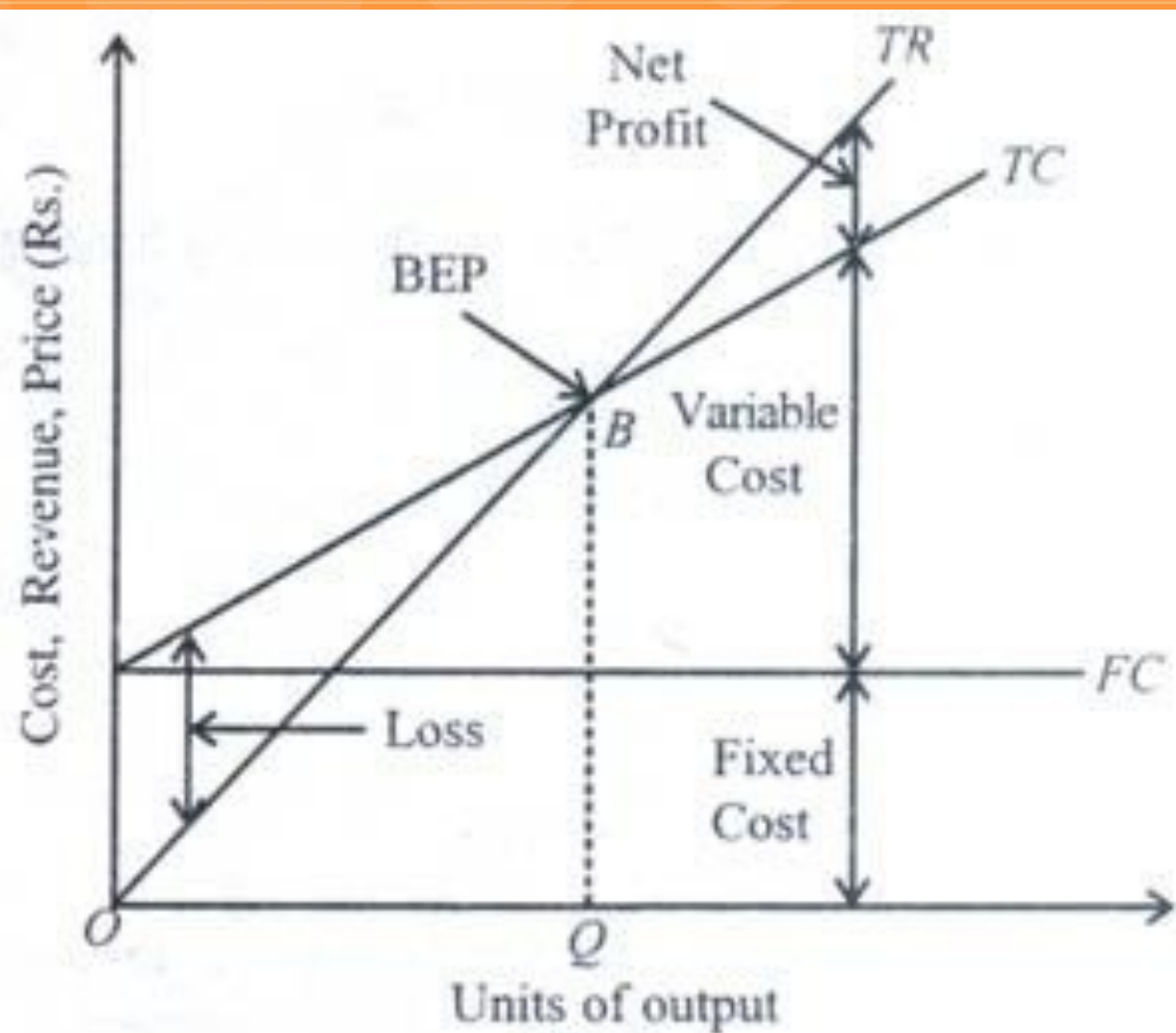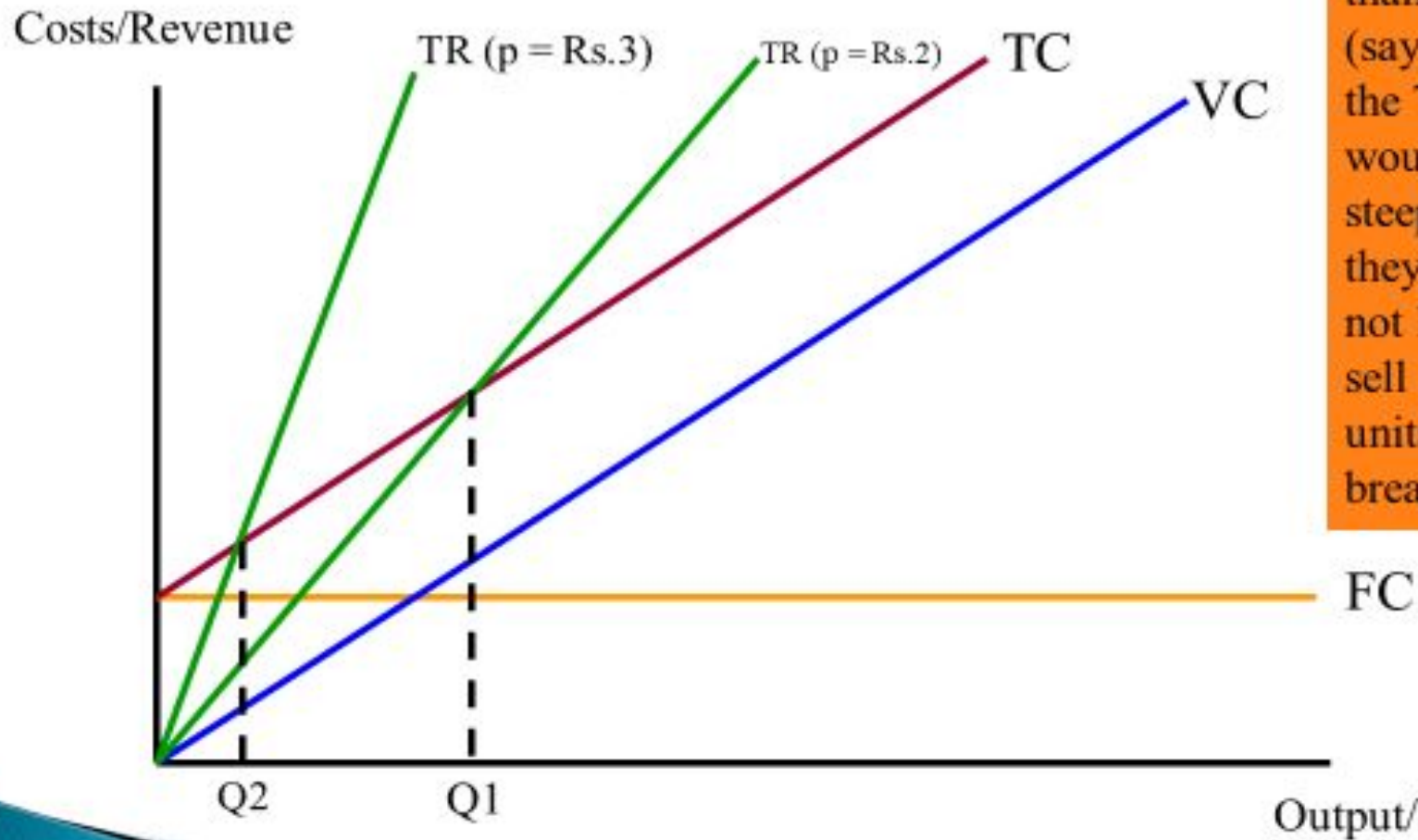