ENGINEERING ECONOMICS (ECE)
UNIT-II

WHAT IS DEMAND?

Demand is the quantity of consumers who are willing and able to buy products at various prices during a given period of time. Demand for any commodity implies the consumers' desire to acquire the good, the willingness and ability to pay for it.

The demand for a good that the consumer chooses, depends on the price of it, the prices of other goods, the consumer's income and her tastes and preferences. Whenever one or more of these variables change, the quantity of the good chosen by the consumer is likely to change as well. If the prices of other goods, the consumer's income and her tastes and preferences remain unchanged, the amount of a good that the consumer optimally chooses, becomes entirely dependent on its price. The relation between the consumer's optimal choice of the quantity of a good and its price is called the demand function.

What is Law of demand?

The law of demand describes an inverse relationship between price and quantity demanded of a good. If the price of the good increases, then the demand falls, because the consumer is usually reluctant to spend more and more money on her purchase. If the price of the good decreases, the demand for the good increases because with price being less, the consumer prefers to buy the good. Law of Demand, along with Law of Supply is used to explain how market economies allocate resources and determine the prices of goods and services in everyday transactions.

Demand is an economic principle referring to a consumer's desire to purchase goods and services and willingness to pay a price for a specific good or service. Holding all other factors constant, an increase in the price of a good or service will decrease the quantity demanded, and vice versa. Market demand is the total quantity demanded across all consumers in a market for a given good. Aggregate demand is the total demand for all goods and services in an economy.

Exceptions to the Law of Demand

Note that the law of demand holds true in most cases. The price keeps fluctuating until an equilibrium is created. However, there are some exceptions to the law of demand. These include the Giffen goods, Veblen goods, possible price changes, and essential goods. Let us discuss these exceptions in detail.

Giffen Goods

Giffen Goods is a concept that was introduced by Sir Robert Giffen. These goods are goods that are inferior in comparison to luxury goods. However, the unique characteristic of Giffen goods is that as its price increases, the demand also increases. And this feature is what makes it an exception to the law of demand.

The Irish Potato Famine is a classic example of the Giffen goods concept. Potato is a staple in the Irish diet. During the potato famine, when the price of potatoes increased, people spent less on luxury foods such as meat and bought more potatoes to stick to their diet. So as the price of potatoes increased, so did the demand, which is a complete reversal of the law of demand.

Veblen Goods

The second exception to the law of demand is the concept of Veblen goods. Veblen Goods is a concept that is named after the economist Thorstein Veblen, who introduced the theory of "conspicuous consumption". According to Veblen, there are certain goods that become more valuable as their price increases. If a product is expensive, then its value and utility are perceived to be more, and hence the demand for that product increases.

And this happens mostly with precious metals and stones such as gold and diamonds and luxury cars such as Rolls-Royce. As the price of these goods increases, their demand also increases because these products then become a status symbol.

The expectation of Price Change

In addition to Giffen and Veblen goods, another exception to the law of demand is the expectation of price change. There are times when the price of a product increases and market conditions are such that the product may get more expensive. In such cases, consumers may buy more of these products before the price increases any further. Consequently, when the price drops or may be expected to drop further, consumers might postpone the purchase to avail the benefits of a lower price.

For instance, in recent times, the price of onions had increased to quite an extent. Consumers started buying and storing more onions fearing further price rise, which resulted in increased demand.

There are also times when consumers may buy and store commodities due to a fear of shortage. Therefore, even if the price of a product increases, its associated demand may also increase as the product may be taken off the shelf or it might cease to exist in the market.

Necessary Goods and Services

Another exception to the law of demand is necessary or basic goods. People will continue to buy necessities such as medicines or basic staples such as sugar or salt even if the price increases. The prices of these products do not affect their associated demand.

