Economics

(Micro-economics)

Chapter 4: THEORY OF THE FIRM UNDER PERFECT COMPETITION

THEORY OF THE FIRM UNDER PERFECT COMPETITION

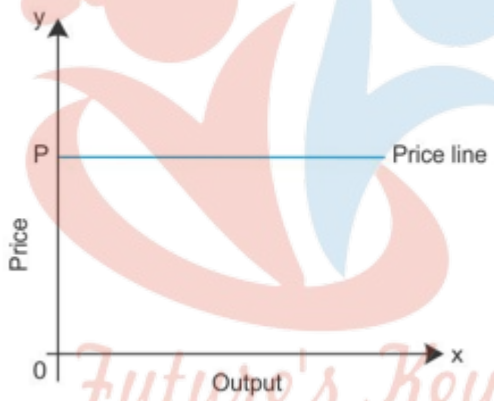
Perfect competition

A perfectly competitive market is a market which consists of buyers and sellers. They produce a homogeneous product. An individual firm cannot change the price of the commodity. Price is determined by the forces of market demand and market supply. All the firms in the industry sell their output at a given price. Hence, a firm under perfect competition is a price taker.

Revenue

A firm selling a good in the market and receiving money from that sale is called revenue. Profit is the difference between revenue and costs, whereas the revenue is the sum of cost and profit.

Revenue = Costs + Profit (or) Profit = Revenue – Costs



- Total revenue is the total money receipts of a producer corresponding to a given level of output.

  TR = p * q

- Average revenue of a firm is the total revenue per unit of output sold.

  AR= TR/q ……..(1)

  TR = p*q ……(2)

  By relating equation (1) and (2), we will find, AR= p * q/q = p

  When AR equals the market price, the firm can sell any amount of good at a given price.

- Marginal revenue of a firm is defined as the increase in total revenue for a unit increase in the firm's output.

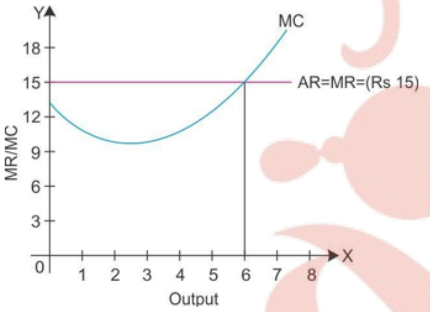
Producer's Equilibrium

Producer's equilibrium means that the producers attain optimum output level with the given factors of production where the producer can maximise the profit.

According to marginal revenue and marginal cost approach, producer strikes equilibrium when the following two conditions are satisfied:

- MR = MC
- MC is rising or MC curve cuts MR curve from below.

Price (AR) is constant so that MR is constant i.e. at Rs 15 as shown in the below table. The table shows that the two condition of equilibrium are satisfied only when 6 units of output are produced. MR is equal to MC which is equal to Rs 15 and MC curve is rising.



Output	Price	TC	TR	MR	MC	TR-TC
1	15	12	15	15	12	3
2	15	21	30	15	9	9
3	15	29	45	15	8	16
4	15	36	60	15	7	24
5	15	45	75	15	9	30
6	15	60	90	15	15	30
7	15	76	105	15	16	29

MC be rising at the point of equilibrium

When MC is falling, the cost of producing an additional unit of output tends to decrease. Under perfect competition, when price is constant the difference between the total revenue and total variable cost tends to increase. This leads to rising gross profit. But a firm will not increase the output with an increasing gross profit. The firm will be at equilibrium only when MC is rising.

Firm increases its output, when MR is equal to MC

As MR is assumed to be constant under perfect competition, even when MR is equal to MC, any increase in output leads to MC is greater than MR. The difference between the total revenue and total variable cost tends to decrease. This leads to decline in firm's gross profit.

Relationship exists between average revenue and marginal revenue, when a firm can sell an additional unit or a good by lowering the price.

- Both AR and MR decrease
- MR decreases at double the rate than the AR
- When MR becomes zero and negative, AR will never be zero.

Short run and long run analysis

In the short run, equilibrium of a firm may occur, when it is making super-normal profits or super normal losses or normal profits.