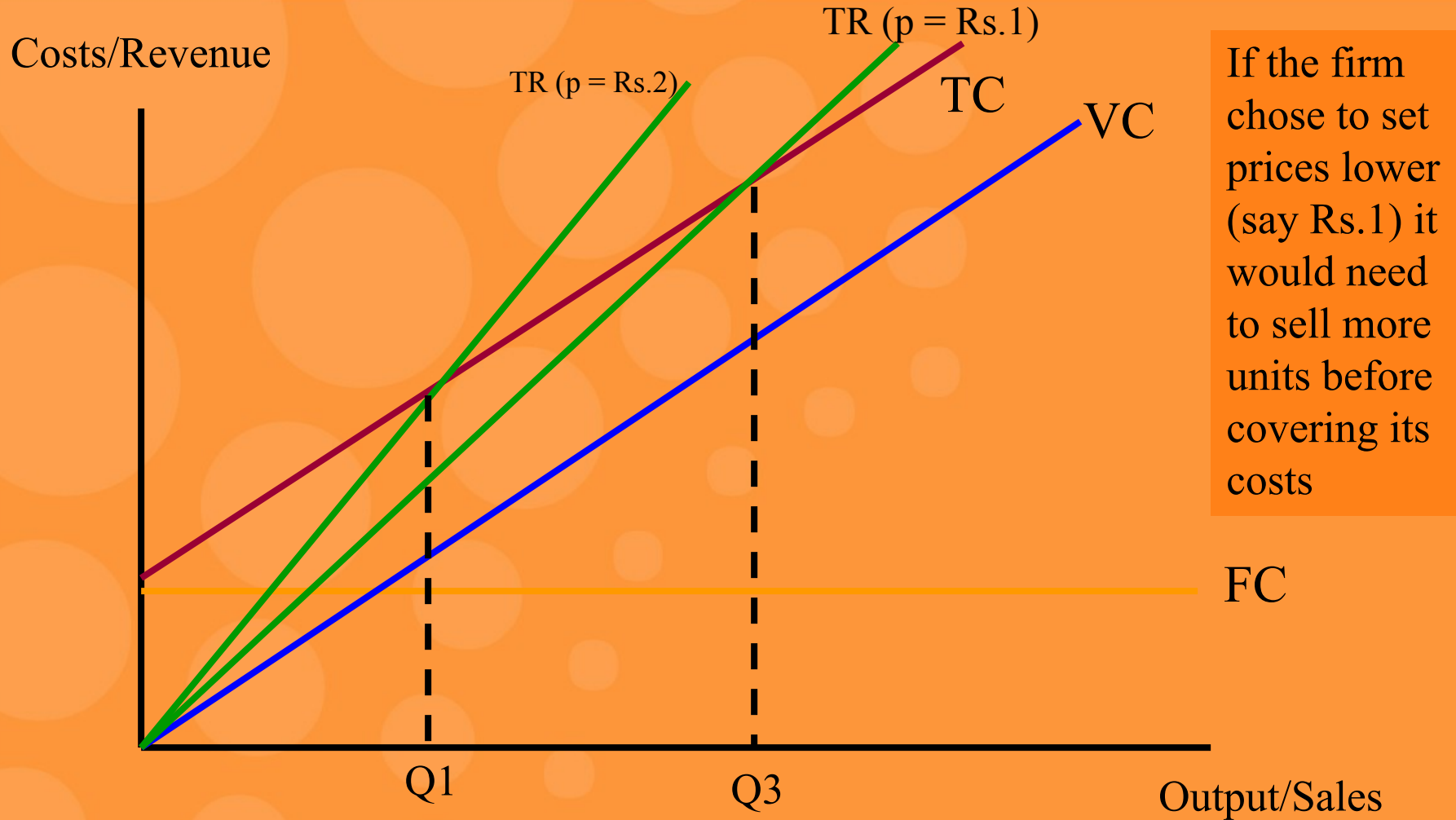
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Fig. 1.

