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# UNIT 2 DEMAND AND SUPPLY ANALYSIS

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## 2.0 OBJECTIVES

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After studying this unit, you will be able to:

- distinguish between want and demand;
- explain the law of demand with the help of a demand schedule and a demand curve;
- identify the movement along a demand curve and a shift of the demand curve;
- state the concept of supply and its determinants;
- discuss the concept of elasticity of demand and supply and various methods of their measurement; and
- explain the importance and determinants of elasticity of demand and supply.

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## 2.1 INTRODUCTION

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Satisfaction of human needs is the basic end and goal of all production activities in an economy. As we have learnt in Unit 1, human wants are unlimited and recurring in nature, whereas means available to satisfy them are limited. Therefore, a rational consumer has to make an optimal use of available resources. The demand and supply analysis provides a framework within which these decisions have to be made. Hence, in this unit we shall discuss the various issues related to the theory of demand and supply analysis.

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## 2.2 THE NATURE OF DEMAND

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At first, let us understand the meaning of the terms like desire, want, and demand. Desire is just a wish on the part of the consumer to possess a commodity. If the desire to possess a commodity is backed by the purchasing power and the consumer is also willing to buy that commodity, it becomes want. The demand, on the other hand is the wish of the consumer to get a definite quantity of a commodity **at a given price in the market** backed by a sufficient purchasing power. There are three important points to remember about the quantity demanded:

**First**, the quantity demanded is the quantity desired to be purchased. It is the desired purchase. The quantity actually bought is referred to as actual purchase.

**Secondly**, quantity demanded is always considered as a flow measured over a period of time, like if the quantity demanded of oranges is 10, it must be per day or per week, etc.

**Thirdly**, the quantity demanded will have an economic meaning only at a given price. For example, the demand for oranges equal to 10 units per week at a price of Rs. 100 per dozen is a full and meaningful statement, as used in micro-economic theory.

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## 2.3 DETERMINANTS OF DEMAND

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The demand of a product is determined by a number of factors. Let us discuss them in detail.

### 2.3.1 Determinants of Demand by a Consumer

The demand for commodity or the quantity demanded of a commodity on the part of the consumer is dependent on a number of factors. These are mentioned as follows:

- i) Price of the commodity in question
- ii) Prices of other related commodities
- iii) Income of the consumers, and
- iv) Taste of the consumers.

Demand function refers to the rule that shows how the quantity demanded depends upon above factors. A demand function can be shown as:

$$D_x = f(P_x, P_y, P_z, M, T)$$

where,  $D_x$  is quantity demanded of X commodity,  $P_x$  is the price of X commodity,  $P_y$  is the price of substitute commodity,  $P_z$  is price of a complement good, M stands for income, T is the taste of the consumer.

If all the factors influencing the demand for a commodity X vary simultaneously, the picture would be highly complicated. Therefore, normally we allow only one of the factors to change, assuming that all other factors remain unchanged ('ceteris paribus' other things remaining equal).

**Demand Relationship:** Relationship of quantity demanded of a commodity to its various determinants can be stated as follows:

- 1) **Price of the commodity:** Normally, higher the price of the commodity, the lower the demand of the commodity. This is the law of demand.
- 2) **Size of the consumer's income:** When the increase in income leads to an increase in the quantity demanded, the commodity is called a 'normal good'. If an increase in income leads to a fall in the quantity demanded, we call that commodity an 'inferior good'.
- 3) **Prices of other commodities:** A consumer's demand for a commodity may also be influenced by the prices of some other commodities. Some are complementary goods, which are consumed along with the commodity in question while others may be used in place of this commodity. This category is called substitutes.

**Demand bears inverse relationship with prices of complements and direct relationship with prices of substitutes.**

Tea and coffee are substitutes and a car and petrol are example of a pair of complementary goods.

- 4) **Tastes of consumer:** If a consumer has developed a taste for a particular commodity, he/she will demand more of that commodity. Similarly, if a consumer has changed his taste against a particular commodity, less of it will be demanded at any particular price. This development of tastes may be related to seasons of the year as well. In summer months, you may consume more cold drinks and ice creams, whereas in winters, the preference may shift towards hot or warm drinks like tea and coffee etc.

### 2.3.2 Determinants of Market Demand

The factors determining the demand for a commodity in a market are the same as those which determine the demand for the commodity on the part of a consumer. Besides that two additional factors are also to be included. These two factors are:

- 1) **Size of the population:** All other factors remaining unchanged, the greater is the size of the population, more of a commodity will be demanded.
- 2) **Income distribution:** People in different income groups show marked differences in their preferences. So if larger share out of national income goes to the rich, demand for the luxury goods may rise and a rise in income share of the poor will increase demand for the wage goods.

A correct specification of the demand equation is a must for the estimated function to predict demand accurately.

#### Check Your Progress 1

- 1) Distinguish between want and demand of a commodity.  
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- 2) What are the determinants of demand of a commodity by an individual consumer?  
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- 3) Explain the factors influencing the market demand of a commodity.  
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## 2.4 THE LAW OF DEMAND

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The inverse relationship between the quantity of a commodity and its price, given all other factors that influence the demand is called 'law of demand'. It gives us a demand curve that slopes downwards to the right. We can explain this idea with help of a demand schedule, a table that records quantities demanded at different prices. This schedule, on being recorded on a two dimensional axes system, gives us a demand curve.

### 2.4.1 The Demand Schedule

Let us use imaginary figures to show the application of the law of demand. Table 2.1 given below, showing the application of the law of demand, is called the 'Demand Schedule'.