When a firm makes super normal profits, AR > AC or P > AC

When a firm makes super normal losses, P < AC

When a firm makes normal profit, P = AC

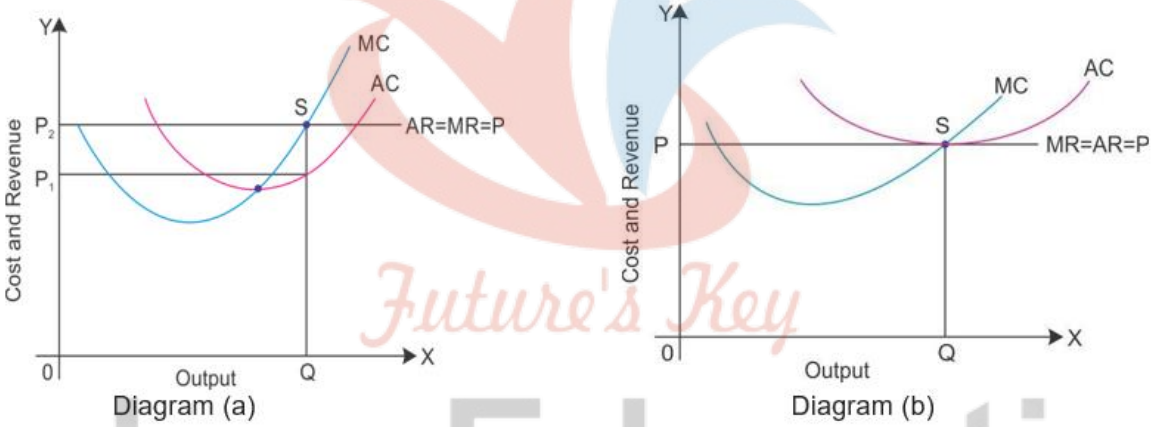
In the short run, if there is a positive level of output at which a firm's profit is maximised, three conditions are satisfied at that output level.

p = SMC or MR = MC

MC is rising or MC curve cuts MR curve from below

p ≥ AVC or MR ≥ AVC

In the diagrams (a) and (b), equilibrium is shown at point S where MR is equal to MC and MC is rising or MC is cutting MR from below. In diagram (a), the firm is in equilibrium with extra-normal profits i.e. P > AC. In the diagram (b), firm is in equilibrium with normal profit i.e. AR = AC.



In the long run, a firm makes only normal profits (AR = AC). Diagram (c) shows equilibrium at the point S, where MR = MC and also AR = AC. Like short run, price is determined by the industry and the firm adjusts its output to the given price. Thus, the firm in the long run strikes equilibrium where

MR = MC

MC is rising and

AR = AC only normal profits are earned

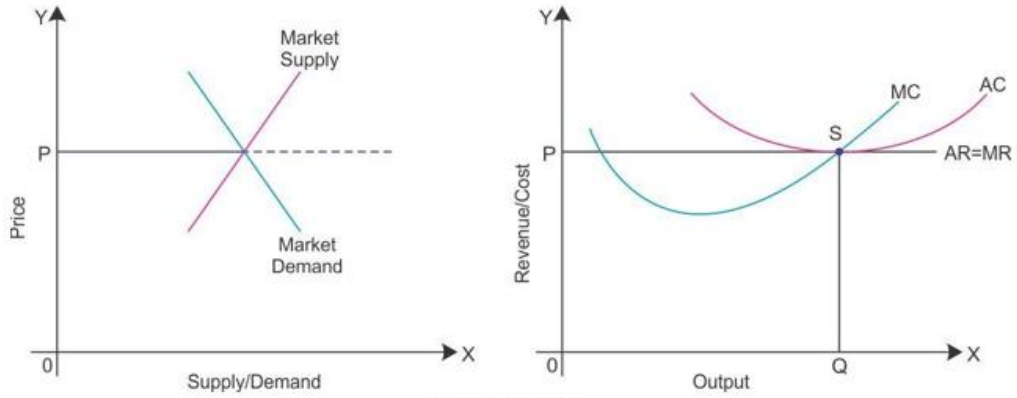


Diagram (c)

