1. Details of Module and its structure

Module Detail	
Subject Name	Economics
Course Name	Economics 03 (Class XII, Semester - 1)
Module Name/Title	Supply: Part – 3
Module Id	leec_10403
Pre-requisites	Knowledge about basic economics terms
Objectives	After going through this lesson, the learners will be able to understand the following: 1. Meaning of individual supply and market supply of a commodity; 2. Factors or determinants affecting supply of a commodity; 3. The relationship between price of a commodity and its quantity supplied with the help of supply schedule; 4. the difference between change in supply and change in quantity supplied 5. Short Run and Long Run Supply Curves 6. Construct an individual firm's supply curve and market supply curve
Keywords	Supply, Seller, Stock, Expansion, Contraction, Increase, Decrease in supply.

2. Development Team

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Introduction to Supply

1. **Introduction to Supply**

In the previous chapters we have studied the meaning of demand for a commodity, determinants of demand and the law of demand. But the consumers will be able to purchase a commodity only when it is available in the market. Who supplies commodities in the market? A commodity must be produced first in order to be available for the consumer.

- Farmers are called producers as they produce food grains, fruits and vegetables etc. in their farms. Similarly
- Manufacturers produce consumer goods such as garments, soaps, tooth paste, tooth brush, shoes, pens, etc in factories.

Consumers buy these items from sellers in the market. The seller and the producer could be the same person or different persons. If they are different, it simply means that the sellers in the market have procured these commodities from the original producers or manufacturers to sell them to the consumers in the market.

To simplify matters, we do not make a difference between 'suppliers' and 'producers'. In short we say that

The farmers, manufactures and sellers all ***supply*** commodities in the market.

They are all called '**producers**'.

The production unit where production of a commodity takes place is called a **firm**.

Thus we can say that **firms supply the commodities**.

2. Meaning of Supply

There is a difference between "availability of a commodity in the market" and "supply of that commodity". These two are not identical concepts. If a commodity is available, it does not mean that it has been supplied. The definition of supply is given as follows:

Supply of a commodity is the quantity of the commodity that a seller offers for sale at a given price at a given time.

Examples of Supply -

1. Hardik sold 120 pens at a price of Rs. 25 per unit during last week.

2. The vegetable seller sold 600 Kg of potato during past 15 days at Rs. 10 per Kg of potato.

Note that the time period may vary. It may be a week or two weeks, or a month and so on.

On the basis of above definition, we can say that

There are three core elements of supply:

(i) Quantity of the commodity

(ii) Price of the commodity

(iii) Time period

3. Determinants of Supply

Determinants of supply are those factors which may affect the willingness and ability of the seller to sell the commodity. The most important factors affecting the supply of a commodity are:

(i) Price of the commodity

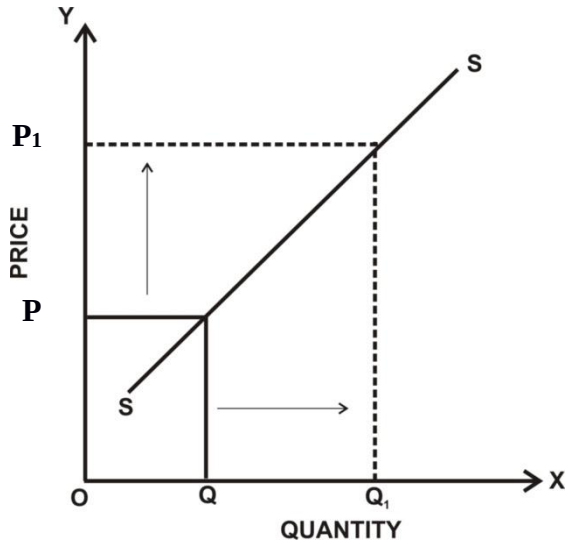

Figure 1: Law of Supply

In the given diagram, SS is an upward sloping curve which represents that with increase in price of the commodity from OP to OP_1, the seller becomes ready to supply more quantity of the commodity from OQ to OQ_1.

(ii) Price of other goods

Supply of the commodity also depends on the price of other goods related to the commodity. When the price of other goods increases, they become relatively more profitable as compared to the commodity concerned.

If resources can be transferred from one production line to another, the producer shifts resources (labour, capital, raw material and other inputs) to produce the commodity whose price has increased and produces less of the commodity under consideration. This results in reduction of supply at any given price. Geometrically speaking, the supply curve shifts leftwards.

(iii) Cost of inputs

When the inputs used in the production become more costly, for any given price of the commodity, profit margin falls. The reduction in profit margin due to increase in the prices of the inputs (wages, rental rate of capital, rent etc.). This leads to a reduction in production at each level of price of the product.

It is represented geometrically by a leftward shift in the supply curve.

(iv) Technological Changes

If Improved and advanced technique is used for the production of a commodity, it leads to efficiency in production. The marginal cost of production will fall and thus, the producer will offer to supply more of the commodity at the prevailing prices. Producers with access to improved technology can supply more goods than the producers with obsolete technology because of the difference in the cost level for two firms. Technological development and innovation improve the productivity of the inputs and more output can be produced with the given level of inputs.