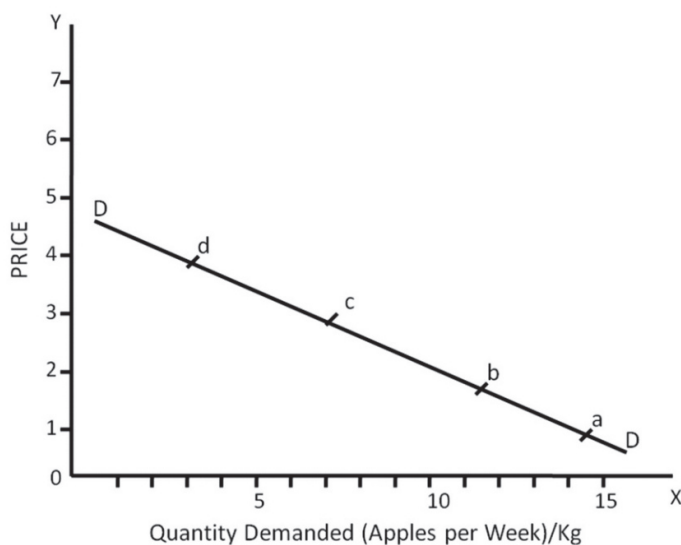
**Table 2.1 : The Demand Schedule of a Consumer for Apples**

Price of Apple per Kg. (in Rs.)	Quantity Demanded of Apples (in Kg. per week)
100	15
200	12
300	8
400	3

Four combinations of price and quantity demanded are shown in the Table 2.1. We can easily infer that as price of an apple rises quantity demanded by the consumer is falling.

### 2.4.2 The Demand Curve

The demand curve graphically shows the relationship between the quantity of a good that consumers are willing to buy and the price of the good. Let us understand the demand curve with the help of the Fig. 2.1. In this figure, on the Y-axis, price of an apple in rupees is measured and on the X-axis the quantity demanded of apples per week is measured. The first combination of Table 2.1 is shown by point a where at Rs. 100 per kg 15 units of apples are demanded. Similarly points b, c, d represent combinations of Rs. 200 price – 12 quantity demanded, Rs. 300 price – 8 quantity demanded and Rs. 400 price – 3 quantity demanded, respectively. The joining together of points a, b, c, and d give us the demand curve, DD.

**Fig. 2.1**

The most important feature of a demand curve is that it slopes downward from left to right. In Fig. 2.1 the demand curve is a straight line. But it can also be in the form of a curve as shown in Fig. 2.2.

Whether a demand curve is a straight line or a curve depends on how much quantity demanded rises with the fall of its price or how much quantity demanded falls with the rise in the price of the commodity. Whether we take Fig. 2.1 or 2.2, in both the cases the law of demand is applicable.

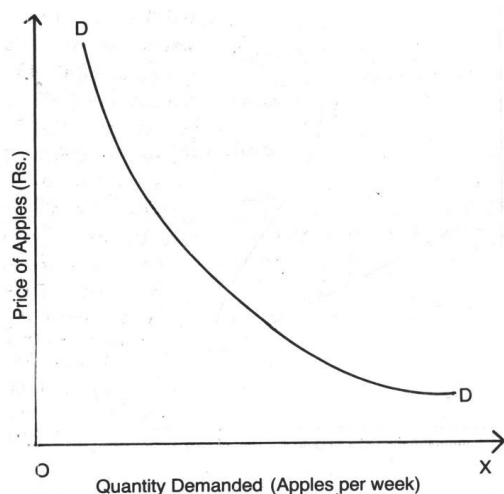


Fig. 2.2

If we record demand schedules of two or more consumers of a commodity on the same axes, we can get a number of demand curves. Horizontal summation of those curves gives us the market demand curve. We are illustrating a two consumer market demand curve for ice cream with help of the following schedule and diagram:

Table 2.2

Price (Rs)	Quantity Demanded by			Market Demand
	Household A		Household B	
3	4	+	5	=9
4	3	+	4	=7
5	2	+	3	=5
6	1	+	2	=3

Market demand curve is a horizontal summation of individual demand curves, as illustrated below.

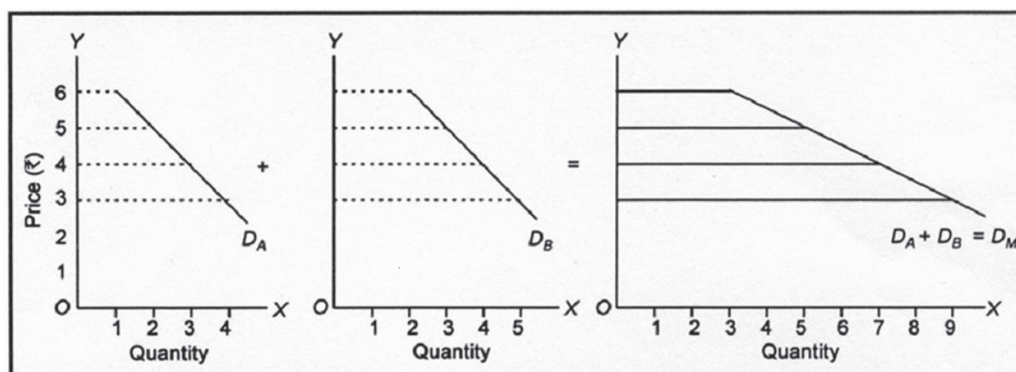


Fig. 2.3

### 2.4.3 Why does a Demand Curve Slope Downwards?

Law of demand states that there is an inverse relationship between the price of a commodity and its quantity demanded.

#### 1) Substitution Effect

Substitution effect results from a change in the relative price of a commodity. Suppose a Pepsi Can and a Coke Can both are priced at Rs. 90 and Rs. 20 each. If the price of Coke is raised to Rs. 25, and the price of Pepsi is not changed, Pepsi will become relatively cheaper to Coke, i.e. although the absolute price of Pepsi has not changed, the relative price of Pepsi has gone down. The change in the relative price of commodity causes substitution effect.

Similarly, if price of mango falls, the rest of the fruits will appear costlier, in comparison with mango.

So in both the cases above, the quantity demanded of relatively costlier items will register a decline.