Supply curve

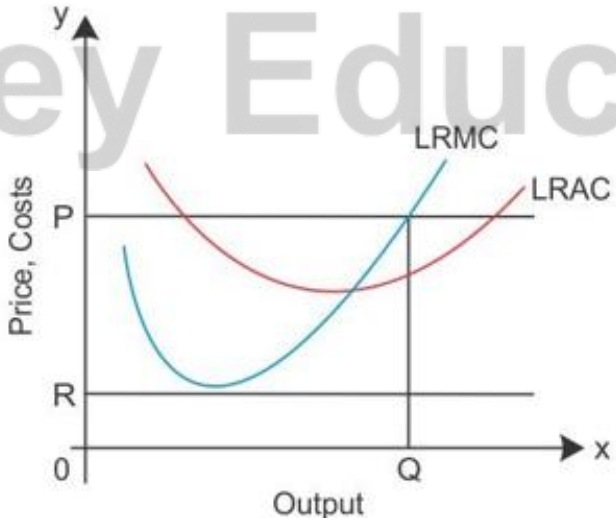
Supply curve, a graphic presentation of supply schedule shows the positive relationship between the market price of good and the quantity supplied. In a market, the output level of a profit maximising firm will depend on the period i.e. short run or long run firm.

The short run supply curve of a firm

When the market price is greater than or equal to the minimum AVC, the firm identifies the output level in the short run to maximise profit. The supply curve of a firm is less elastic and it is responsive to changes in price.

The long run supply curve of a firm

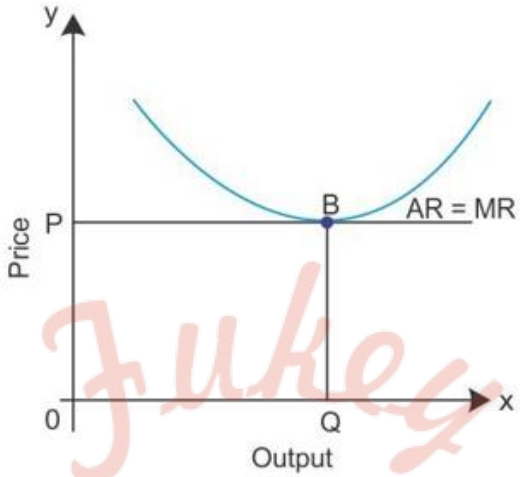
In the long run, the market price is greater than or equal to the minimum LRAC. The market price exceeds the minimum average cost in the long run as shown below. At the marginal cost rising point, the level of output Q is obtained. Average cost does not exceed the market price at the output level Q. Therefore, the firm supplies OQ level of output in the long run.



In the diagram, the market price is R, which is less than the average cost. But the profit maximising firm will produce output where the market price R is greater than or equal to the

average cost.

When a firm earns normal profit, the breakeven point of minimum average cost is at which the supply curve cuts the average cost. A firm only covers the cost, and therefore the breakeven point is at point B where AR = AC.



Determinants of Supply

- **Price of the product:** When there is an increase in the price of the product and if it is more than the marginal cost of production, then it enables the firm to earn more profit by selling at a higher price. Hence, there is an increase in the supply of the product.
- **Prices of the factors of production:** Given the other factors, if the prices of the factors of production increase, then there is decline in the profit of the firm. Hence, the firm would reduce the quantity of supply at the current price level.
- **Technological condition:** Technological improvement in production enables the firm to increase the supply at the current price level.
- **Price of other commodities:** When the prices of other commodities increase, the producer starts producing those commodities to make more profit. Hence, the supply of the existing commodity will fall.
- **Price of related commodities:** If the price of a commodity remains constant and the price of its substitute rises, then producers would produce substitute goods to make more profit. Hence, the supply of the existing commodity will fall.
- **Taxes:** When the government imposes heavy taxes on the production of a particular commodity, the cost of production of that good increases and the price will remain constant. This results in reduction in profits. In such a situation, the producer will use the resources to produce those commodities on which the government has levied less tax. Therefore, the supply of that particular commodity decreases.

Market supply curve

Market supply curve is derived by the horizontal summation of the supply curves of all the firms in the industry. It shows various quantities of commodity which all the firms in the market are ready to sell at different possible prices of that commodity.

Price elasticity of supply

Price elasticity of supply is the measure of change in quantity supplied of a commodity because of change in its price.

