

CH2404 Process Economics

Unit – II

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Manufacturing Cost

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Determining Cost of Production

- The total annual cost of producing a product is traditionally considered to have two components, **fixed cost** and **variable cost**.
- The major components of any **fixed cost** are as follows:
 1. Fixed charges on plants and property
 - Depreciation
 - Property taxes
 - Insurance
 - Rent paid to others
 2. Overhead costs: medical, safety and protection, general plant overhead, payroll overhead, cafeteria, recreation, control laboratories, supervision
 3. Administrative expenses: executive salaries, engineering salaries, research and development, general office expenses

Determining Cost of Production (contd.)

- **Variable costs** (VC) are those costs associated with producing and selling the product, which depend upon the rate of production. The major components of the VC are as follows:
 1. Direct production costs
 - Raw materials
 - Operating labor
 - Power and utilities
 - Maintenance
 - Operating supplies (i.e., catalysts, solvents, etc.)
 - Laboratory charges
 2. Distribution and marketing expenses: sales offices, salesperson wages and expenses, shipping, advertising, marketing, and technical sales

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Determining Cost of Production (contd.)

- It is frequently useful to express the variable cost VC as a function of the plant annual production rate q . A useful functional relationship often used is

$$VC(q) = aq + bq^n$$

- The total cost of production TC for producing a particular amount q of a product is simply the sum of the fixed and variable costs at that production rate:

$$TC = FC + VC(q)$$

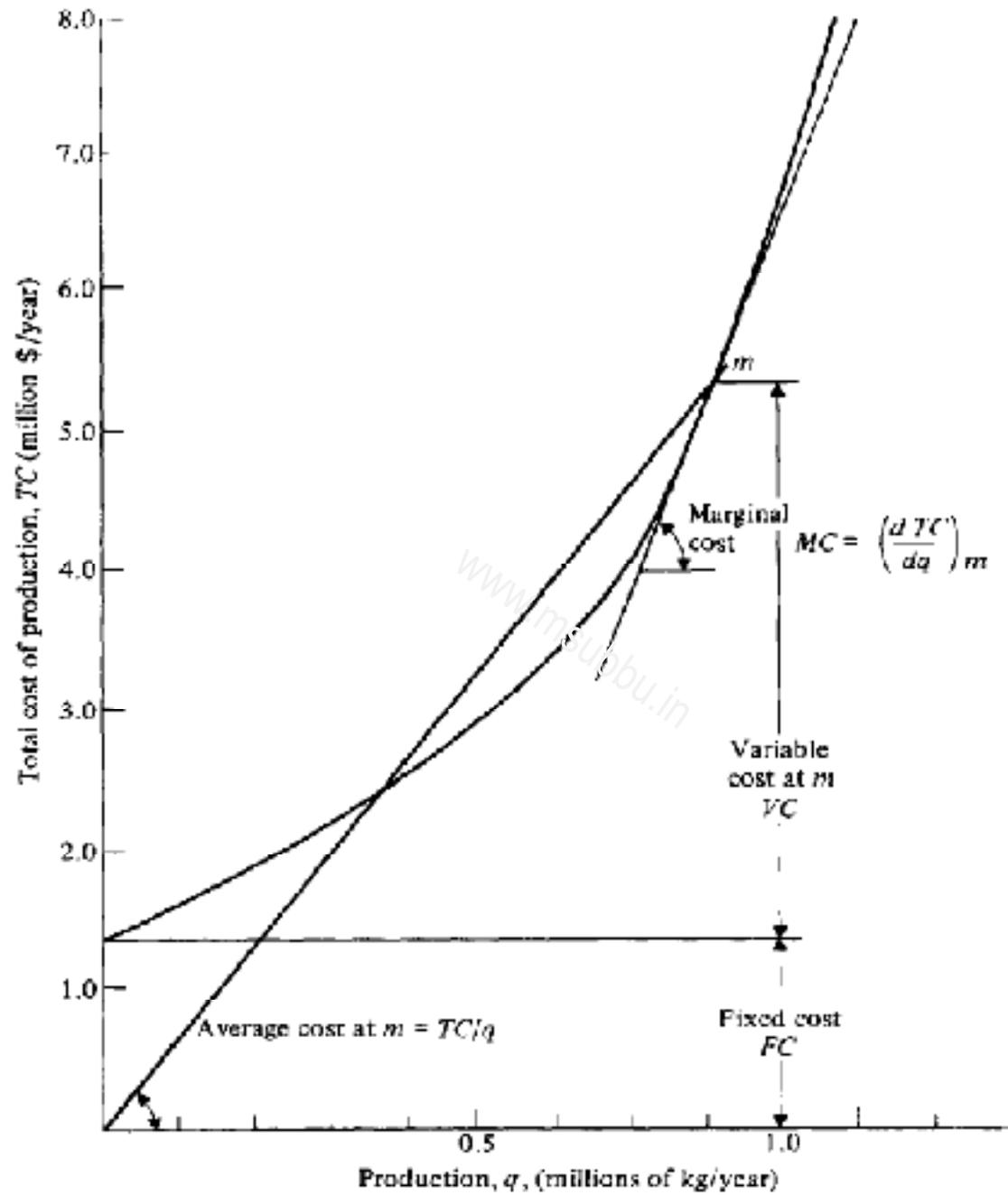


FIGURE 2.7 Total cost of production versus production.

- The average cost AC is defined as follows:

$$AC(q) = \frac{TC}{q}$$

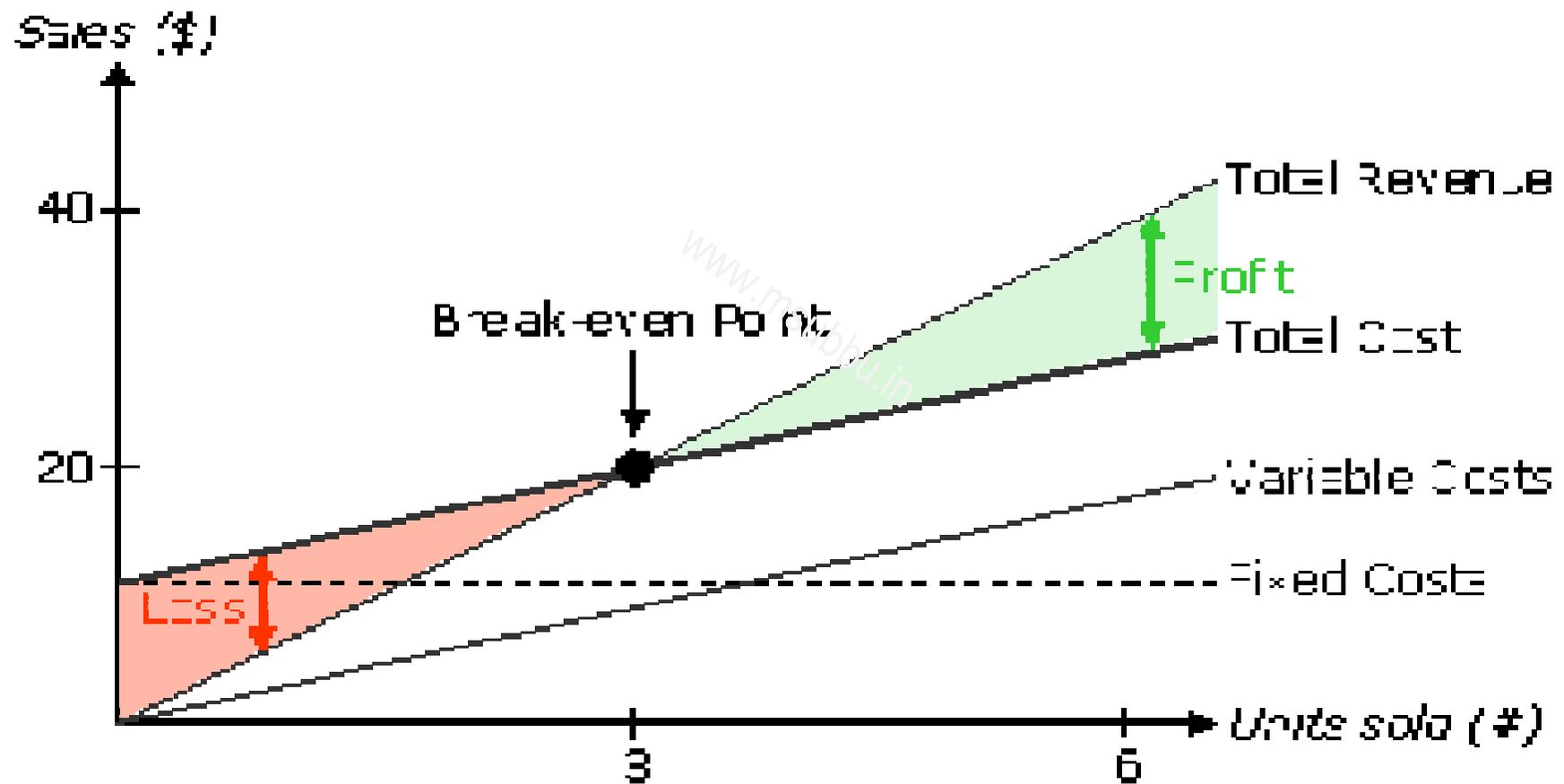
- The marginal cost MC is the incremental cost of producing one additional unit:

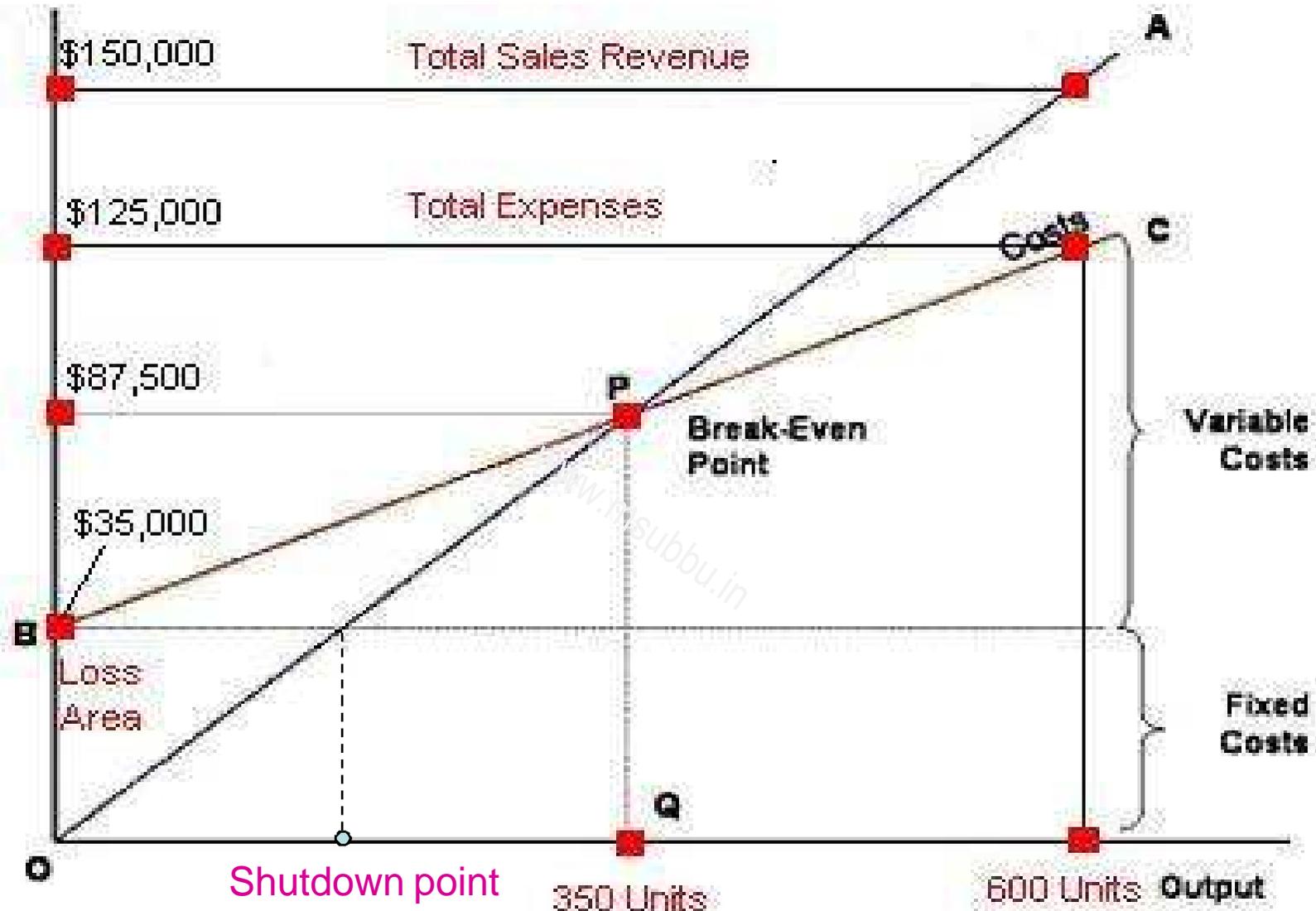
$$MC(q) = \frac{d(TC)}{dq}$$

Break-Even Analysis

- **Break-even plot:** the revenue or expenses are plotted as a function of the production rate or production capacity. The production capacity at which the revenue line intersects the total expense line is the breakeven point. Break-even refers to the point at which operations break even, where income just equals expenses.
- Break-even analysis can be used to show, the effect of various selling prices of a product on profit. Other possible uses may be to study fixed and variable expenses and production level scenarios.