Break-Even Analysis

Costs/Revenue

TR (p = Rs.3)   TR (p = Rs.2)   TC

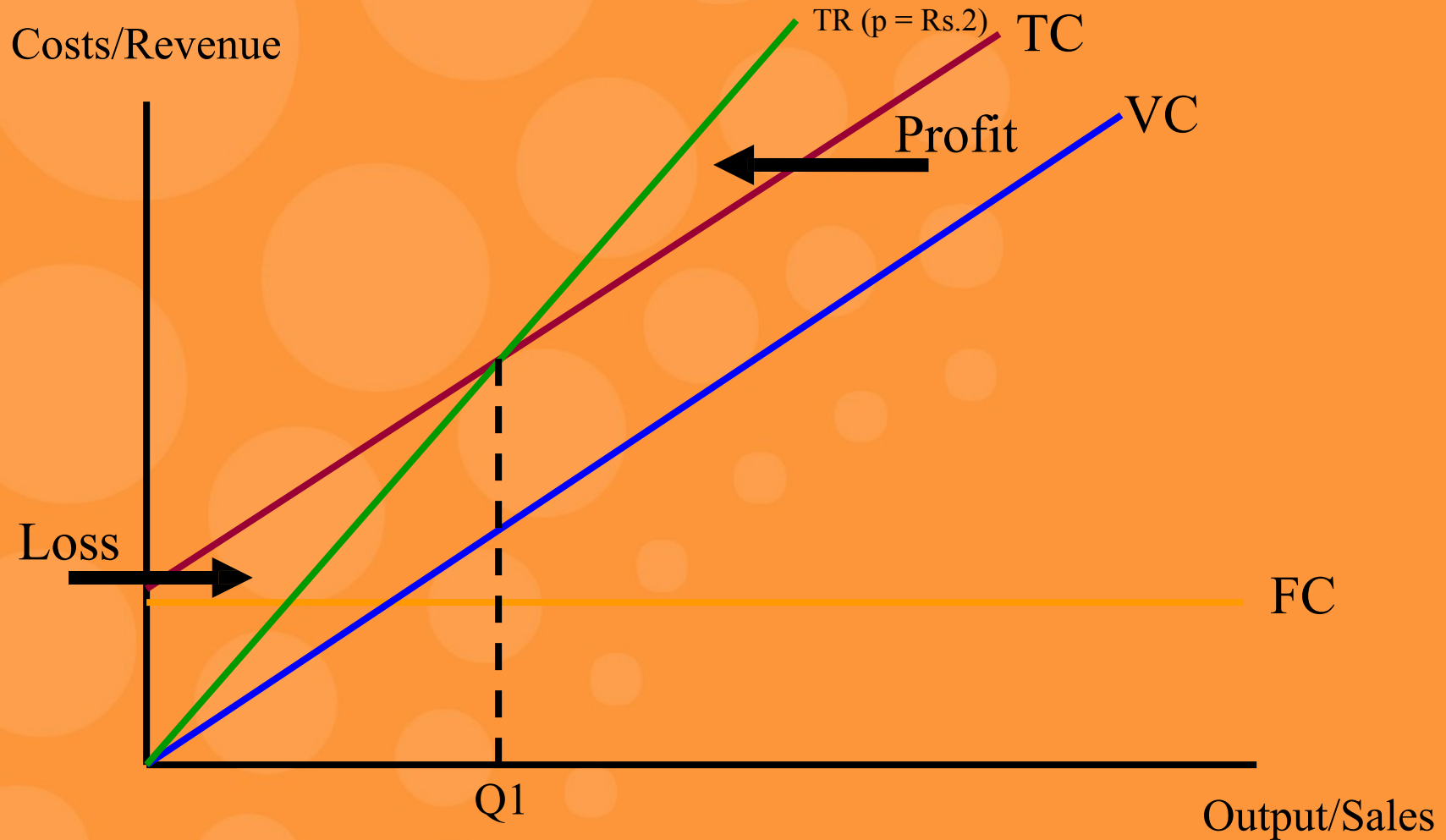VC

FC

Q2   Q1

Output/Sales

If the firm chose to set price higher than Rs.2 (say Rs.3) the TR curve would be steeper – they would not have to sell as many units to break even

Break-Even Analysis

Costs/Revenue

TR (p = Rs.1)

TR (p = Rs.2)

TC

VC

FC

Q1

Q3

Output/Sales

If the firm chose to set prices lower (say Rs.1) it would need to sell more units before covering its costs