(v) Objectives of the producer

Generally it is presumed that the goal of the firm is to maximize its profits. However, firms may set maximization of output, market share, sales etc. as their objectives. A firm having sales maximization as the goal is likely to supply more than the firm having the goal of profit maximization. Thus the supply of goods will also depend on the priority of a firm regarding these goals and the extent to which it is prepared to sacrifice one goal to the other. The change in objective of the firm may lead to shift in supply curve.

5. Law of Supply

Law of supply represents the functional relationship between quantity supplied of a commodity and the price of the commodity. It states that, "other thing remaining constant, quantity supplied of a commodity is directly related to the price of the commodity." i.e. the seller is willing to offer more quantity of the commodity for sale at a higher price of the commodity and vice versa.

Assumptions of the Law of Supply

The law of supply is based on the basic assumption

"OTHER THINGS BEING CONSTANT (CETERIS PARIBUS)".

In other words, the direct relationship between supply of a commodity and its own price holds good when following assumptions are satisfied:

i) The prices of other goods do not change.
ii) There should be no change in the cost of inputs used in the production process.
iii) There should be no change in technology used in the production process.
iv) The firm is a rational and the objective of the firm is to maximize profits.

6. Supply Schedule and Supply Curve: Supply schedule is defined as a tabular statement which represents various quantities of the commodity supplied by the seller at different price levels. While Supply curve is defined as the graphical representation of supply schedule. It is always positively sloped, i.e., it slopes upward from left to right as it represents the positive relationship between quantity supplied of a commodity and its own price. Law of supply can be explained with the help of the following example -

PRICE	**QUANTITY SUPPLIED**
10	20
12	40

Table 1: Individual Supply Schedule

In the given schedule, when the price of the commodity increases from Rs. 10 to Rs. 12, the quantity supplied of the commodity increases from 20 units to 40 units. This a positive association between the price of the commodity and the units of the commodity supplied.

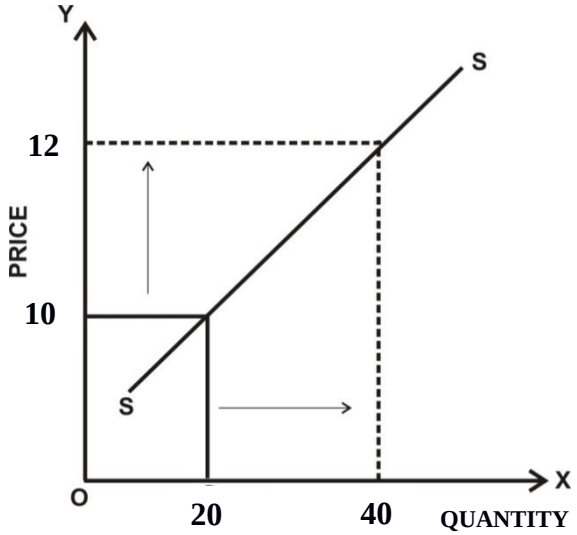

Figure 2: Supply Curve

In the given diagram, when the price of the commodity increases from 10 to 12 then the quantity supplied increases from 20 to 40.

Why Does a Supply Curve Slope Upwards?

Supply curve is based on the direct relationship between price of the commodity and its quantity supplied, i.e., it represents that the seller sells more quantity of the commodity only at a higher price.

Why Does a Supply Curve Slope Upwards?

The curvature and overall shape of supply curve depends on the marginal cost of production. An upward sloping marginal cost curve represents that the cost of producing additional unit of the commodity increases with increase in units of the commodity produced. Due to increasing marginal cost, the seller will sell additional unit of the commodity only at a higher price and hence the supply curve is upward sloping indicating a positive relationship between quantity offered for sale and price of the commodity.

Movement along the Supply Curve and the Shift of the Supply Curve

When the quantity supplied for a commodity changes due to changes in its price while keeping other determinants of supply fixed then we have a movement along the supply curve. Such changes in quantity supplied are also termed as change in quantity supplied. Here the movement is either upward or downward along the same supply curve depending on the direction of price movement. Here, we basically move from one point on the supply curve such as point A to another point such as A_1 or A_2 on the same supply curve.

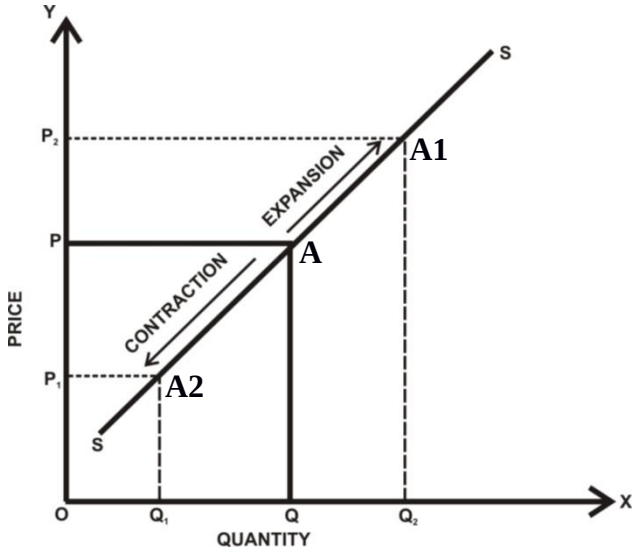

Figure 3: Movement along the Supply Curve

The two kinds of Movements along the Supply curve are called:

i. **Expansion in Supply and**

ii. **Contraction in Supply**

Other things being equal, when then seller offers to sell additional quantity of the commodity at a higher price, it is termed as extension or expansion in supply or increase in quantity supplied. It is shown by a rightward movement along the same supply curve from a point such as A to A_1. Here it is assumed that other factors that affect the supply for the commodity are constant. Other things being equal, when then seller offers to sell lesser quantity of the commodity at a lower price, it is termed as contraction in supply or decrease in quantity supplied. It is shown by the leftward movement along the supply curve from a point such as A to A_2.