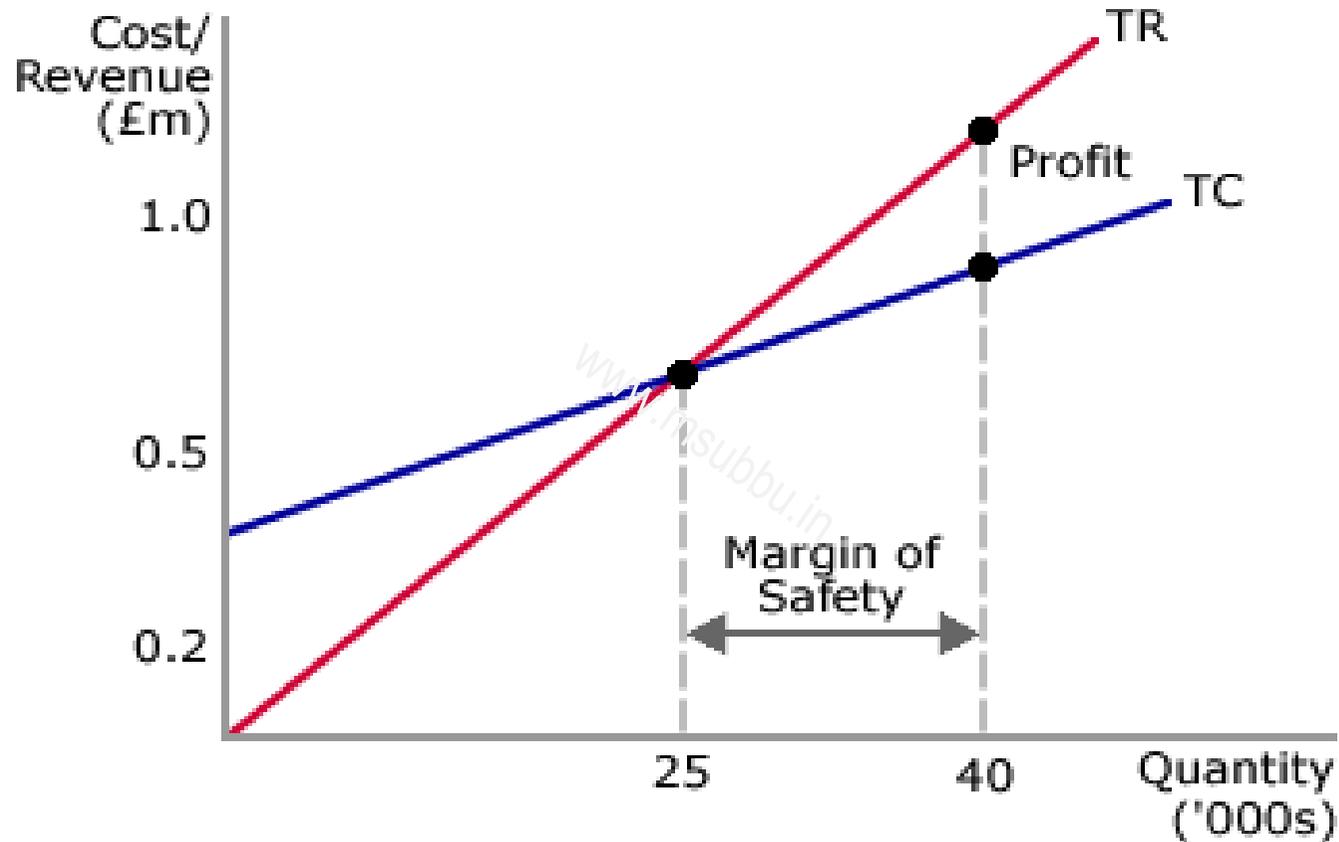
Break-even Analysis



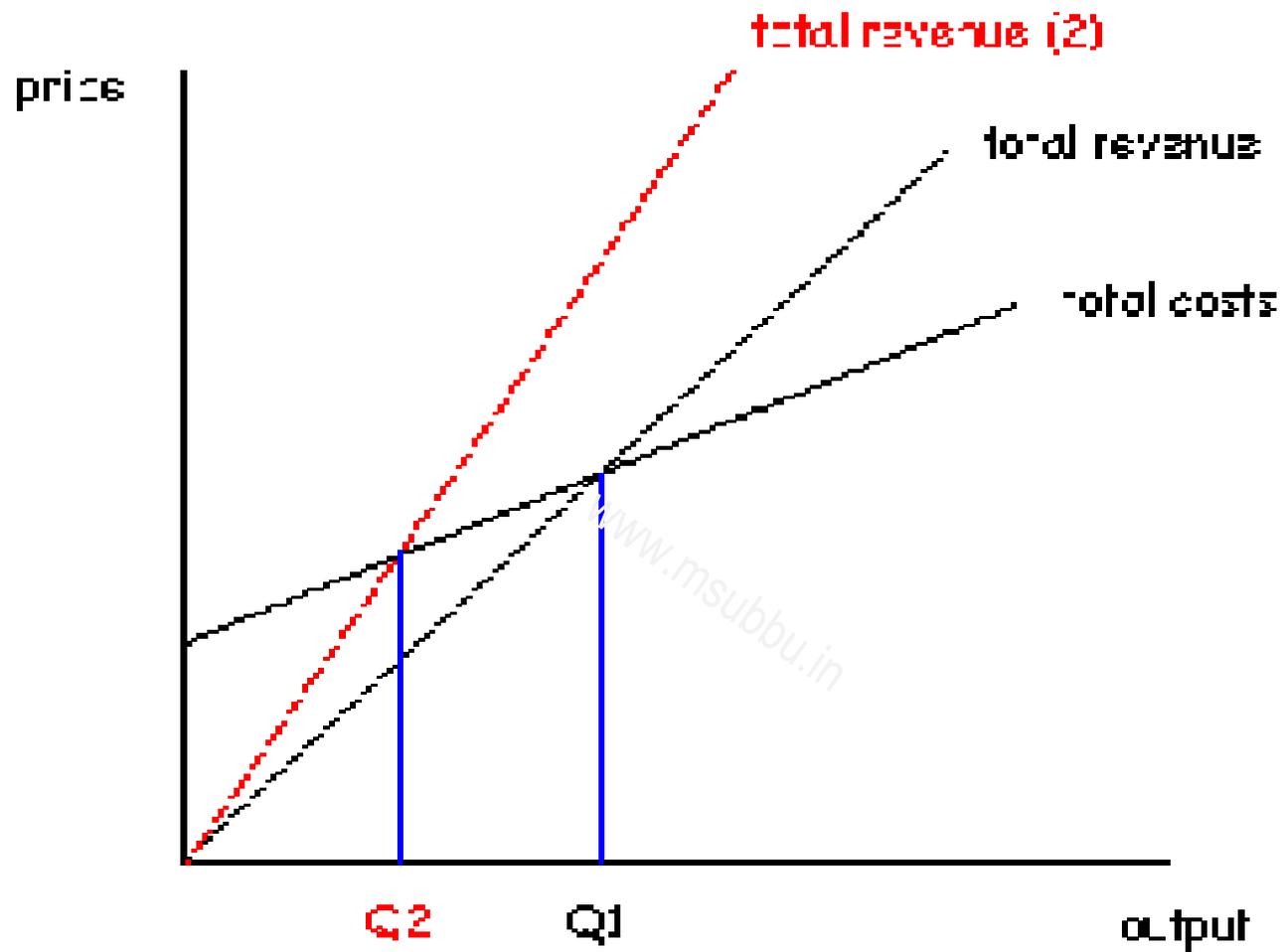


The shutdown point occurs where the revenue line crosses the fixed expense line.