Break-Even Analysis

DETERMINATION OF BEP

- The formula for calculating the _break-even point_ is

  BEP = Total Fixed Cost/Contribution Margin Per Unit

- _Contribution margin_ per unit can be found out by deducting the average variable cost from the selling price. So the formula will be

  BEP = Total Fixed Cost/Selling Price – AVC

- Example:

- Suppose the fixed cost of a factory in Rs. 10,000, the selling price is Rs. 4 and the average variable cost is Rs. 2, so the break-even point would be

- BEP = 10,000/(4-2) = 5,000 units.

- It means if the company makes the sales of 5,000 units, it would make neither loss nor profit. This can be seen in the analysis.

Sales = Rs.20, 000

Cost of goods sold:
(a) Variable cost at Rs.2 = Rs. 10,000
(b) Fixed costs = Rs. 10,000

Total Cost = Rs. 20,000

Net Profit = Nil

BEP IN TERMS OF SALES VALUE

- Multi-product firms are not in a position to measure the break-even point in terms of any common unit of product. They find it convenient to determine the break-even point in terms of total rupee sales. Here again the break-even point would be where the contribution margin (sales value - variable costs) would be equal to fixed costs. The contribution margin however, is expressed as a ratio to sales. The formula for calculating the break-even point is

- *BEP = Fixed Cost/Contribution Ratio*

Contribution Ratio (CR) =

Total Revenue (TR)-Total Variable Cost (TVC)/Total Revenue (TR)

- For example, if TR is Rs. 600 and TVC is Rs. 450 & TFC is 150, then the contribution ratio is

$$\text{CR} = 600 - 450/600 = 150/ 600 = 0.25$$

- The Contribution Ratio is 0.25

BEP = Total Fixed Cost /Contribution Ratio = 150/0.25 = 600

- The firm achieves its BEP when its sales are Rs. 600
- Total Revenue = Rs.600
- Total Cost = Rs.600
- Net Profit/loss = Nil

USES OF BEA

(i) It helps in the determination of selling price which will give the desired profits.

(ii) It helps in the fixation of sales volume to cover a given return on capital employed.

(iii) It helps in forecasting costs and profit as a result of change in volume.

(iv) It gives suggestions for shift in sales mix.

(v) It helps in making inter-firm comparison of profitability.

(vi)   It helps in determination of costs and revenue at various levels of output.

(vii)   It is an aid in management decision-making (e.g., make or buy, introducing a product etc.), forecasting, long-term planning and maintaining profitability.

(viii)   It reveals business strength and profit earning capacity of a concern without much difficulty and effort.

MANAGERIAL USES OF BEA

- To the management, the utility of break-even analysis lies in the fact that it presents a microscopic picture of the profit structure of a business enterprise. The break-even analysis not only highlights the area of economic strength and weakness in the firm but also sharpens the focus on certain leverages which can be operated upon to enhance its profitability.

- It guides the management to take effective decision in the context of changes in government policies of taxation and subsidies.

(i) Safety Margin:

- Safety Margin= (Sales – BEP)/ Sales x 100

- From the numerical example at the level of 250 units of output and sales, the firm is earning profit, the safety margin can be found out by applying the formula

- Safety Margin = 250- 150 / 250 x 100 = 40%

- This means that the firm which is now selling 250 units of the product can afford to decline sales up to 40 per cent. The margin of safety may be negative as well, if the firm is incurring any loss. In that case, the percentage tells the extent of sales that should be increased in order to reach the point where there will be no loss.