Shift in Supply or Change in Supply

If the firm supplies more or less quantity of a commodity at the same price due to the change in factors other than price of the commodity concerned, it is called as shift in supply or change in supply. In this situation there is either a rightward shift in the supply curve itself from SS to S_1S_1 as shown in the figure, or a leftward shift in the supply curve from SS to S_2S_2. Thus, change in other factors (for example, change in Input Prices, Technical Innovation, etc.) affecting supply result in a movement from one supply curve to another.

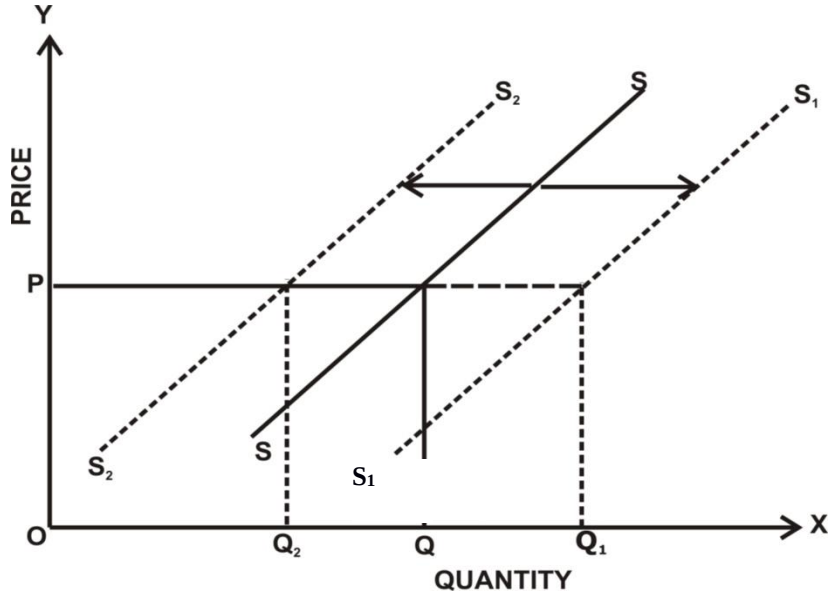

Figure 4: Shift in Supply or Change in Supply

Underlying Reasons for Shift in supply

i. Increase in Supply / Rightward Shift in Supply Curve

If the quantity supplied for the commodity increases due to factors other than price of the commodity (change in prices of factors of production, change in objectives of the firm, seasonal variations, technological advancement etc.) then it is termed as increase in supply which is represented by rightward shift in supply curve for the commodity.

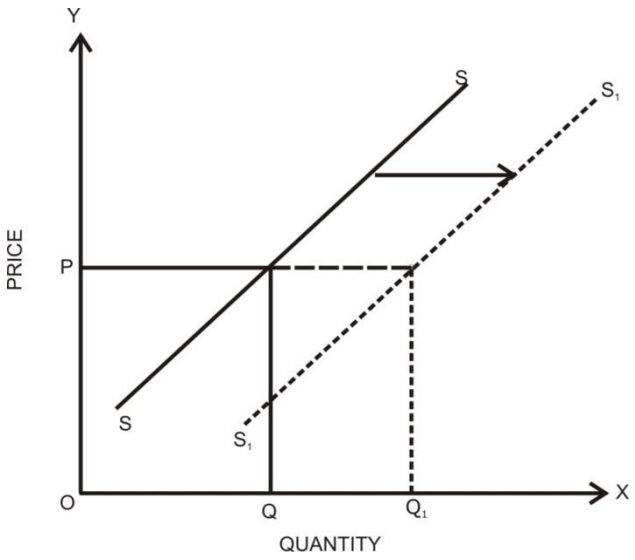

Figure 5: Increase in Supply / Rightward Shift in Supply Curve

7. Factors Responsible for Increase in Supply: -

(i) Decrease in the price of the other goods: -

When the price of some other good say commodity Y, which the seller can supply decreases, then supply of commodity Y becomes relatively less profitable as compared to the commodity concerned, say commodity X. Hence the seller is likely to find it relatively more profitable to supply more quantity of commodity X at the same given price. Thus, there is an increase in supply of commodity X. Surely, this is possible provided resources can be moved from one line of productions and resources can be utilized for alternative production processes.

(ii) Decrease in cost of inputs used in the production process: -

When the inputs used in the production process become cheaper, it leads to a decrease in cost of producing the commodity. Thus, the seller becomes ready to supply more quantity of the commodity at a given price. The profit margins increase and the seller offer more for sale at any given price of the commodity.