Margin of Safety



The margin of safety shows how far from break-even output the firm is currently producing. It shows, in other words, how much output could fall before the firm started making a loss.



Increase in Price » Decrease in Break Even Level of Output

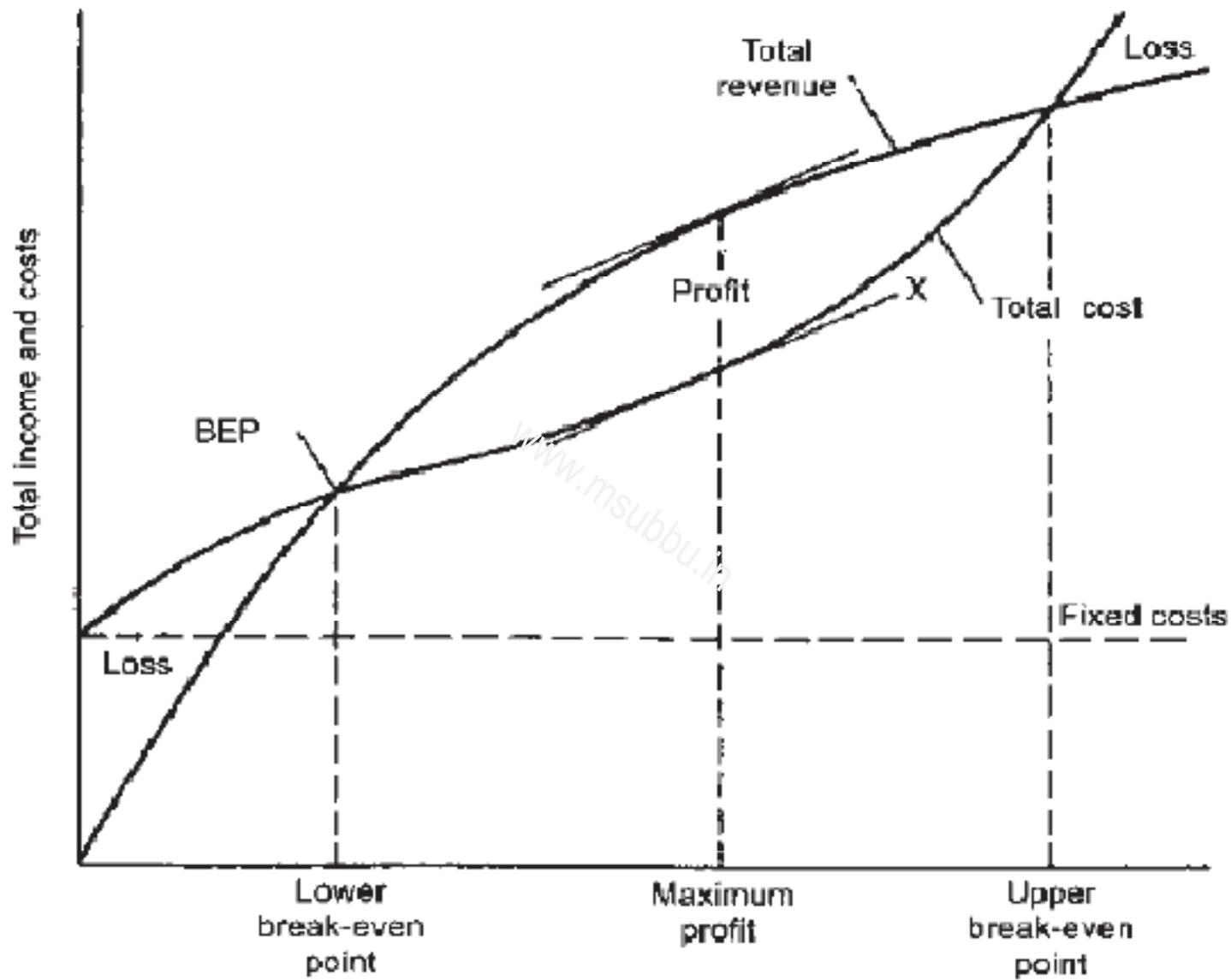


FIGURE 10.3 A realistic break-even plot.