#### 2) Income Effect

This is the effect of a change in total purchasing power of the money income of the consumer. As price of mango falls the purchasing power of the given money income rises, or his real income rises. Thus, he can buy more of the mangoes with the same money income. His demand for any other commodities may also rise. This is called the '**income effect**'. A commodity with positive income effect is called a 'normal good'. It shows a positive or direct relationship between the income and the quantity demanded.

When rise in income leads to a fall in the quantity demanded, we have a case of **negative income effect**. Such goods are called the '**inferior goods**'.

#### 3) Price Effect

**Price Effect** is the sum total of the substitution effect and income effect, i.e.

$$PE = SE + IE$$

Where PE = Price Effect.

SE = Substitution Effect

IE = Income Effect

It is important to note that substitution effect and income effect **operate simultaneously** with the change in the price of the commodity. '**Substitution effect**', and '**income effect**' taken together give 'price effect.' We can identify three cases.

- 1) Substitution effect always operates in a manner such that as price falls, quantity demanded of this commodity increases. If along with substitution effect, we take income effect and if that happens to be positive (a case of normal commodity) the law of demand will necessarily apply.
- 2) Given substitution effect, if income effect is negative (a case of an 'inferior commodity') the law of demand can still apply provided the substitution effect outweighs or is more powerful than the negative income effect, and

- 3) Given substitution effect, if income effect is negative and it outweighs or is more powerful than the substitution effect, the law of demand will not hold good.

### **GIFFEN GOOD**

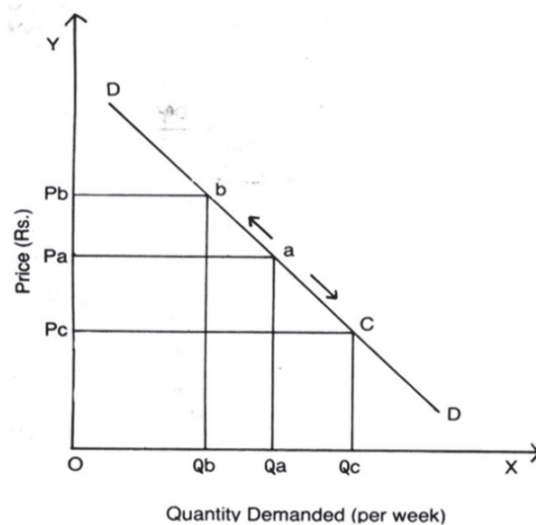
A case where negative income effect outweighs substitution effect is possible when we have ‘Giffen good’ named after the Robert Giffen who first talked of such paradox. Here a fall in the price of a commodity does not lead to a rise in its demand, it may result in a fall in demand for this commodity.

## **2.5 CHANGE IN QUANTITY DEMANDED Vs. CHANGE IN DEMAND**

When the demand for a commodity changes because of the change in its price, it is called ‘change in quantity demanded’. On the other hand, when the change in demand is due to the factors other than its price cause a change it is called ‘change in demand’.

### **Expansion and Contraction in Demand**

The change in quantity demanded of a commodity is called the expansion in demand if a fall in the price causes the quantity demanded to rise. Conversely, if with a rise in the price of a commodity, its quantity demand falls, we call it contraction in demand. These can be represented in the form of a movement on a demand curve, as shown in Fig. 2.4.



**Fig. 2.4**

DD is the demand curve. At point ‘a’ on the demand curve we find that at price  $OP_a$ ,  $OQ_a$  of a commodity is demanded. As price falls to  $OP_c$ , demand becomes  $OQ_c$ . This movement from point a to point c on the demand curve DD is referred to as ‘extension in demand’. Similarly when price of a commodity rises to  $OP_b$ , demand falls to  $OQ_b$ . Thus, the movement from a to b on the demand curve DD is known as ‘contraction in demand’.

### **Change in Demand**

Change in demand takes place when the whole demand scenario undergoes a change. This change occurs due to a change in any determinant of demand



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other than the price of that commodity.

Change in demand may take two forms:

- i) Increase in demand, and (ii) Decrease in demand

Increase in demand takes place when;

- a) at a given price, higher quantity is demanded, or
- b) at a higher price, the same quantity is demanded

Decrease in demand takes place when:

- a) at a given price, lower quantity is demanded, or
- b) at a lower price, the same quantity is demanded

Graphically, increase in demand results in rightward shift of the whole demand curve. Likewise, decrease in demand results in leftward shift of the demand curve. This is shown in the Fig. 2.5.

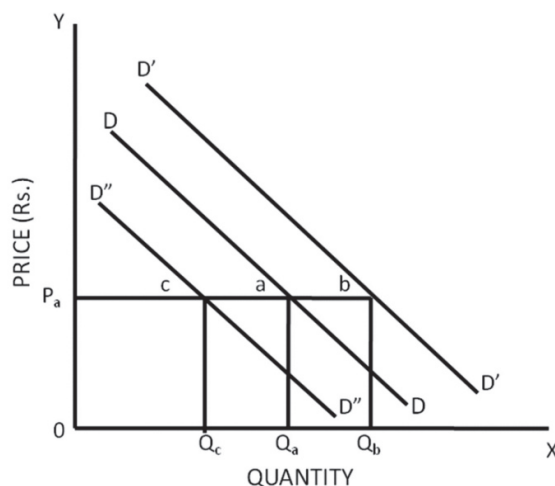


Fig. 2.5

At price  $P_a$ , at point 'a' on DD, quantity demanded is  $OQ_a$ . At the same price, quantity demanded rises to  $OQ_b$  at point b on the demand curve  $D'D'$ . This is called 'increase in demand'. Similarly, at price  $OP_a$  the quantity demanded comes down to  $OQ_c$  on point 'c' of demand curve  $D''D''$ . This change in quantity demanded is 'decrease in demand'. The shift of the demand curve to the right shows 'increase in demand' and a movement of the demand curve to the left of the initial demand curve is a 'decrease in demand'.