(iii) Improvement in technology: -

Any improvement in the technology used in the production process will lead to an increase in efficiency in input use in the production process which leads to decrease in cost of production, on account of technological innovation and upgradation. Thus, the same units of labour and capital can now produce more units of output, leading to fall in input costs for any given level of output of the firm. The profit margin increase and hence the seller offers to supply more quantity of the commodity at a given price.

(v) Increase in number of sellers: - If there is an increase in the market size or number of sellers selling a commodity in the market then it will lead to an increase in market supply of the commodity at a given price.

Decrease in Supply / Leftward Shift in Supply Curve

When due to other factors, the seller becomes ready to sell lesser quantity of a commodity at a given price then it is termed as decrease in supply. In other words, if the quantity supplied for the commodity decreases due to factors other than price of the commodity then it is termed as decrease in supply which is represented by leftward shift in supply curve for the commodity from SS to S_1S_1.

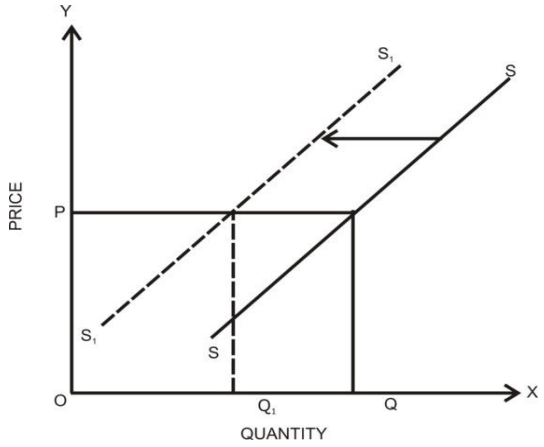

Figure 6: Decrease in Supply / Leftward Shift in Supply Curve

Factors Responsible for Decrease in Supply: -

(i) Increase in the price of the other goods: -

When the price of some other good (Y) increases, then supply of Y becomes relatively more profitable as compared to supply of commodity X. Hence the seller changes his preference towards production of commodity Y and offers to sell lesser quantity of the commodity X at a given price.

(ii) Increase in cost of inputs used in the production process: -

When the input prices used in the production process increases, it leads to an increase in cost of producing the commodity. This results in the seller supplying lesser quantity of the commodity at a given price.

(iii) Degradation in technology: - Any degradation in the technology used in the production process will lead to a decrease in efficiency (and hence fall in profit margins) in the production process which leads to increase in cost of production and hence the seller becomes ready to supply lesser quantity of the commodity at a given price.

(iv) Decrease in number of sellers: - If there is a decrease in the market size or number of sellers selling a commodity in the market then it will lead to a decrease in market supply of the commodity at a given price.

Diagrammatic Representation of Factors leading to Change in Supply

Now we present the diagrammatic representation of changes in other factors that lead to shift in supply curves.

(i) Price of other related goods

Let us assume that a seller sells two commodities viz. Tea and Coffee. Being hot beverages we can also assume that Tea and Coffee are substitutes of each other.

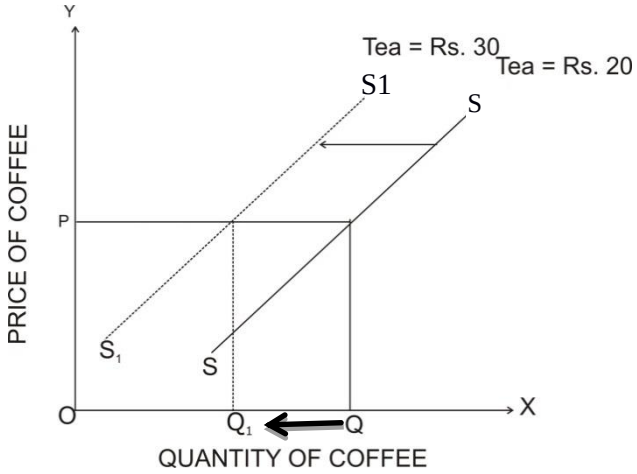

Figure 7: Price of other related goods

In the given diagram, we depict the supply curve of coffee. Suppose SS is the initial supply curve of coffee, when the price of tea is Rs. 20 per unit. Let us assume that the seller sells OQ amount of coffee at a per unit price of coffee = OP. Now, suppose the price of tea increases from Rs. 20 to Rs. 30 per unit. The seller of coffee is now ready to sell lesser quantity of the coffee than before and he cuts his supply from OQ to OQ_1 at a price = OP. At every price, he will sell lesser quantity than before, and this is represented by a leftward shift in supply curve of the coffee from SS to S_1S_1.

(ii) Changes in Cost of Inputs

Suppose the production of a commodity uses labour as an input. Let us see how the supply curve shift when labours' hourly wage rate changes.