E_s = Percentage change in quantity supplied / Percentage change in price

Geometric method

Under geometric method, elasticity of supply depends on the origin of the supply curve. Assuming the supply curve to be a straight line and positively sloped curve, three possible situations of elasticity of supply can be noticed

- Positively sloped supply curve starts from the point of origin, $E_s = 1$
- Positively sloped supply curve starts from Y axis, $E_s > 1$
- Positively sloped supply curve starts from X axis, $E_s < 1$

Important Questions

Multiple Choice Questions:

1. The concept of supply curve is relevant only for?
   (a) Monopoly
   (b) Monopolistic competition
   (c) Perfect competition
   (d) Oligopoly
2. Which of the following is an example of perfect competition?
   (a) Agriculture
   (b) Banking sector
   (c) Car manufacturing
   (d) Railways
3. Can MR be negative or zero.
   (a) Yes
   (b) Can't say
   (c) No
   (d) Only negative but not zero
4. If all units are sold at same price how will it affect AR and MR?
   (a) B. AR > MR
   (b) A. AR = MR
   (c) D. AR + MR = 0
   (d) C. AR < MR
5. What is price line
   (a) The demand curve
   (b) The AR curve
   (c) The MR curve
   (d) The TR curve
6. Can TR be a horizontal Straight line?
   (a) May be
   (b) Can't say

(c) Yes

(d) No

7. The revenue of a firm per unit sold is its

(a) MR

(b) AR

(c) TR

(d) TC

8. The product of AR and price at every unit sold is the firm's

(a) TR

(b) TVC

(c) MR

(d) AR

9. In perfect competition, in the long run, _____?

(a) There are large profits for the firm

(b) There is no profit and no loss for the firm

(c) There are negligible profits for the firm

(d) There are large losses for the firm

10. In perfect competition, when the marginal revenue and marginal cost are equal, profit is?

(a) Maximum

(b) Zero

(c) Negative

(d) Average

11. In perfect competition, a firm earns profit when _____ exceeds the _____?

(a) Total revenue, total fixed cost

(b) Marginal cost, marginal revenue

(c) Average revenue, average cost

(d) Total cost, total revenue

12. In the perfectly competitive market, in the long run, competitive prices equal the minimum possible _____ cost of good?

(a) Average

(b) Total

(c) Variable

(d) Marginal

13. In perfect competition, in the long run, if a new firm enters the industry the supply curve shifts to the right resulting in_____?

(a) Reduction in supply

(b) No change in price

(c) Fall in price

(d) Rise in price

14. Which of the following type of competition is just a theoretical economic concept, not a realistic case where actual competition and trade take place?

(a) Monopolistic competition

(b) Monopoly

(c) Oligopoly

(d) Perfect competition

15. In perfect competition, which of the following curves generally lies below the demand curve and slopes downward?

(a) Average revenue

(b) Average cost

(c) Marginal revenue

(d) Marginal cost

Very Short:

1. Define perfect competition.

2. Define Monopoly.

3. What is oligopoly?

4. What is product differentiation?

5. What is the shape of marginal revenue curve under monopoly?

6. What is break – even price?

7. What is the normal profit?

8. What is a patent right?

9. What is a price taker company?

10. What is a price maker company?

Short Questions :

1. A market for a good is in equilibrium. Demand for good 'increases'. Explain the chain effects of this change.
2. Why is the demand curve in monopolistically competitive firms likely to be very elastic?
3. Explain the implication of free entry and free exit of a firm in a perfect competitive market?
4. With the help of the diagram, show the effect on equilibrium price and quantity when supply is perfectly inelastic and demand increases & decreases.
5. Which features of monopolistic competition are monopolistic in nature?
6. When will the equilibrium price not change even if demand and supply increases?

Long Question :

1. Distinguish between change in supply and change in quantity supplied. State two factors responsible for change in supply.
2. Explain the conditions of a producer's equilibrium in terms of Marginal Cost and Marginal Revenue. Use a diagram.
3. When the price of a commodity rises from Rs. 10 to Rs. 11 per unit, its quantity supplied rises by 100 units. Its price elasticity of supply is 2. Calculate its quantity supplied at the increased price.
4. A firm supplies 500 units of a good at a price of Rs. 5 per unit. The price elasticity of supply of good is 2. At what price will the firm supply 700 units?

Assertion Reason Question:

1. **Direction:** In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as:

   A. Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of the Assertion (A).

   B. Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

   C. Assertion (A) is true, but Reason (R) is false.

   D. Assertion (A) is false, but Reason (R) is true.

Assertion (A): There is no restriction on the entry and exit of the firms in the perfect competitive market.

Reason (R): The perfect competition market is characterised by the sellers being a price taker and not a price maker.

2. **Direction:** In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as:

A. Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of the Assertion (A).

B. Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

C. Assertion (A) is true, but Reason (R) is false.

D. Assertion (A) is false, but Reason (R) is true.

Assertion (A): The vegetable market is a perfect example of perfect competition market.