Many factors can shift a demand curve. Some of them are:

- 1) A rise in income of the consumer can enable him to demand more of a commodity at a given price and a fall in income will generally force him to curtail his demand.
- 2) A rightward shift in the demand curve can also take place because of increase in price of a substitute. Similarly, a leftward shift in the demand curve can be because of decrease in price of a substitute.
- 3) If the consumer develops a taste for a commodity, he may demand more of it even if the price remains unchanged, shifting the demand curve to the right. On the other hand, a leftward shift in the demand curve can indicate that our consumer has started disliking the commodity.

**Check Your Progress 2**

1) Given the demand function

$$q = 90 - 3P$$

i) at what price, no one will be willing to buy any commodity?

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ii) what will be the quantity demanded, if the commodity is given free.

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2) State the law of demand. Does it apply to all the goods?

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3) What is substitution effect?

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4) Substitution effect + Income effect = Price effect. Is it always true?

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5) Does a change in taste leads to a movement along the demand curve?

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**2.6 THE CONCEPT OF SUPPLY**

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Supply refers to the quantity of a commodity that producers are willing to sell at different prices per unit of time. Just like demand, the word supply also has some distinguishing features which are given below.

- 1) The supply of a commodity indicates the offered quantities. In fact, current supply can be different from current production, the difference is accounted for by the changes in the inventories or the stocks.
- 2) Like the demand, the supply is also with reference to the price at which that quantity is supplied. If the price is not mentioned, our statement would not carry any economic meaning.

- 3) The supply is a flow. It has a time unit attached therewith. The supply has to be per day/week or month.

Formally, supply of a commodity refers to the quantity that a producer is willing to sell at different prices.

### 2.6.1 Determinants of Supply

Some of the important determinants of supply are as follows:

- 1) **Price of the commodity supplied:** The price is most immediate determinant of supply. A person or firm will make quick check whether the costs will be covered by the price. As the price goes up, a firm/person will be willing to sell larger quantity.
- 2) **The prices of factors of production or cost of production:** These affect the cost of production and possible profits of the firm. A rise in the prices of factors of production discourages the production and supply of the commodity.
- 3) **Prices of other goods:** As the prices of other commodities rise, they become more attractive to produce for a profit maximising firm. Hence supply of commodity whose price is unchanged will decline.
- 4) **The state of technology:** The improvement in the knowledge about the means and the methods of production lead to lower costs of production and helps increasing output.
- 5) **Goals of the producer:** The objective with which the producer undertakes production also influences his production and supply decisions.

A simultaneous change in all the determinants makes analysis difficult. Therefore, we talk of a change in only one of the factors, others remaining unchanged to work out effect of that factor on the quantity of the commodity supplied by a firm.

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## 2.7 THE LAW OF SUPPLY

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A producer aims to maximise profits, the difference between total revenue and total cost. Total revenue is the price of the product multiplied by its quantity sold. Total cost is the cost of production.

$$\text{Profit} = \text{TR} - \text{TC}$$

$$\text{TR} = \text{Total Revenue (q.p)}$$

$$\text{TC} = \text{Total Cost (q.AC)}$$

where AC is average cost.

A higher price would mean more profits. The producer will supply more at a higher price. Similarly, a producer will supply smaller quantity at a lower price. This is a direct relationship between the price and the quantity supplied of a commodity and is called the 'Law of Supply'.

Here the change in price is the cause and change in supply is the effect. Thus, the supply function is:

$$S = f(P)$$

The supply of a commodity is a function of its price, the price of all other commodities, the prices of factors of production, technology, the objectives of producers and other factors remaining unchanged. So:

$$Q_s = f(P_1, P_2, P_3 \dots P_n, F_1 \dots F_a, T, G, \dots)$$

Where  $Q_s$  stands for the quantity of the commodity supplied;

$P_1$  is the price of that commodity,  $P_2, P_3 \dots P_a$  are the prices of other commodities;

$F_1 \dots F_n$  are the prices of all factors of production;

T is the state of technology;

G is the goal of the producer.

### 2.7.1 The Supply Schedule

A supply schedule shows quantities of a commodity that a seller is willing to supply, per unit of time, at each price, assuming other factors remaining constant. A supply schedule of a product based on imaginary data is given in Table 2.3 illustrating the relationship between price and quantity supplied as given by the law of supply.

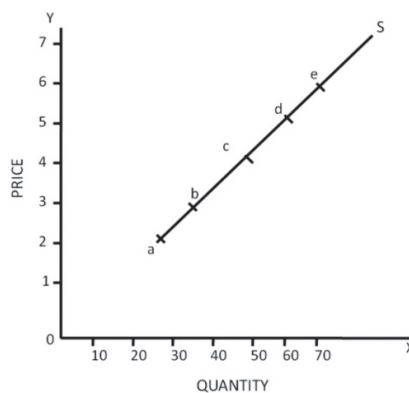
**Table 2.3: Supply Schedule of a Pen Producer**

Price (in Rs) per Pen	Quantity Supplied (in thousand) per Month
2	25
3	40
4	50
5	60
6	70

The schedule presented in Table 2.3 shows that at Rs. 2 per pen, the producer is willing to supply 25 thousand pens per month. At a higher price of Rs. 3 per pen, he is willing to supply 40 thousand pens per month and so on. This schedule depicts direct relationship between price per pen and quantity supplied of pens per month.

### 2.7.2 The Supply Curve

Look at Fig. 2.6 where the data from Table 2.3 has been plotted. Here price is plotted on the Y-axis and quantity supplied on X-axis.



**Fig. 2.6 : Supply Curve**

Fig. 2.6 shows that point labelled a, for example, gives the same information that is given on the first row of the table; when the price of pens is Rs. 2 per pen, 25,000 pens per month are offered for sale. Similarly, points b, c, d, and e on the graph correspond to row 3rd, 4th, 5th and 6th of Table 2.3 respectively.