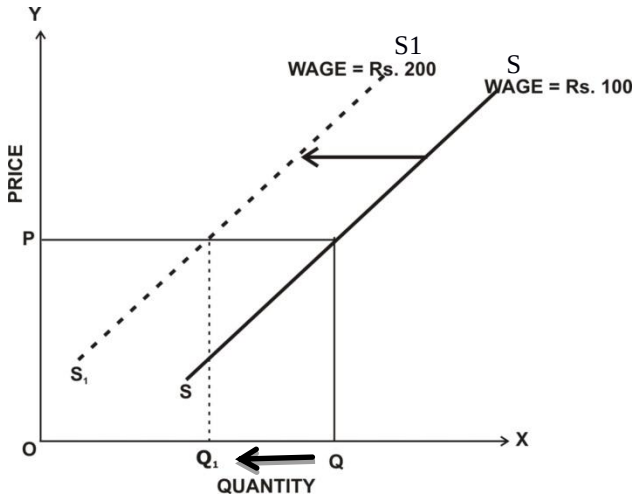

Figure 8: Changes in Cost of Inputs

In the given diagram, suppose SS is the initial supply curve of the commodity, when the wage rate is Rs. 100. Let us assume that the seller sells OQ amount of the commodity at a per unit price = OP. Now, suppose the wage rate increases from Rs. 100 to Rs. 200. The seller is now ready to sell lesser quantity of the commodity than before and he cuts his supply from OQ to OQ_1 at a price = OP. At every price, he will sell lesser quantity than before, and this is represented by a leftward shift in supply curve of the commodity from SS to S_1S_1.

(iii) Technological Changes

Next, we see how Technological Changes bring about a shift in the supply curve.

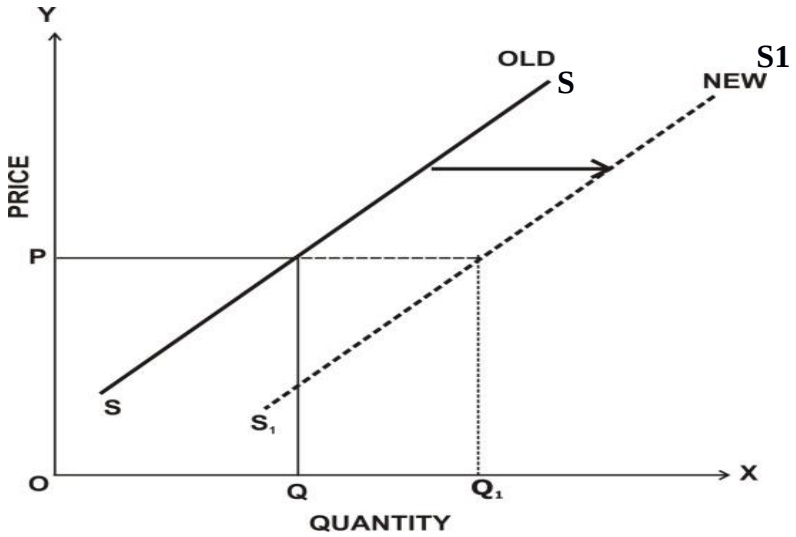

Figure 9: Technological Changes

In the given diagram, suppose a producer's supply curve is SS and he sells a quantity = Q at a given price = P. If he adopts a new technology in the production process, it leads to a rightward shift in supply curve for the commodity from SS to S_1S_1, and the producer is ready to sell a greater quantity OQ_1 at the given price OP.

In the remaining part of this module, we shall focus on the following:

1. **Derivation of** Short run Supply curve of **a profit maximizing** firm **which operates under perfect competition**
2. Derivation of Long run Supply curve of a similar firm
3. Derivation of Market Supply curve of a commodity.

It will be useful for the viewers to revise the conditions for profit maximization by a firm under perfect competition. **Let us quickly revise the Distinction between the Short run and Long run.** Output decisions of a firm are affected by the ease and possibility of shifting and employing factors of production over time. Some factors of production are fixed in nature as their uses cannot be altered for some specified period of time. The duration in which some factors are assumed to be fixed in the production process is termed as the S**hort Run**. It has nothing to do with the duration of time. Short run can be of 5 days or it can span into years, if there are some adjustments in organization of production process yet to be made.

However, the duration in which all adjustments have already been made and no factors of production are assumed to be fixed is termed as the **Long Run**.

The supply curve of a firm represents and plots the levels of output that the firm chooses to produce for different market prices of the product. We distinguish between the long run and the short run supply curves as output decision of a firm are significantly influenced by these considerations.
Let us first look at the Short Run Supply Curve of a Firm
Here we have two cases to consider.

Case I: When market price is greater than or equal to the Minimum Average Variable Cost (AVC)