Reason (R): The marketers have no control over the prices of the product.

MCQ Answers :

1. (c) Perfect competition

2. (a) Agriculture

3. (a) Yes

4. (b) A. AR = MR

5. (c) The MR curve

6. (d) No

7. (b) AR

8. (a) TR

9. (b) There is no profit and no loss for the firm

10. (a) Maximum

11. (c) Average revenue, average cost

12. (a) Average

13. (c) Fall in price

14. (d) Perfect competition

15. (c) Marginal revenue

Very Short Answers :

1. A market with perfect competition has a large number of customers and sellers selling the same product at the same price.

2. A monopoly is a market arrangement in which a single supplier has complete price control.

3. Oligopoly is defined as a market structure characterized by a small number of significant sellers who sell either homogeneous or differentiated commodities.

4. It is the practice of differentiating products and services on various basis such as style, looks, label, color, size, packaging, brand name, etc., with an objective to make

it more attractive and better than the product or service of the competitors.

5. In a monopoly market, the marginal revenue curve slopes downhill from left to right and is lower than the average revenue curve.
6. The break-even price in a completely competitive market is the price at which a firm earns normal profit (Price =AC). In the long run, the break-even price is the point at which P=AR=MC.
7. Normal profit is referred to as the minimum or least amount of profit which is required to keep an organisation engaged in the production process for the long run.
8. Patent right is an exclusive license or right conferred to an organisation to manufacture particular goods or services under a specific technology.
9. Price taker companies are those companies that have no option but to accept the price determined by the industry.
10. A price maker company is that company which can influence the price of a product on its own.

Short Answers :

1. The chain effects of this change are:

   1. When the price is constant, surplus demand emerges

   2. This also increases the competition among the buyers insisting them to raise the price

   3. A rise in the price of a product cause fall or decrease in the demand and expansion or rise in supply

   4. The cost of the product continues to increase until the market is balanced at a greater price

2. The demand curve in monopolistically competitive firms is likely to be very elastic. The reason for this is because the products produced by monopolistically competitive enterprises are nearly identical, and the firms have less control over the price. If the items are close replacements of one another, and the product is not differentiated enough, the elasticity of demand becomes strong, making the firm's demand curve very elastic.

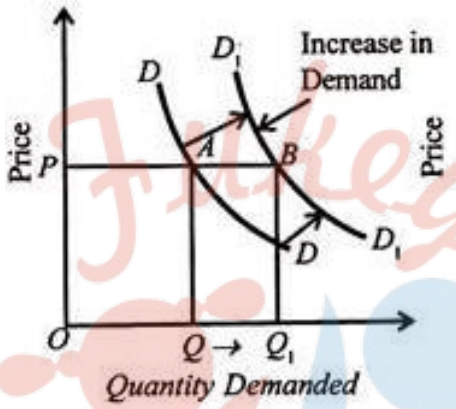
3. If firms can enter and exit freely, no firm can achieve an extraordinary profit in the long run. That is, the corporation earns no extraordinary profit in case of freedom of entry and exit, and hence, each company gets a standard profit. In a perfect competition there are large numbers of buyers and sellers.

   'Free Entry' means that there are no obstacles in the entry of new firms in the market. When the existing businesses are earning abnormal profits, the new firms are influenced due to the profit and they enter the industry. This increases market supply which leads to fall in market price and furthermore profits.

'Freedom to exit' means that there are no obstacles which stop the existing firms from stepping down from the market. The firms attempt to quit when they are dealing with losses. As the firms start to exit, market supply drops, which begins to rise in market price and consequently decreases in losses. The firms do not stop to leave till the losses are eliminated and each remaining firm will be earning just the normal profits.

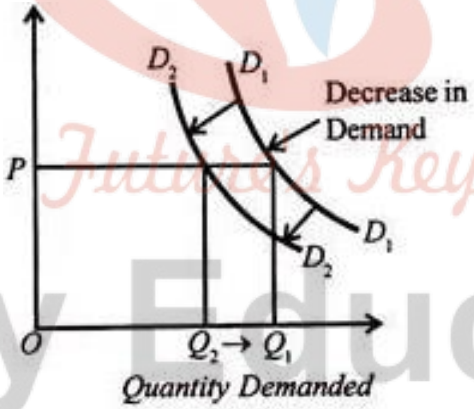
4. Rise in Demand

When supply is completely inelastic and demand rises, the demand curve shifts to the right. At point, the new demand curve intersects the supply curve at point As a result, prices rise whereas quantity demand remains unchanged.