Change in Income

Sometimes the demand for a product may change according to the change in income. If a household's income increases, they may purchase more products irrespective of the increase in their price, thereby increasing the demand for the product. Similarly, they might postpone buying a product even if its price reduces if their income has reduced. Hence, change in a consumer's income pattern may also be an exception to the law of demand.

Market Demand vs. Aggregate Demand

The market for each good in an economy faces a different set of circumstances, which vary in type and degree. In macroeconomics, we can also look at aggregate demand in an economy. Aggregate demand refers to the total demand by all consumers for all good and services in an economy across all the markets for individual goods. Because aggregate includes all goods in an economy, it is not sensitive to competition or substitution between different goods or changes in consumer preferences between various goods in the same way that demand in individual good markets can be.

Demand Schedule

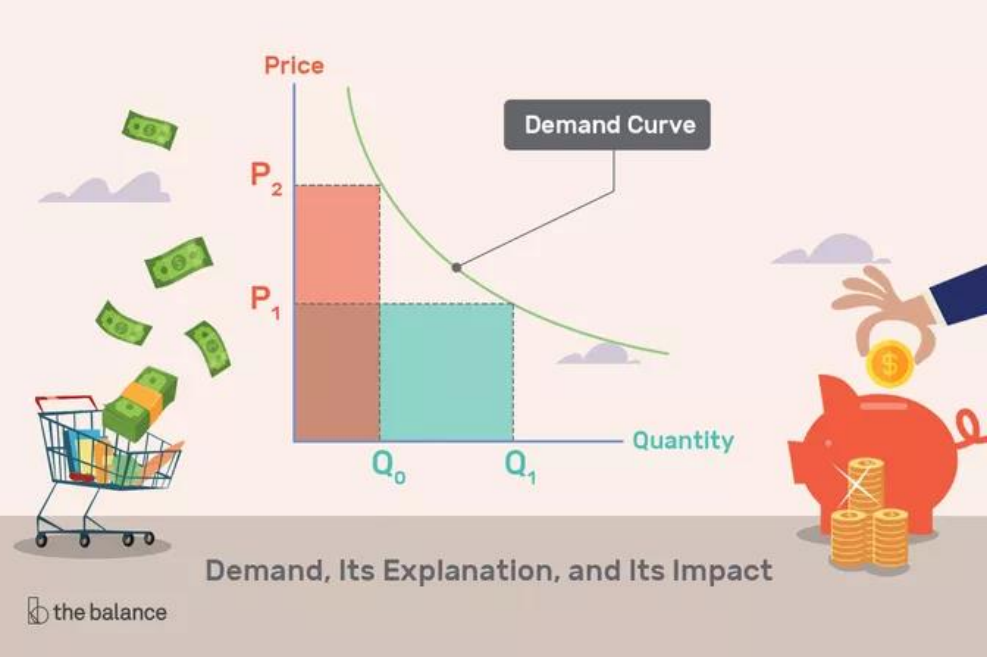
The demand schedule is a table or formula that tells you how many units of a good or service will be demanded at the various prices, *ceteris paribus*. Here is an example of a demand schedule:

Amount of Beef Bought at Each Price Point

Price/lb.	Quantity (in lbs.)
$3.46	10.0
$3.55	9.8
$3.69	9.5
$3.80	9.4
$3.85	9.3
$3.88	9.3
$3.88	9.3
$4.01	9.1
$4.09	8.9
$4.45	8.5

Demand Curve

If you were to plot out how many units you would buy at different prices, then you've created a demand curve. It graphically portrays the data that's been detailed in a demand schedule.



In the chart above, price is on the x-axis and quantity bought is on the y-axis. At P_2, the higher price, people will only buy Q_0, the lower quantity. If the price drops to P_1, then the quantity bought will increase to Q_1.

When the demand curve is relatively flat, then people will buy a lot more even if the price changes a little. When the demand curve is fairly steep, then the quantity demanded doesn't change much, even though the price does.