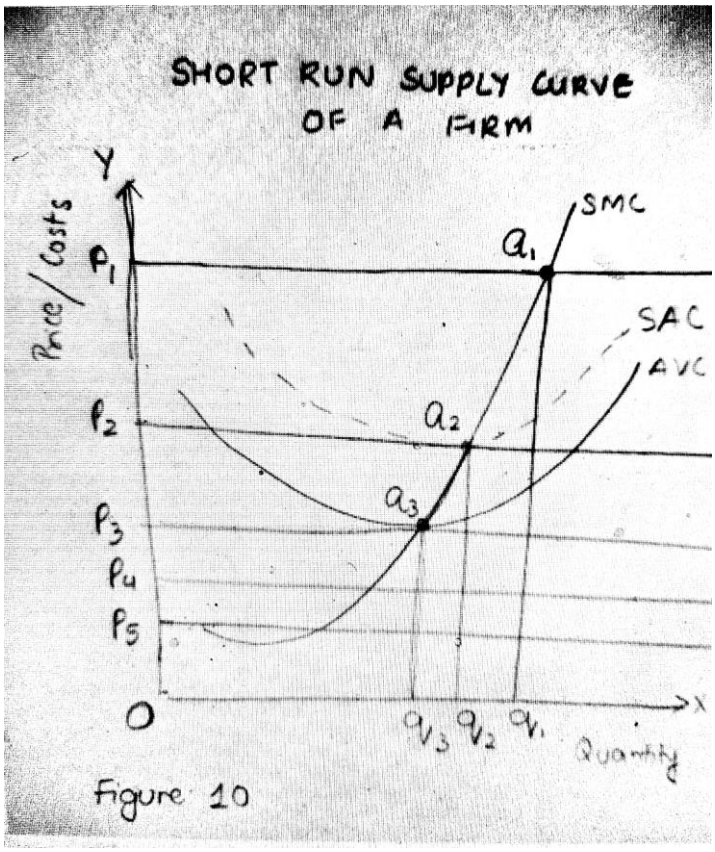

Figure 10: Short run Cost Curves of a Firm

The diagram shown on your screen depicts a firm's short run cost curves: the Short run Average Variable Cost curve (AVC), the Short run Average Cost curve (SAC) and the Short run Marginal Cost curve (SMC). Suppose the product price in the market is P_1. Note that this per unit price is greater than the producer's minimum average variable cost of production denoted in the diagram by point a_3. The producer decides upon how much quantity to supply at price P_1 by equating P_1 with short-run marginal cost of production, on the rising portion of the marginal cost curve (denoted as SMC in the diagram). This determines the level of output q_1 which the producer will supply at price = P_1, thus giving us a point a_1 on the firm's short run supply curve.

Likewise, if the market price of the commodity was P_2, which is still higher the firm's minimum average variable cost of production, the firm will supply an output equal to q_2, giving us yet another point its short run supply curve, i.e. a_2. The market price can be as low as P_3, where it becomes equal to the firm's average variable cost of production. The firm will supply an output equal to q_3 and we get another point on its short run supply curve, i.e. a_3. At this market price, this firm exactly covers its variable cost of production.

Case II: When market price is less than Average Variable Cost (AVC).

If the market price of the commodity is P_4, which is lower than the firm's minimum average variable cost (a_3), the firm will not supply any quantity as it will not be able to cover its variable cost of production. Hence, at price P_4, the quantity supplied by the firm will be zero.

Likewise, if the market price of the commodity is P_5, still lower than the firm's minimum average variable cost (a_3), the firm will again not supply any quantity. Hence, at price P_5, the quantity supplied by the firm will be zero.

If we combine the two cases, we see that a profit maximizing firm supplies a positive level of output only if the market price of the commodity is greater than or equal to its minimum average variable cost, such that the firm is able to cover its variable cost of production.

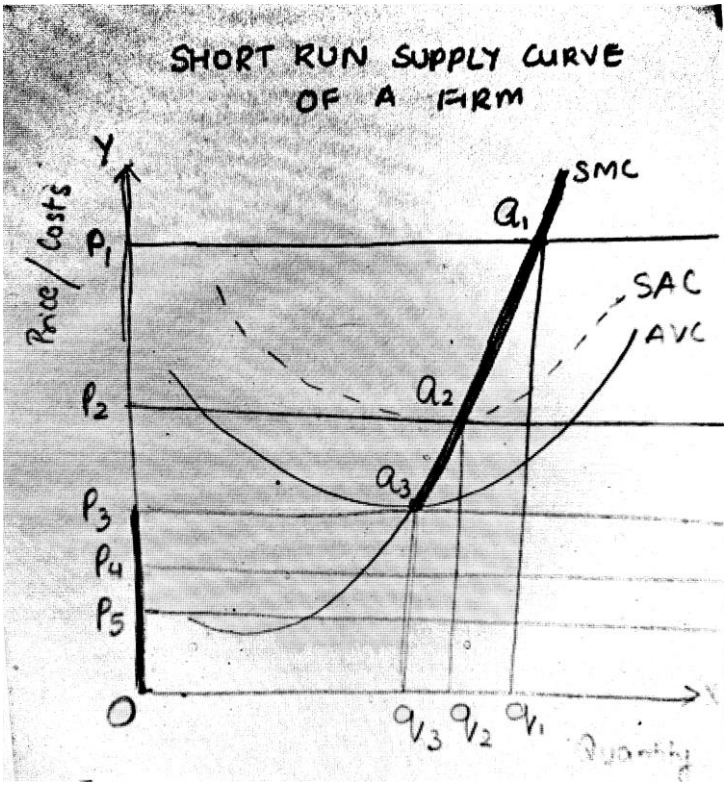

Figure 11: Short run Supply Curve

The curve drawn through the points - a_1, a_2 a_3 denotes the firm's short run supply curve. As can be seen from the diagram, this curve overlaps part of the upward sloping short run marginal cost curve of the firm, which lies above the minimum average variable cost a_3. Hence, we arrive at the conclusion that: A firm's short run supply curve is the rising portion of the Short run Marginal Cost (SMC) that lies above the minimum of the short run Average Variable Cost (AVC), highlighted in the diagram in blue.