The supply curve S is a smooth curve drawn through the five points a, b, c, d and e. This curve shows the quantity of pens offered for sale at each price.

The supply curve (just like a demand curve) can be linear straight line, or in the shape of an upward slopping curve convex downwards.

The upward slope of the supply curve indicates that higher the price, the greater the quantity will be supplied. If the supply curve is extended to the Y-axis, it may or may not pass through O. If it passes through O, it shows that the quantity supplied is zero when the price is zero. If it does not pass through zero, it shows that until the price rises up to a certain point, the quantity supplied will remain zero. Re. 1 can be such a price. The producer will not offer any quantity for sale if price is Re. 1 or less. The upward sloping supply curve is just a diagrammatic representation of the law of supply.

### 2.7.3 Exceptions to the Law of Supply

Generally speaking, the law of supply indicates a direct relation between the price and the quantity supplied. But there can be some exceptions to the law of supply such as:

**Non-maximisation of profits:** In some cases the enterprise may not be pursuing the goal of maximisation of profits. In that case, the quantity supplied may increase even when price does not rise. For example, if the firm wants to maximise sales, it may sell larger quantities even when the price remains unchanged.

A multiproduct firm may aim at maximising total profits, rather than profit from each of the line of production. So, the law of supply may not apply for each product.

**Factors other than price not remaining constant:** We may notice that factors other than the price of the product may not remain constant. For example, the quantity supplied of a commodity may fall at a given price if prices of other commodities show a tendency to rise. The change in technology can also bring about a change in the quantity supplied of a commodity even if the price of that commodity does not undergo a change.

**Check Your Progress 3**

- 1) Producers supply more at a higher price. Why?  
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- 2) Why does a supply curve usually slope upwards to the right?  
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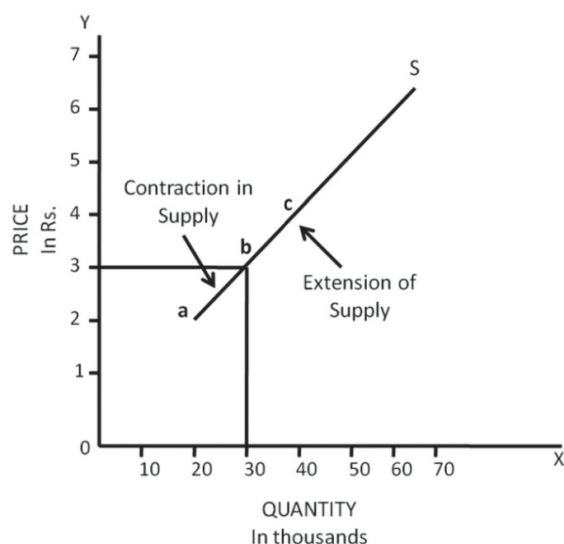
**2.8 CHANGES IN SUPPLY VERSUS CHANGES IN QUANTITY SUPPLIED**

**2.8.1 Changes in Quantity Supplied**

Just as we saw for the demand, there can be changes in the quantity offered for sale due to changes in the price of the commodity only, all other factors remaining constant. This is termed as change in quantity supplied. The change in quantity supplied can be of two types,

- 1) When the price of a commodity falls and its quantity supplied falls. It is termed as ‘contraction of supply’.
- 2) When the price of a commodity rises and its quantity supplied rises, provided the law of supply applies, it is termed as “extension of supply”.

The contraction, and ‘extension’ of supply has been shown in Fig. 2.7 below.



**Fig. 2.7 : Supply Curve**

Start with point b on the supply curve at which price per pen is Rs. 3 and quantity supplied is 30,000 pens. As price per pen falls to Rs. 2, the quantity supplied falls to 20,000. This is contraction of supply. When price of pen rises to Rs. 4, the quantity supplied rises to 40,000. This is extension of supply.

On the graph it is the movement from b to a on the supply curve which represents ‘contraction of supply’. Similarly, the movement from b to c on the curve represents ‘extension of supply’.

### 2.8.2 Change in Supply

If supply of a commodity undergoes a change because of changes in factors other than the price of the commodity, we call this change in supply. It is usually shown by a shift in the position of the supply curve.

Change in supply can be of two types:

**A decrease in supply:** When the quantity of a commodity supplied declines, at the same price it is referred to as a ‘decrease in supply’. It implies a leftward shift of the supply curve.

**An increase in supply:** When the quantity of a commodity supplied increases, at the same price, it is known as an increase in supply. This is shown by a rightward shift in the supply curve.

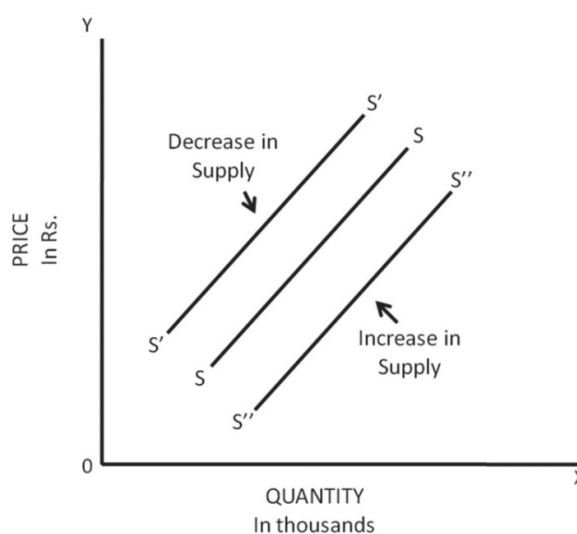


Fig. 2.8: Shifts in Supply Curve

In short, a rise in supply implies a rightward shift of the supply curve showing that producers are willing to supply more at each price. A fall in supply, on the other hand, implies a leftward shift of the supply curve indicating that producers are willing to supply less at each price.