Types of Demand

Few important different types of demand are as follows:

1. **Price demand:** It refers to various types of quantities of goods or services that a customer will buy at a quoted price and given time, considering the other things remain constant.
2. **Income demand:** It refers to various types of quantities of goods or services that a customer will buy at different stages of income, considering the other things remain constant.
3. **Cross demand:** This means that the product's demand does not depend on its own cost but depends on the cost of the other related commodities.
4. **Direct demand:** When goods or services satisfy an individual's wants directly, it is known as direct demand.
5. **Derived demand or Indirect demand:** The goods or services demanded or needed for manufacturing the goods and satisfying the consumer indirectly is known as derived demand.
6. **Joint demand:** To produce a product there are many things that are related to each other, for example, to produce bread, we need services like an oven, fuel, flour mill, and more. So, the demand for other additional things to produce a product is known as joint demand.
7. **Composite demand:** A composite demand can be described when goods and services are utilised for more than one cause. Example: Coal
8. **Market or individual demand:** Here, the individual demand is defined as the demand for products or services by an individual consumer. The market demand can be defined as a demand for a product made by a bunch of consumers who buy that product. Therefore, it is a collective demand of each individual's demand.
9. **Derived demand:** The derived demand is defined when the goods manufactured are related to the demand for other products . For example, the demand for silk yarn is the result of the demand for silk cloth. However, the direct demand for goods can be defined when the demand for a product is independent. For example, there is an autonomous demand for cotton cloth.
10. **Price demand:** The price demand refers to the number of goods or services an individual is eager to buy at a given price.
11. **Income demand:** The income demand means the eagerness of a person to buy a definite quantity at a given income level.
12. **Cross demand:** This is one of the important types of demand where the demand of a product is not subjected to its own price but the price of other similar products is known as the cross demand

Q.1 Define demand. Explain any four important factors that affect the demand for a commodity.

Answer:

(A) Definition of demand

- Demand may be defined as the quantity of a commodity that a consumer is able and willing to buy, at each possible price, over a given period of time.
- Essential elements of demand are quantity, ability, willingness, prices, and period of time.

(B) The following are the important factors that affect the demand of a commodity:

(a) Own price of the given commodity

[$P_{i20\ Car}$ $D_{i20\ Car}$] [$P_{i20\ Car}$ $D_{i20\ Car}$]…Inverse Relation

Own price is the most important determinant of demand.
When the own price of a commodity falls, its demand rises and when its own price rises, its demand fal
Thus, we can say that there is an indirect relation between the price of a commodity and its quantity der

(b) Price of related goods

Substitute goods [$P_{Maruti\ Swift}$ $D_{i20\ Car}$]…Direct Relation
Complementary goods [$P_{Petrol}D_{i20\ Car}$]…Inverse Relation
Related goods are of two types. They are substitute and complementary.
(i) Substitute goods

When the prices of the substitute goods rise, the demand for the given commodity also rises and vice vers
For example, if the price of Maruti Swift increases, the demand for i20 will rise.

(ii)Complementary goods

	  (Car and Petrol) When the prices of the complementary goods rise, the demand for the given commodit versa. For example, if the price of petrol rises, the demand for cars falls.
(c) income of the consumer	**[Income$_{Household}$D$_{Normal\ Goods}$]…Direct relation** **[Income$_{Household}$D$_{Inferior\ Goods}$]…Inverse relation** To check the effect of change in the income of households over their demand, goods are divided into two c are as follows:

	 **(i) Normal goods** (Positive relation) These are the goods whose demand rises with the rise in income. Example: Basmati rice **(ii) Inferior goods** (Negative relation) These are the goods whose demand falls with the rise in income and vice versa. Example: Low quality ric
	(iii) Necessities: *A **third category** is also there, necessities, demand for these generally does not change with change in inco saving drugs.*
(d) Tastes and preferences of the consumer	The demand for a commodity is also affected by tastes and preferences. It rises if there is a favourable change in the tastes and preferences of the consumer and vice versa.
(e) Miscellaneous	Future expectations about price and income also affect the demand for a commodity in the present. Suppose, if we expect a rise in price in the near future, then we will increase demand in the present even at