Long Run Supply Curve

The derivation of a firm's long run supply is similar. Here again we have two cases to consider.

Case I: Price is greater than or equal to firm's minimum of Long Run Average Cost of production (LRAC)

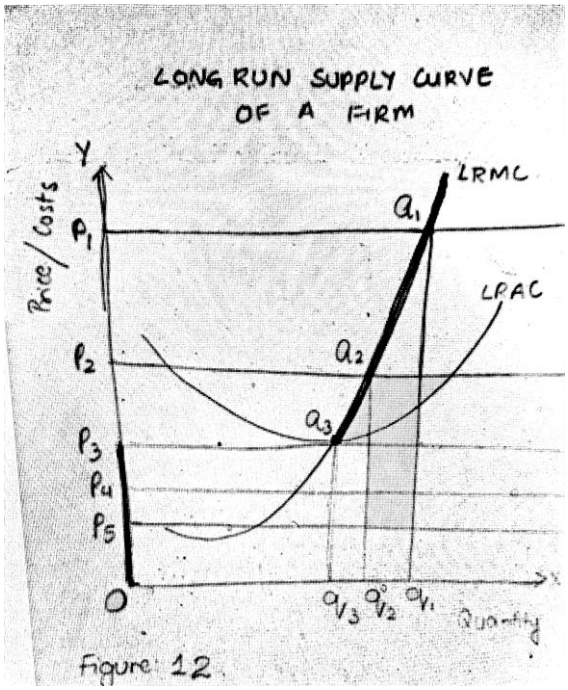

Figure 12: Long run Cost Curves

The diagram on your screen depicts a firm's Long Run Marginal Cost curve (LRMC) and Long Run Average Cost curve (LRAC). Suppose the product price in the market is P_1. Note that this per unit price is greater than the producer's minimum average cost of production denoted in the diagram by point a_3. The producer decides upon how much quantity to supply at price P_1 by equating P_1 with long-run marginal cost of production, on the rising portion of the marginal cost curve. This determines the level of output q_1 which the producer will supply at price = P_1, thus giving us a point a_1 on the firm's long run supply curve. Likewise, if the market price of the commodity was P_2, which is still higher the firm's minimum average cost of production, the firm will supply an output equal to q_2, giving us yet another point its long run supply curve, i.e. a_2. The market price can be as low as P_3, where it becomes equal to the firm's long run average cost of production. The firm will supply an output equal to q_3 and we get another point on its long run supply curve, i.e. a_3. At this market price, this firm exactly covers its total cost of production.

Case II: Price is less the minimum of Long Run Average Cost (LRAC).

If the market price of the commodity is P_4, which is lower than the firm's long run minimum average cost (a_3), the firm will not supply any quantity as it will not be able to cover its total cost of production. Hence, at price P_4, the quantity supplied by the firm will be zero. Likewise, if the market price of the commodity is P_5, still lower than the firm's long run minimum average cost (a_3), the firm will again not supply any quantity. Hence, at price P_5, the quantity supplied by the firm will be zero.

If we combine the two cases, we see that a profit maximizing firm supplies a positive level of output only if the market price of the commodity is greater than or equal to its minimum long run average cost, such that the firm is able to cover its variable cost of production.

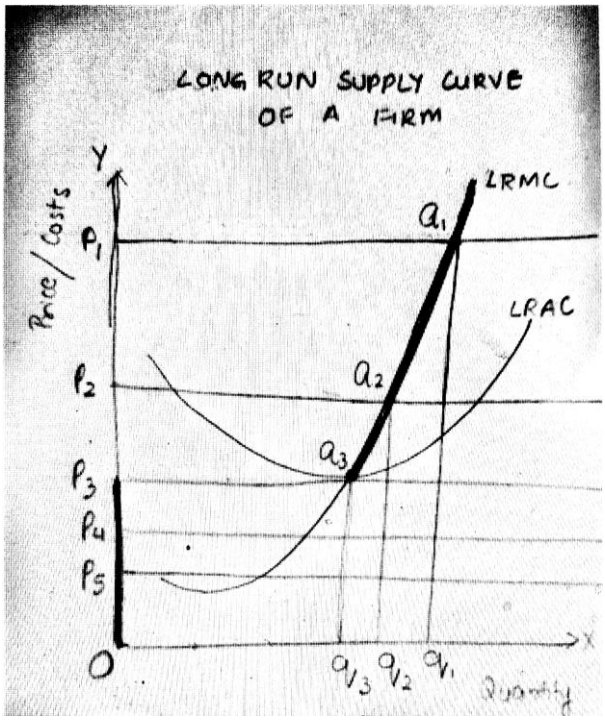

Figure 13: Long run Supply curve

The curve drawn through the points - a_1, a_2 a_3 in figure 13 denotes the firm's long run supply curve. As can be seen from the diagram, this curve overlaps part of the upward sloping long run marginal cost curve of the firm, which lies above the minimum average cost a_3. Hence, we arrive at the conclusion that:

A firm's long run supply curve is the rising portion of the Long Run Marginal Cost (LRMC) that lies above the minimum of the Long Run Average Cost (LRAC), highlighted in the diagram in blue.