### 2.8.3 Why the Supply Curve Shifts?

The reasons for the change in supply (both increase and decrease in supply) are:

- 1) **Change in the prices of other commodities:** A decrease in the prices of other commodities increases the supply of the commodity in question at each price because relative profits from supplying other products fall. An increase in the prices of other commodities decreases the supply of the commodity in question at each price.
- 2) **Change in the prices of factors of production:** An increase in the prices of factors of production used in producing the commodity tends to reduce the supply of the commodity as the cost of production rises but the price is given. Conversely, a decrease in the price of factors of production used

in making a commodity leads to an increase in supply, at each price.

- 3) **Change in technology:** An improvement in technology normally leads to a fall in cost of production and given the price of the product, a producer tends to produce more of that commodity, at each price. Conversely, loss in technical knowledge (the chances of which are meager) leads to a fall in supply.
- 4) **Change or expectation of change in other factors:** Sometimes, supply of a commodity may change because of the change in or expectation of a change in government policies, taxes or rate of interest, fear of war, inequalities of income and wealth which influence the demand pattern. This will affect supply through expectations of the producer about the profits.

**Check Your Progress 4**

- 1) How do you interpret a right shift of a supply curve?  
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- 2) Effects of factors other than the own price are shown by a shift of entire supply curve. Why?  
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- 3) Distinguish between an ‘increase’ in supply and an ‘extension’ of supply.  
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- 4) How does a contraction of supply differ from a decrease in supply?  
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## 2.9 THE IDEA OF ELASTICITY

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In Sections 2.4 to 2.8, we have studied impact of changes in determinant variables on the demand and supply. We examined, in particular, impact of own price, prices of related goods and income of the consumer on demand for a commodity. Likewise, we tried to explore impact of a change in own price, prices of factors of production etc. on the supply of a commodity. The above analysis underlined only one aspect: a change in a determinant leads to a change in the determined variable. We still do not know how strong the impact is. We still cannot say that how much change in, say, demand for oranges (or in



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supply of) will be if their price increased by 10 per cent. This situation makes it difficult to talk about the possible effects of the policy changes. In fact, an assessment of relative strength of the impacts of different determinants is also not possible. To this end, we use 'the idea of elasticity'.

The elasticity of a variable X with respect to some other variable Y shows responsiveness or sensitivity of X to changes in Y. the elasticity of X with respect to Y is defined as the ratio of per cent change in X to per cent change in Y. Symbolically:

$$E_{XY} = \frac{\text{Per cent change in X}}{\text{Per cent change in Y}}$$

We can also write it as:

$$E_{XY} = \frac{\Delta X/X}{\Delta Y/Y}$$

So the elasticity of demand for (or supply of) oranges with respect to a change in their price will be:

$$E_{q,p} = \frac{\Delta Q/Q}{\Delta P/P}$$

Where Q represents quantity of oranges and P represents their price.

If we show two commodities by symbols X and Y, their respective quantities and prices by  $Q_x$  &  $Q_y$  and  $P_x$  &  $P_y$  we can write down the expression for the cross elasticity of demand for X with respect to a change in the price of commodity Y:

$$E_{X,Y} = \frac{\Delta Q_x/Q_x}{\Delta P_y/P_y}$$

Similarly, We can write expression for income elasticity of demand:

$$E_{X,M} = \frac{\Delta Q_x/Q_x}{\Delta M/M}$$

Where M shows the income of the consumer.

### 2.9.1 Elasticity of Demand

We can use different diagrams to depict the demand curves and their elasticities.

The demand curve with Zero elasticity is depicted in Fig. 2.9. Here a change in price has no impact on the quantity demanded. Such a commodity is, sometimes, called an absolute necessity.

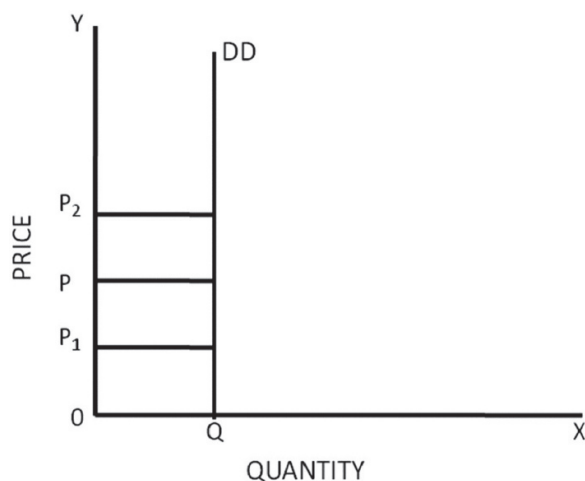


Fig. 2.9: Demand curve with zero elasticity

The Fig. 2.10 shows a demand curve which is infinitely elastic. In such a situation, a very small fall in price can lead to an extremely large increase in quantity demanded.

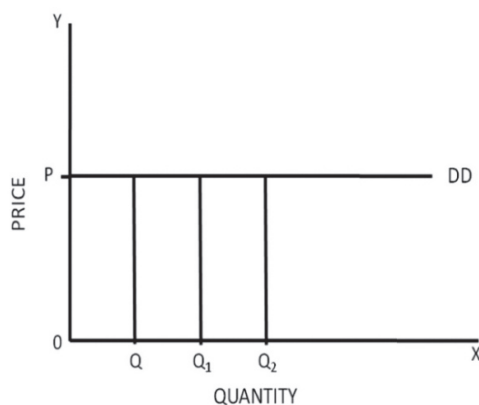


Fig. 2.10 : Infinite Elasticity of Demand

For a straight line demand curve falling to the right, elasticity of demand at any point on the curve is given by the ratio of the lower segment to the upper segment. Fig. 2.11, the elasticity will be:

$$E = (-) BE/EA$$

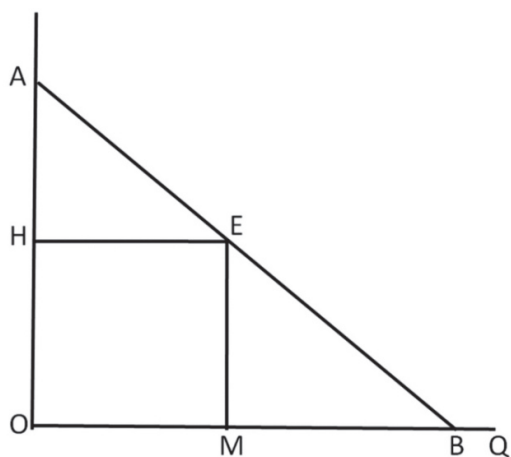


Fig. 2.11

## Introduction

A Proof: Initial price was OH and quantity demanded was OM. The price rises to OA. At this price, the consumer does not demand any quantity of the good. So, new demand is zero. Using this information in the formula for elasticity we get:

$$E = (\text{Change in quantity} / \text{original quantity}) / (\text{change in price} / \text{original price}) \\ = (OM/OM) / \{(OA - OH) / OH\} = 1 / (HA/OH) = OH/HA.$$

Now consider right angled triangle AOB. Line HE is parallel to base OB. Therefore it divides perpendicular and the hypotenuse in equal proportions. Therefore:

$$OH/HA = BE / EA$$

That means elasticity at point E on the demand curve AB equals ratio of lower segment BE to the upper segment EA.

We can depict a special type of demand curve which has elasticity equal to unity at every point. Such a demand function is shown using a rectangular hyperbola, a curve which shows constant area under the curve at every point on the curve. The Fig. 2.12 is such a demand curve.

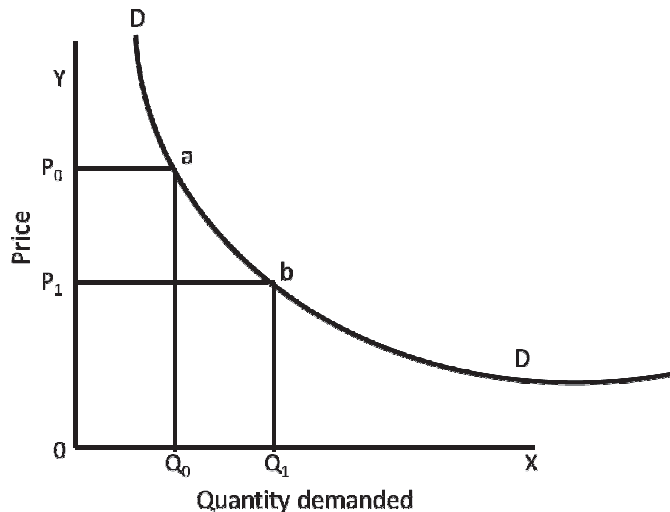


Fig. 2.12: Demand curve with unitary elasticity

We can, likewise, show supply curves with zero, unitary, infinite and variable elasticity.

### 2.9.2 Elasticity of Supply

A supply curve with zero elasticity is a vertical straight line, just like the perfectly inelastic demand curve.

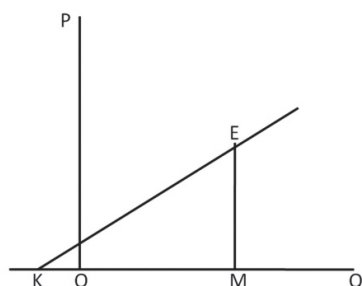
A straight line supply curve passing through the origin will have unitary elasticity throughout.

A straight line supply curve running parallel to the quantity axis will have infinite elasticity. This too is similar to the case of demand curve.

A straight line supply curve that intersects price axis will have elasticity greater than one at all points in the 1<sup>st</sup> quadrant.

A straight line demand curve that intersects quantity axis in 1<sup>st</sup> quadrant has elasticity less than one.

We can make a general observation about the supply curves involving the above characteristics. For a straight line supply function shown in Fig. 2.13, elasticity of supply at a point E can be determined in this manner: drop a perpendicular EM from E to the quantity axis. Extend the supply line to meet the quantity axis in point K. Then:



**Fig. 2.13: Elasticity of supply at point E**

$$E_s = KM/OM$$

If supply line passes through origin, point K will coincide with O. Therefore, the ratio KM/OM will be equal to unity (KM = OM). If the supply line intersects quantity axis in the 1<sup>st</sup> quadrant, elasticity will be less than one as KM < OM. In the Fig. 2.13, the supply line cuts quantity axis in 2<sup>nd</sup> quadrant. Therefore, KM > OM. Hence elasticity is greater than one.

## **2.10 MEASUREMENT OF PRICE ELASTICITY OF DEMAND**

There are a number of methods to measure price elasticity of demand. Some of the important methods are as follows:

- 1) **Point Method:** Also known as the percentage method (as discussed above), the main point to remember about this method is that it is employed only when the changes in price and quantity demanded are very small.
- 2) **Total Expenditure Method:** This total outlay method to measure price elasticity of demand is used whenever the changes in price and demand are not small. But it only helps us to distinguish three situations (i) whether the price elasticity of demand is one or unity, (ii) whether the price elasticity of demand is more than one, and (iii) whether the price elasticity of demand is less than one. Here the elasticity is measured by ratio  $P_1Q_1/P_0Q_0$ .

$$E = (P_1Q_1) / (P_0Q_0)$$

Where initial and after change price and quantity are indicated by subscript 0 and 1 respectively

- 3) **Geometrical Method:** According to this method, elasticity of demand is different at different points on a given demand curve, and is measured as follows on any point of a straight line curve.

$$E_p = \frac{\text{Lower segment of the demand curve}}{\text{Upper segment of the demand curve}}$$

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## 2.11 DETERMINANTS OF PRICE ELASTICITY OF DEMAND

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The price elasticity of demand for a commodity depends on these important factors:

- 1) **Nature of the Commodity:** The commodities are divided into three categories (i) necessities, (ii) comforts, and (iii) luxuries. Price elasticity of demand will be less for the necessities. We know a rise in the price of salt will not be able to force people to reduce their consumption. As luxuries are purchased by people with high income their demand also does not change much with change in price.
- 2) **Number of Substitutes:** If a good's substitutes are easily available, price elasticity of demand will be high.
- 3) **Number of uses of a commodity:** The greater the number of possible uses of a commodity, the greater its price elasticity of demand will be.
- 4) **Price level of a commodity:** The level of price will also have an impact on price elasticity of demand. A commodity priced high will have higher elasticity of demand and a low priced commodity will have lower elasticity (This idea becomes clearer when you revisit Fig. 3.12).