Determinants of Demand

There are many determinants of demand, but the top five determinants of demand are as follows:

1) **Product cost:** Demand of the product changes as per the change in the price of the commodity. People deciding to buy a product remain constant only if all the factors related to it remain unchanged.
2) **The income of the consumers:** When the income increases, the number of goods demanded also increases. Likewise, if the income decreases, the demand also decreases.
3) **Costs of related goods and services:** For a complimentary product, an increase in the cost of one commodity will decrease the demand for a complimentary product. Example: An increase in the rate of bread will decrease the demand for butter. Similarly, an increase in the rate of one commodity will generate the demand for a substitute product to increase. Example: Increase in the cost of tea will raise the demand for coffee and therefore, decrease the demand for tea.
4) **Consumer expectation:** High expectation of income or expectation in the increase in price of a good also leads to an increase in demand. Similarly, low expectation of income or low pricing of goods will decrease the demand.

5) **Buyers in the market:** If the number of buyers for a commodity are more or less, then there will be a shift in demand.

Elasticity is a concept in economics that talks about the effect of change in one economic variable on the other.

Elasticity of Demand, on the other hand, specifically measures the effect of change in an economic variable on the quantity demanded of a product. There are several factors that affect the quantity demanded for a product such as the income levels of people, price of the product, price of other products in the segment, and various others.

Elasticity of Demand, or Demand Elasticity, is the **measure of change in quantity demanded of a product in response to a change in any of the market variables, like price, income etc.** It measures the shift in demand when other economic factors change.

In other words, the elasticity of demand is the **percentage change in quantity demanded divided by the percentage change in another economic variable**.

The demand for a commodity is affected by different economic variables:

1. Price of the commodity
2. Price of related commodities
3. Income level of consumers

> **"The elasticity (or responsiveness) of demand in a market is great or small according as the amount demanded increases much or little for a given fall in price, and diminishes much or little for a given rise in price".**
>
> – Alfred Marshall, British Economist

1. Price Elasticity of Demand (PED)

Any change in the price of a commodity, whether it's a decrease or increase, affects the quantity demanded for a product. For example, when there is a rise in the prices of ceiling fans, the quantity demanded goes down.

This measure of responsiveness of quantity demanded when there is a change in price is termed as the Price Elasticity of Demand (PED).

The mathematical formula given to calculate the Price Elasticity of Demand is:

PED = % Change in Quantity Demanded % / Change in Price

The result obtained from this formula determines the intensity of the effect of price change on the quantity demanded for a commodity.

2. Income Elasticity of Demand (YED)

The income levels of consumers play an important role in the quantity demanded for a product. This can be understood by looking at the difference in goods sold in the rural markets versus the goods sold in metro cities.

The Income Elasticity of Demand, also represented by YED, refers to the sensitivity of quantity demanded for a certain good to a change in real income (the income earned by an individual after accounting for inflation) of the consumers who buy this good, keeping all other things constant.
The formula given to calculate the Income Elasticity of Demand is given as:

YED *= % Change in Quantity Demanded% / Change in Income*

The result obtained from this formula helps to determine whether a good is a necessity good or a luxury good.

3. Cross Elasticity of Demand (XED)

In a market where there is an oligopoly, multiple players compete. Thus, the quantity demanded for a product does not only depend on itself but rather, there is an effect even when prices of other goods change.

Cross Elasticity of Demand, also represented as XED, is an economic concept that measures the sensitiveness of quantity demanded of one good (X) when there is a change in the price of another good (Y), and that's why it is also referred to as Cross-Price Elasticity of Demand.

The formula given to calculate the Cross Elasticity of Demand is given as:

XED *= (% Change in Quantity Demanded for one good (X)%) / (Change in Price of another Good (Y))*

The result obtained for a substitute good would always come out to be positive as whenever there is a rise in the price of a good, the demand for its substitute rises. Whereas, the result will be negative for a complementary good.