Derivation of a Market Supply curve:

Until now, we have looked as various aspects of an individual seller's or an individual firm's supply curve. Market Supply of a commodity is defined as the quantity of the commodity which is sold by all the sellers in the market put together, at different prices within a given period of time. It is calculated as the sum total of quantities supplied by all the individual sellers at each price. The concept of the market supply can be explained with the help of deriving the market supply schedule and market supply curve.

Market Supply Schedule is a schedule of quantity supplied of a commodity by the entire market at different prices. It is arrived at by adding all individual supply schedules as follows. For simplicity, let us assume that there are only two firms A and B in the market, selling a particular commodity and their supply schedules are presented in the given table:

PRICE (P)	**INDIVIDUAL SUPPLY**	
	Q_A	**Q_B**
4	10	15
5	20	18
6	30	21
7	40	24
8	50	27

Table 2: Supply Schedules of Firms A and B

The market supply can be determined by simply adding the quantities supplied by these two firms at each price.

PRICE (P)	**INDIVIDUAL SUPPLY**		**MARKET SUPPLY**
	Q_A	**Q_B**	**$Q_M = Q_A + Q_B$**
4	**10**	**15**	25
5	20	18	38
6	30	21	51
7	40	24	64
8	50	27	77

Table 3: Market Schedule

Hence at a price of Rs. 4, firm A is willing to sell 10 units while firm B is willing to supply 15 units. Hence at a price of Rs. 4, a total of 25 units will be supplied in the market. Likewise, the quantities supplied at each price can be added to obtain the market supply schedule as depicted in the table.

Market Supply Curve

The diagrammatic representation of the market schedule gives us the market supply curve, which represents total market supply of a commodity at its various prices. It is constructed by horizontal summation of all individual supply curves.

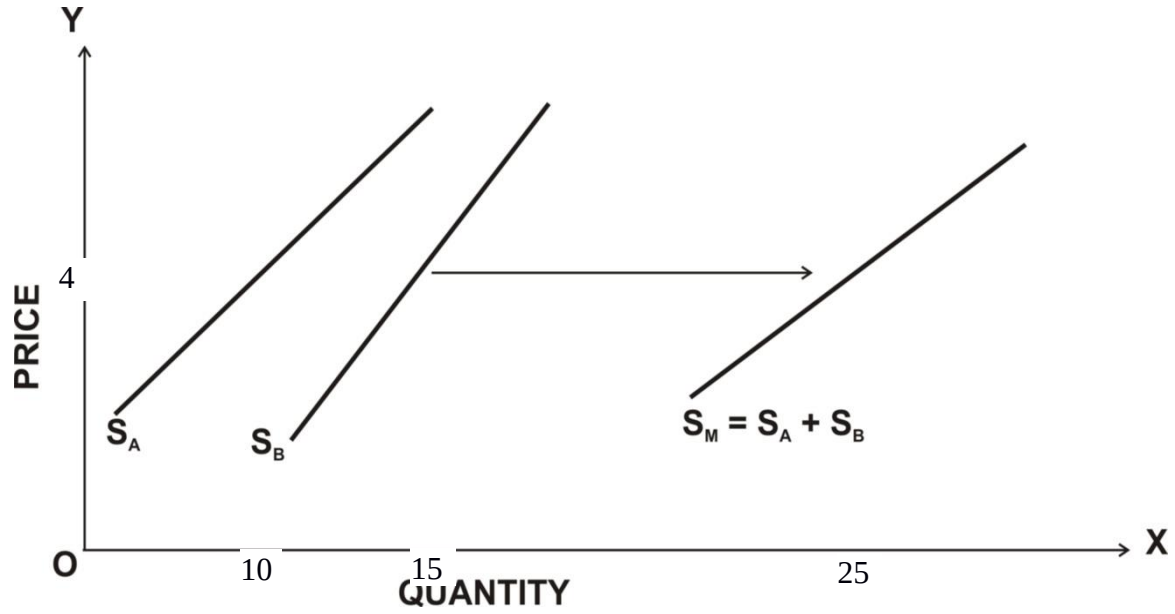

Figure 14: Market Supply Curve

In the diagram, we see the supply curves S_A and S_B of firms A and B respectively. At a market price of Rs.4, firms A and B are willing to sell 10 and 15 units respectively. Thus, we have a total of 25 units of the commodity for sale at a market price of Rs. 4, which gives us a point on the market supply curve. At each price, the market supply curve S_M depicts the sum total of quantities supplied by firms A and B. Thus, the market supply curve is constructed by the horizontal summation of all individual supply curves.

8. Summary

A supply curve shows relationship between the quantity of goods and the price marked for the sale of the good. Here the supply of goods depends upon the 1) Cost of production of a good and quantity of goods sold 2) and price of other similar goods.

The supply decision of the firm is an important indicator of profit. It is affected by the cost of producing the good and revenue earned by the sale of the good. In the market when the price of the good increases its supply may also increase and vice versa. Market supply is the total of all the goods supplied by the producer in the particular period.