Fall in Demand

In the diagram shown below, demand curve shifts towards left when demand falls and price decreases from but quantity remains same.



5. Monopolistic competition refers to a market situation in which there are a large number of firms selling products that are closely related but distinct.

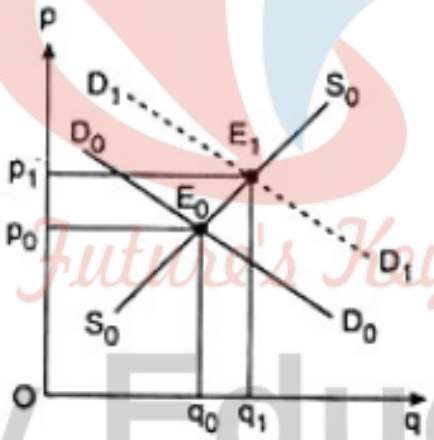
- Large number of sellers: There are a large number of businesses selling products that are related but not identical. Each firm operates independently and has a limited market share. As a result, a single firm has only limited control over the market price. The presence of a large number of businesses creates market competition.
- Product Differentiation: Despite the large number of sellers, each firm can exercise some degree of monopoly through product differentiation. Product differentiation is the process of distinguishing products based on their brand, size, color, shape,

and so on. A firm's product is a close but not perfect substitute for another firm's product.

- Selling costs: Products are differentiated in monopolistic competition, and these differences are communicated to buyers through selling costs. The expenses incurred on marketing, sales promotion, and product advertisement are referred to as selling costs.
- Freedom of entry and exit: Firms are free to enter or exit the industry at any time under monopolistic competition. It ensures that a firm does not experience abnormal profits or losses in the long run.
- Lack of perfect knowledge: Buyers and sellers do not have a complete understanding of market conditions. Selling costs create an artificial superiority in the minds of consumers, making it difficult for them to evaluate different products on the market. As a result, even if other less expensive products are of equal quality, consumers prefer a specific product (even if it is highly priced).

6. When the proportionate rise in demand is exactly equal to the proportionate increase in supply, the equilibrium price remains constant. It is depicted in the diagram below.

Diagram



In this diagram one can see that when both demand and supply increase at an equal level. The price remains unchanged, even though the quantity changes.

Long Answers :

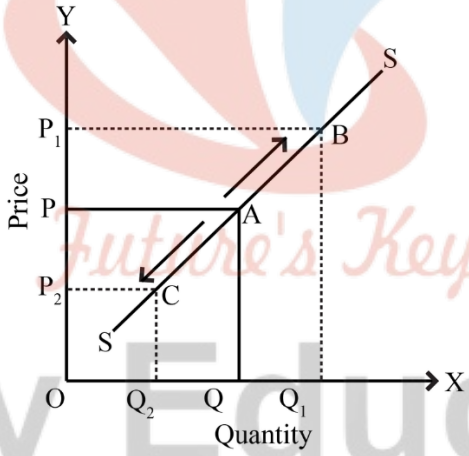
1. Ans: The difference between change in supply and change in quantity supplied is as follows:

Basis	Change in-Quantity Supplied	change in supply
Meaning	When the quantity supplied changes due to change in price, keeping other factors constant,	when the supply changes due to any change in the other factors, at the same price, it leads to a shift

	it leads to a movement along the supply curve,	in supply curve.
Effect on supply curve	The movement is along the same suppiy curve either upward .(known as contraction in supply).	The shift in the supply curve is either rightward (known as increase in supply) or leftward (known as decrease in supply).
Reason	Tt occurs due to change (increase or decrease) in the price of the given commodity.	It occurs due to a change in other factors like change in the price of inputs, change in taxes, change in technology etc.

Supply represents how much the market can offer at different prices. In contrast, quantity supplied represents what amount of commodity producers will supply at a specific price. The supply schedule or supply curve indicates the supply of the commodity.

Movement along the supply curve or change in quanity supplied: When the supply of a good rises due to rise in the price of the good alone, it is termed as an expansion of supply. When supply of a good falls due to fall in its price, it is called contraction of supply. Graphically, it means a movement along the supply curve.