These three types of Elasticity of Demand measure the sensitivity of quantity demanded to a change in the price of the good, income of consumers buying the good, and the price of another good.
The effect of change in economic variables is not always the same on the quantity demanded for a product.

The demand for a product can be elastic, inelastic, or unitary, depending on the rate of change in the demand with respect to the change in the price of a product.

On the basis of the amount of fluctuation shown in the quantity demanded of a good, it is termed as **'elastic'**, **'inelastic'**, and **'unitary'.**

- An **elastic demand** is one that shows a larger fluctuation in the quantity demanded of a product, in response to even a little change in another economic variable. For example, if there is a hike of $0.5 in the price of a cup of coffee, there are very high chances of a steep decline in the quantity demanded.

- An **inelastic demand** is one that shows a very little fluctuation in the quantity demanded with respect to a change in another economic variable. An example of this can be petrol or diesel.

- **Unitary elasticity** is one in which the fluctuation in one variable and quantity demanded is equal.

We can further classify these elastic and inelastic types of demand into five categories.

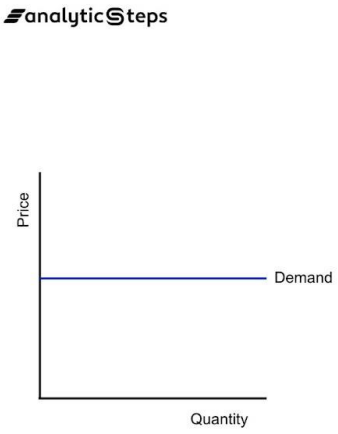


Figure 1: Perfectly Elastic Demand

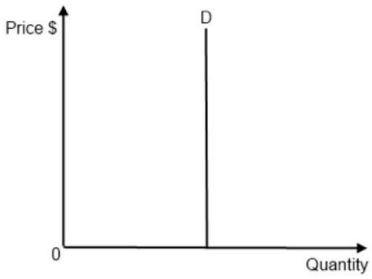


Figure 2: Perfectly Inelastic Demand

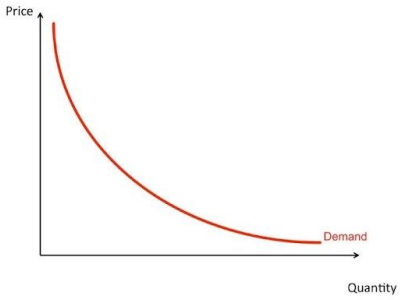


Figure 3: Unitary Elastic Demand

Demand Curves

1. Perfectly Elastic Demand

When there is a sharp rise or fall due to a change in the price of the commodity, it is said to be perfectly elastic demand.

In perfectly elastic demand, even a small rise in price can result in a fall in demand of the good to zero, whereas a small decline in the price can increase the demand to infinity.

However, perfectly elastic demand is a total theoretical concept and doesn't find a real application, unless the market is perfectly competitive and the product is homogenous.

The degree of elasticity of demand helps to define the slope and shape of the demand curve. Therefore, we can determine the elasticity of demand by looking at the slope of the demand curve.

A Flatter curve will represent a higher elastic demand. Thus, the slope of the demand curve for a perfectly elastic demand is horizontal.

2. Perfectly Inelastic Demand

A perfectly inelastic demand is the one in which there is no change measured against a price change.

Like perfectly elastic demand, the concept of perfectly inelastic is also a theoretical concept and doesn't find a practical application. However, the demand for necessity goods can be the closest example of perfectly inelastic demand.

The numerical value obtained from the PED formula comes out as zero for a perfectly inelastic demand.

The demand curve for a perfectly inelastic demand is a vertical line i.e. the slope of the curve is zero.