Break-Even Analysis

Costs/Revenue

TR (p = Rs. 3)   TR (p = Rs. 2)   TC

VC

Margin of Safety

FC

Q3   Q1   Q2

Output/S
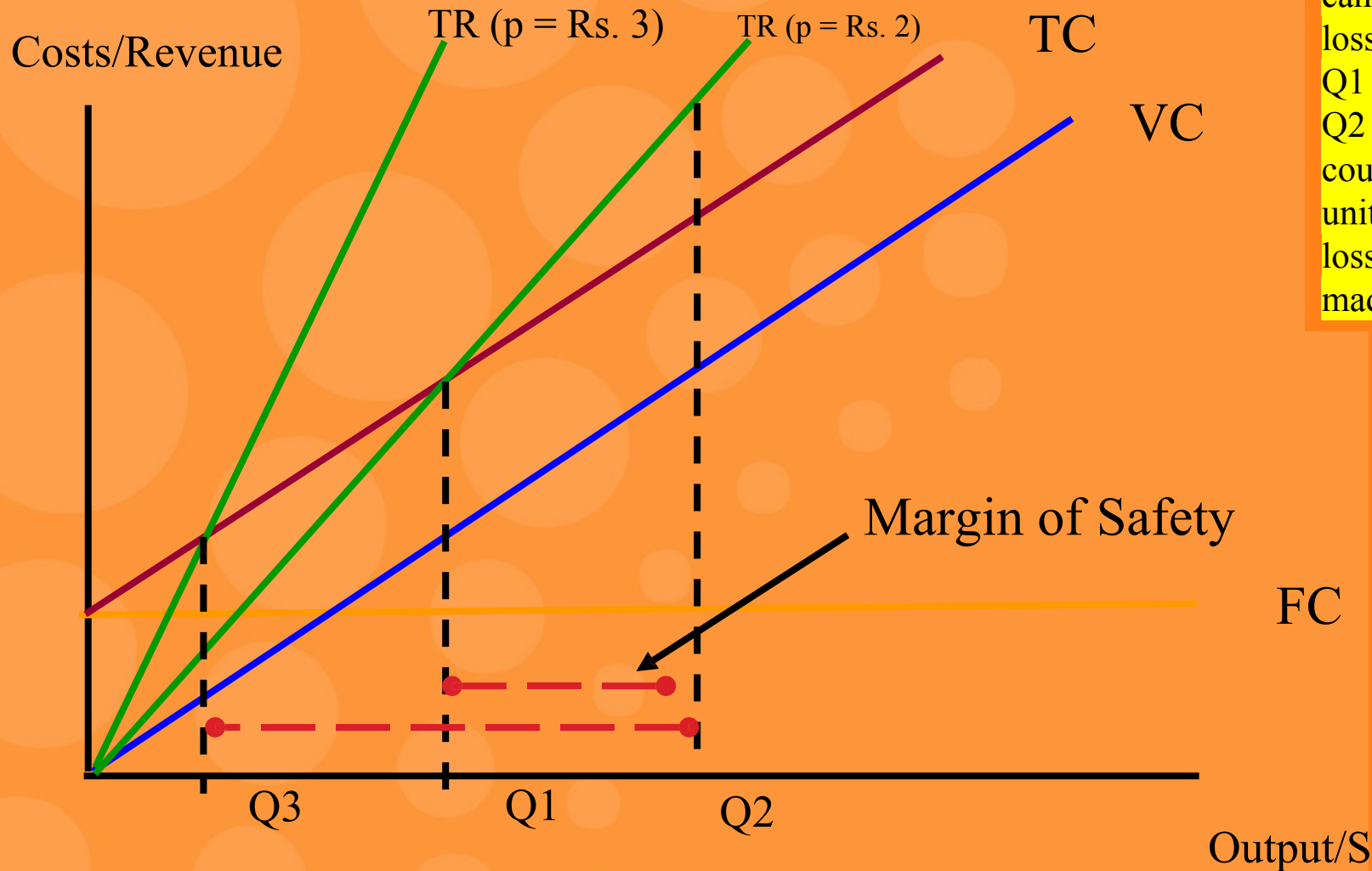
Margin of safety shows how far sales can fall before losses made. If Q1 = 1000 and Q2 = 1800, sales could fall by 800 units before a loss would be made

A higher price would lower the break even point and the margin of safety would widen

(ii) Target Profit:

- By way of illustration, Suppose the firm fixes the profit as Rs. 100, then the volume of output and sales should be 250 units. Only at this level, it gets a profit of Rs. 100. By using the formula, the same result will be obtained.