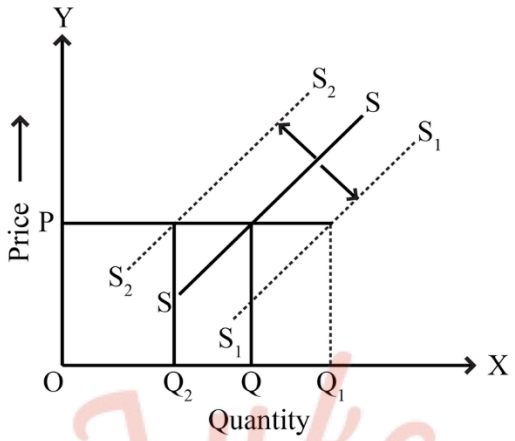
In the given digram, at point OP, the supply is OQ. When price rises to OP_1, supply rises to OQ_1. In this case, the producer moves from A to B upwards but remains on the same supply curve. When price falls to OP_2 , supply falls to OQ_2

The producer moves from A to C but remains on the same supply curve.

Shifts in supply curve or change in supply.

When at the given price, the supply of a good increases, it is called increase in supply. When at the given price, the supply decreases, it is called decrease in supply. Graphically, it means shift of supply curve. In the figure, at price OP, the supply is OQ. When there is increase in supply at the given price, the supply curve shifts to the right, If there is a decrease in supply at the given price, the supply curve shifts to the left.

Thus, movement along the supply curve means expansion and contraction of supply whereas shifts in supply curve means increase and decrease in supply.



Factors are responsible for changes in supply:

- **Production costs:** Input prices and the consequent production costs are inversely related to supply. Changes in input prices and production costs, in other words, create an opposing shift in supply. For example, as wages or labor expenses rise, the supply of goods falls.
- **Technology:** Improvements in manufacturing technology change the supply curve. Improvements in technology, in particular, boost supply, resulting in a rightward shift in the supply curve, that is better the technology, higher the supply.
- **Other goods prices:** Other items' price adjustments are a little more challenging. To begin, in order to influence supply, producers must believe the items are related. What customers believe is unimportant. Ranchers, for example, believe that meat and leather are connected since they both come from a steer.

2. Ans: The term "producer's equilibrium" refers to a condition in which a producer produces the amount of output that maximizes earnings. It is a profit-maximizing condition. Under the MR-MC technique, the producer will only reach equilibrium at the level of production if the following conditions are met.

- MR = MC
- After MR = MC, MC must rise.
- At the point of equilibrium, the MC curve must cut the MR curve from below.

The addition to TR from the sale of one additional unit of output is denoted by MR, and the addition to TC is denoted by MC. Firms compare their MR with their MC in order to maximize earnings.

In the diagram, output is indicated on the X axis, while revenue and cost are shown on the Y-axis. The MC curve is U-shaped, and P~MR=AR is a horizontal line parallel to the X-axis.

(Image will be Uploaded Soon)

When output level is more than OQ, MR < MC, which implies that the firm is making a loss on its last unit of output. Hence, so as to maximize profit, a rational producer will keep decreasing its output as long as MC > MR. Thus, the firm moves towards producing OQ units of output.

3. Given:

P=10

P_1=11

$\Delta Q = 100\text{units}$

$E_s = 2$

$\Delta P = P_1 - P$

$= 11 - 10$

$= 1$

The price elasticity of supply is calculated as

$$E_s = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Substitute the known values in the above equation,

$$2 = \frac{100}{1} \times \frac{10}{Q}$$

$$Q = \frac{100 \times 10}{2} = 500$$

Therefore, the quantity supplied at the increase price is calculated as

$Q_1 = Q + \Delta Q$

$= 500 + 100$

$= 600$ units

4. Given:

$$P = 5$$

$$Q_1 = 700$$

$$Q = 500$$

$$E_s = 2$$

$$\Delta Q = Q_1 - Q$$

$$= 700 - 500 = 200$$

The price elasticity of supply is calculated as

$$E_s = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Substitute the known values in the above equation,

$$2 = \frac{200}{\Delta P} \times \frac{5}{500}$$

$$\Delta P = \frac{2 \times 500}{200 \times 5} = 1$$

Therefore, the new price is calculated as

$$P_1 = P + \Delta P$$

$$= 5 + 1$$

$$= 6 \text{ units}$$

Therefore, the firm will supply 700 units at Rs. 6 per unit.

Assertion Reason Answer:

1. B. Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
2. A. Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of the Assertion (A).