3. Relatively Elastic Demand

Relatively elastic demand refers to the demand when the proportionate change in the demand is greater than the proportionate change in the price of the good. The numerical value of relatively elastic demand ranges between one to infinity.

In relatively elastic demand, if the price of a good increases by 25% then the demand for the product will necessarily fall by more than 25%.

Unlike the aforementioned types of demand, relatively elastic demand has a practical application as many goods respond in the same manner when there is a price change.

The demand curve of relatively elastic demand is gradually sloping.

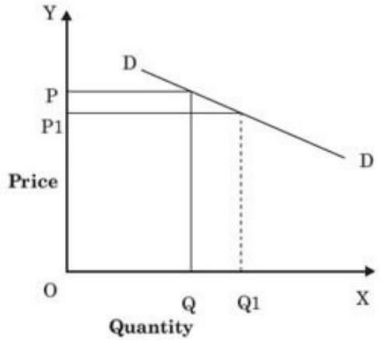


Figure 4: Relatively Elastic Good

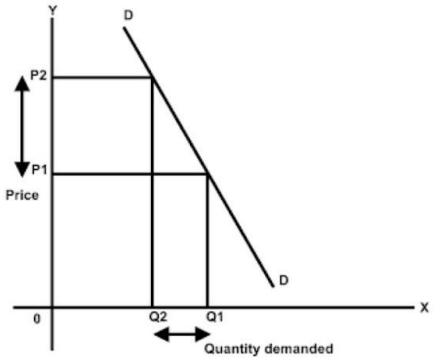


Figure 5: Relatively Inelastic Good

Demand Curves

4. Relatively Inelastic Demand

In a relatively inelastic demand, the proportionate change in the quantity demanded for a product is always less than the proportionate change in the price.

For example, if the price of a good goes down by 10%, the proportionate change in its demand will not go beyond 9.9..%, if it reaches 10% then it would be called unitary elastic demand.

The numerical value of relatively inelastic demand always comes out as less than 1 and the demand curve is rapidly sloping for such type of demand.

5. Unitary Elastic Demand

When the proportionate change in the quantity demanded for a product is equal to the proportionate change in the price of the commodity, it is said to be unitary elastic demand.

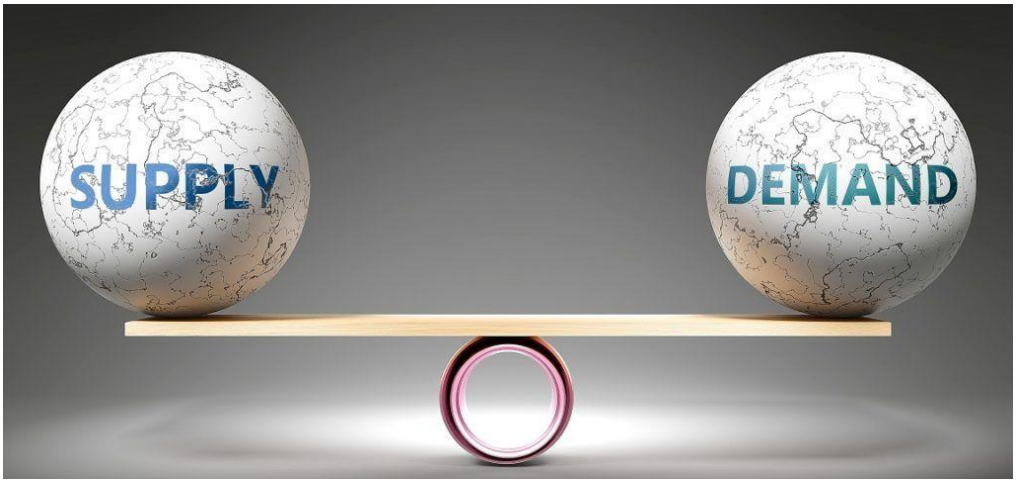
The numerical value for unitary elastic demand is equal to 1. The demand curve for unitary elastic demand is represented as a rectangular hyperbola.