- *Target Sales Volume = Fixed Cost + Target Profit / Contribution Margin per unit = 150 + 100 / 4-2 = 125 units (125*2 VC) (150 FC) TC = 400 TR = 125*4 = 500*

(iii) Change in Price:

- The formula for determining the new volume of sales to maintain the same profit, given a reduction in price, will be as follows:

- *New Sales Volume = Total Fixed Cost + Total Profit/ New Selling price – Average Variable Cost*

- For example, suppose a firm has a fixed cost of Rs. 8,000 and the profit target is Rs.20,000. If the sales price is Rs.8 and the average variable cost is Rs. 4, then the total volume of sales should be 7,000 units on the basis of the formula given under target price.

- Suppose the firm decides to reduce the selling price from Rs.8 to Rs. 7, then the new sales volume should be on the basis of the above formula:

- New Sales Volume = 8,000 + 20,000/7-4 = 9,333

- From this, we can infer that by reducing the price from Rs. 8 to Rs. 7, the firm has to increase the sales from Rs. 7,000 to Rs 9,333 if it wants to maintain the target profit of Rs. 20,000. In the same way, the sales executive can calculate the new volume of sales if it increases the price.

(iv) Change in Costs:

(i)Change in variable cost

- The contribution margin is Rs. 64,000, the present sale price is Rs.10 and the present variable cost is Rs.6. If the variable cost per unit goes up from Rs.6 to Rs. 7, what will be the new sales volume and price?
- New Sales Volume = 64,000/ 10-7 = 64,000 /3 = 21,300 units
- New Sales Price = (10+7-6) = Rs. 11.

(ii) Change in fixed cost

- The fixed cost of a firm increases from Rs. 5,000 to Rs. 6,000. The variable cost is Rs. 5 and the sale price is Rs. 10 and the firm sells 1,000 units of the product
- New Sales Volume = 1,000 + 6,000 – 5,000/ 10 – 5
 =1,000 + 1,000/ 5 = 1,000 + 200=1,200 units

  - New Sale Price = 10 + 6,000 – 5,000/ 1,000 = 10 + 1,000/ 1,000 = Rs.10 + Re1 = Rs. 11

(v) Decision on Choice of Technique of Production:

☐ For example, for low levels of output, some conventional methods may be most probable as they require minimum fixed cost. For high levels of output, only automatic machines may be most profitable. By showing the cost of different alternative techniques at different levels of output, the break-even analysis helps the decision of the choice among these techniques.

(vi) Make or Buy Decision:

A manufacturer of car buys a certain components at Rs. 20 each. In case he makes it himself, his fixed and variable cost would be Rs. 24,000 and Rs.8 per component respectively.

BEP = Fixed Cost/ Purchase Price – Variable Cost

$= 24,000/ 20-8 = 24,000/ 12 = 2,000$ units

LIMITATIONS OF BEA

1. In the break-even analysis, we keep everything constant. The selling price is assumed to be constant and the cost function is linear. In practice, it will not be so.

2. In the break-even analysis since we keep the function constant, we project the future with the help of past functions. This is not correct.

3. The assumption that the cost-revenue-output relationship is linear is true only over a small range of output. It is not an effective tool for long-range use.

4. Profits are a function of not only output, but also of other factors like technological change, improvement in the art of management, etc., which have been overlooked in this analysis.

5. When break-even analysis is based on accounting data, as it usually happens, it may suffer from various limitations of such data as neglect of imputed costs, arbitrary depreciation estimates and inap-propriate allocation of overheads. It can be sound and useful only if the firm in question maintains a good accounting system.

6. Selling costs are specially difficult to handle break-even analysis. This is because changes in selling costs are a cause and not a result of changes in output and sales.

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

8. It usually assumes that the price of the output is given. In other words, it assumes a horizontal demand curve that is realistic under the conditions of perfect competition.

9. Matching cost with output imposes another limitation on break-even analysis. Cost in a particu-lar period need not be the result of the output in that period.

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

THANKYOU