### Importance of Elasticity of Demand

The price elasticity of demand is very important in a number of policy decisions regarding individual commodity markets. Some of the important fields where price elasticity of demand is important are:

- 1) **Price fixation by a monopolist:** The monopolist is always interested in charging a higher price. If he comes to know that the price elasticity for a commodity is low, he would fix up a higher price for that commodity. He would not be able to charge a very high price for a commodity whose price elasticity of demand is relatively higher.
- 2) **Price support programme of the government:** A good harvest, because of better monsoon can lead to a big fall in agricultural prices as elasticity of demand is rather low. To protect the farmer's interests, the government announces a price support programme and the price of the commodity is not allowed to fall below a particular level. Obviously, this creates a situation of excess supply and the government has to lift the excess supply from the market.

Similarly, a poor harvest can raise the price. Here to protect the interest of the consumer, the government can announce a 'price ceiling' and releases stock from its own warehouses or imports to meet the excess demand in the market.

### Check Your Progress 5

- 1) Income elasticity is positive for normal goods only. Explain.

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- 2) Do you agree with the statement that ‘The sign of coefficient of cross elasticity depends on whether the commodity is a complement or a substitute’. Give reasons.

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## 2.12 DETERMINANTS OF ELASTICITY OF SUPPLY

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Elasticity of supply depends on a number of factors and all these factors are to be taken together before one can comment on the elasticity of supply of a commodity. Some of the important determinants of elasticity of supply are given as follows:

- 1) **Behaviour of costs as output varies:** As output of a commodity rises total cost do rise, normally, at a falling rate in the beginning, then at a constant rate and finally at a rising rate. If cost of production rises rapidly as output rises, then a rise in price will not induce a big rise in supplies.
- 2) **Nature of the commodity:** Perishable products cannot be stored for long and thus, their supply does not respond very much to the price changes. Durable products can be stored and their supply responds to the price changes.
- 3) **Time:** In the short-run, supply of a commodity is less elastic, but in the long run, the size of the plant can be changed supply responds to the price changes. Hence, supply can be more elastic.
- 4) **Price expectations:** If the producers expect that prices in the future will be maintained above particular level, they may produce more. If they expect prices to rise in the future, they may hold more stocks and may supply lesser quantities in the market. Supply in such a case will be inelastic. If the prices are expected to fall in the future, supply will be more elastic.

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## 2.13 LET US SUM UP

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The demand refers to the wish on the part of the consumer to buy a commodity in the market at a given price backed by the sufficient purchasing power. The price of the commodity in question, prices of other related commodities, income and taste of the consumers determine the demand for consumer.

Supply refers to the quantity a firm is willing to sell at a given price in every time period. In addition to the own price, supply of a commodity depends on prices of related goods and the factors of production as well. State of technology is another important determinant of supply.

Elasticity is the responsiveness of quantity demanded (supplied) to given changes in own price or prices of other related goods. In case of demand, it can be with respect to income as well. Elasticity can be measured by way of point

method, outlay method or geometrical method. Nature of the commodity, number of substitutes, number of uses of a commodity and price level of the commodity are among important determinants of price elasticity. Elasticities of demand and supply play an important role in price fixation by a monopolist, price support programme of the government and in determination of incidence of indirect tax.

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## **2.14 REFERENCES**

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- 1) Case, Karl E. and Ray C. Fair, *Principles of Economics*, Pearson Education, New Delhi, 2015.
- 2) Stiglitz, J.E. and Carl E. Walsh, *Economics, viva Books*, New Delhi, 2014.
- 3) Hal R. Varian, *Intermediate Microeconomics: a Modern Approach, 8<sup>th</sup> edition*, W.W.Norton and Company/ Affiliated East-West Press (India), 2010.

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## **2.15 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES**

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### **Check Your Progress 1**

- 1) See Section 2.2
- 2) See Sub-section 2.3.1
- 3) Size of the population, Income distribution.

### **Check Your Progress 2**

- 1) i) Rs. 30  
ii)  $q = 90$
- 2) See Section 2.4
- 3) See Section 2.4
- 4) Yes
- 5) No

### **Check Your Progress 3**

- 1) See Section 2.6
- 2) See Sub-section 2.7.2

### **Check Your Progress 4**

- 1) See Sub-section 2.8.2
- 2) See Sub-section 2.8.3
- 3) See Section 2.8
- 4) See Sub-section 2.8.1 & 2.8.2

### Check Your Progress 5

- 1) See Section 2.9
- 2) See Section 2.9

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## 2.16 TERMINAL QUESTIONS

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- 1) Explain the main determinants of demand for a commodity in the market.
- 2) Explain the law of demand with the help of a demand schedule and a demand curve.
- 3) Explain the exceptions to the Law of demand using the distinction between substitution and income effects.
- 4) Distinguish between an inferior good and a Giffen good.
- 5) What uses can be made by the government of the law of demand in deciding about the price policy and tax cum subsidy policy.
- 6) What is law of supply? Explain with help of a suitable example.
- 7) Explain the circumstances where the law of supply may not hold.