Supply

The number of units of goods or services a supplier is willing and able to bring to the market for a specific price

What is Supply?

Supply is a term in economics that refers to the number of units of goods or services a supplier is willing and able to bring to the market for a specific price. The willingness and ability to avail products to the market are influenced by stock availability and the determiners driving the supply. A change in prices impacts the market equilibrium too. A price increase will result in more supplies, and a decrease will result in the opposite effect.



Ideally, in economics, consumers influence the supply of a product by indicating they need more units of a product, which drives prices higher. To the supplier, the market movements are a positive indication to increase the volume of supplies. However, the pattern may vary across products. At the point when the supply is equal to the demand, the price is said to be at equilibrium, i.e., there is no surplus supply or shortages.

However, as far as supply is at equilibrium, the consumer maximizes utility, and the suppliers enjoy optimal profits. Any more push of supplies in the market will disproportionately lead to suppliers incurring losses. Such an effect will reduce supply, which will tend to decrease prices until equilibrium is regained again.

The Law of Supply

This law in economics explains the reaction of the supplier when the prices in the market change. In its simplest explanation, when there is a shift in the price of a particular product or service, suppliers tend to maximize profits by increasing the quantity of products supplied.

All factors in the market must remain constant. On the contrary, when prices fall, they tend to move the supply on the opposite side until equilibrium is met.

Types of Supply

- **Short-term supply** explains that the ability of a purchaser to buy goods is constrained by the available supplies. Buyers cannot purchase beyond the supplied products.
- **Long-term supply** explains the factor of time availability whenever the demand changes – meaning, the availability of time gives the supplier a leeway to adjust to a sudden shift in demand.
- **Joint supply** explains the consequential supply. For example, lamb production affects meat and wool supply. In case farmers reduce farming lambs, meat and wool supply will go down, too. Similarly, an increase will result in the opposite effect.
- **Market supply** explains the overall willingness and ability of all suppliers to supply the market a particular product on a day-to-day basis. For example, wheat suppliers A, B, and C may be willing to supply 5, 0, 6 kilos in the market at $1 per kilo for a total of 11 kilos.

If prices rise to $2.50, the suppliers may increase to 10, 8, and 15 kilos, respectively. In total, the market supply amounts to 33 kilos.

- **Composite supply** is used to explain the supply of products that serves more than one purpose. A perfect illustration is the mining of crude oil. The production of oil affects the manufacturing of petrol, gas, kerosene, diesel, etc.

Supply in Brief-

Supply is the quantity of a commodity which is offered by a firm or a seller at a particular price during a given period of time. In other words, supply is that part of stock which is actually brought into the market for sale. A market supply refers to the quantity of a commodity that all firms are able to offer at a particular price during a given period of time.

Factors affecting supply

There are many factors affecting the supply of a commodity in the market including input costs, price of the commodity, the state of technology at a given time, taxation, prices of other goods, objective of the seller, number of firms selling the same commodity among others.

What does the law of supply state?

Law of supply expresses a relationship between the supply and price of a product. It states a direct relationship between the price of a product and its supply, if other factors remain unchanged. If the price of a product increases, sellers would prefer to increase the production of the product to earn high profits, which would automatically lead to increase in supply. Similarly, if the price of the product decreases, the suppliers would decrease the supply of the product in the market as they would wait for a rise in the price of the product in future. It indicates the direction of change in the amount supplied and it does not indicate the magnitude of change.

What are the exceptions to the law of supply?

There are certain exceptions to the theory law of supply. The law will not apply if there are future expectations for further change in prices. If sellers expect further fall in prices in future, they would be ready to sell more even at low prices. For perishable goods like milk, vegetables, fish, eggs, etc. the supply is not affected by their prices. Sellers cannot hold these goods for long. Even for agricultural goods, the supply depends more on natural factors such as drought, floods, natural calamities etc. and less on their prices.