UNIT 2
ANALYSIS OF DEMAND, DEMAND AND MARKET EFFICIENCY

→ DEMAND

- Meaning of demand:

  Demand is defined as the quantity of commodity that can be purchased at the given price and period of time.

  Ability and willingness to pay are essential elements of demand. If a consumer is able to pay, but is not willing to pay, his desires will not demand. In the same way, if a consumer is willing to pay, but unable to pay, his desires will not change into demand. Thus, in order to changes desires into demand, we should have both ability and willingness to pay.

- Determinants of demand:

  Demand depends on different factors. Factors determining demand are known as determinants of demand. Some determinants of demand are as follows:

  a) Price of the commodity: Price of the commodity is one of the important determinants of demand. When the price of the commodity rise, the demand for a commodity decrease and vice-versa. It shows that there is inverse relationship between price and demand of the commodity.

  b) Income of the consumer: When the income of the consumer change, the demand for a commodity also change. In case of normal good, if there is rise in income

of the consumer the demand for a commodity also increase and vice-versa. But in the case of inferior goods, the demand for commodity with the rise in income of the consumer. It means that, there is positive relationship between income and demand for normal goods and inverse relationship between income and demand for inferior goods.

c) Price of related goods: If the price of related goods change, the demand for a commodity also change. There are two types of related goods:
   i. Substitute goods: In the case of substitute goods, if the price of one goods increases, the demand for others will also increase and vice-versa. i.e. Tea and coffee, if the price of tea increases, assuming price of coffee remains constant, the demand for coffee increases.
   ii. Complementary goods: In case of complementary goods, if the price of one goods increases, assuming price of related goods remain constant, the demand for other will decrease. For example, pen and ink, if the price of pen increases, assuming price of ink remains constant, the demand for ink will decreases.

d) Taste and preference of consumers: Demand also depends on the taste and preference of consumers. The change in taste and preference cause in demand for goods. If the taste and preference of a commodity is in favour of consumer, the demand for the commodity increases and vice-versa.

e) Advertisement: There is a great importance of advertisement. Goods which are widely advertised, becomes popular and its demand will increase. People can get more information about goods from advertisement. As a result, demand of those goods increases.
f) Income distribution: Distribution of income also change demand for the commodity. If the distribution of income is more equal, the propensity to consume of the society in relatively high, and demand increases. If the distribution of income is more inequal, the propensity to consume is relatively low, which decreases demand for a commodity.
g) Climate and weather: Climate and weather also affect demand for goods. In winters season, the demand for warm clothes, hot drinks, heaters, etc. are increases. On the other hands, cold drinks, ice-cream, cotton clothes are increases in summer season.

- Law of demand:

The law of demand states the inverse relationship between the quantity price of a commodity and its quantity demanded. According to this law, the demand for a commodity increases with a fall in its price and decreases with a rise in its price, other things remaining the same.

Alfred Marshall states that the law of demand as " Other things remaining the same, the amount demanded increases with a fall in price and diminishes with a rise in price."

- Assumptions:
  - There is no change in income of the consumer.
  - There is no change in price of related goods.
  - There is no change in taste and preference of the consumers.
  - There is no change in climate and season.
  - There is no change in size and composition of population.

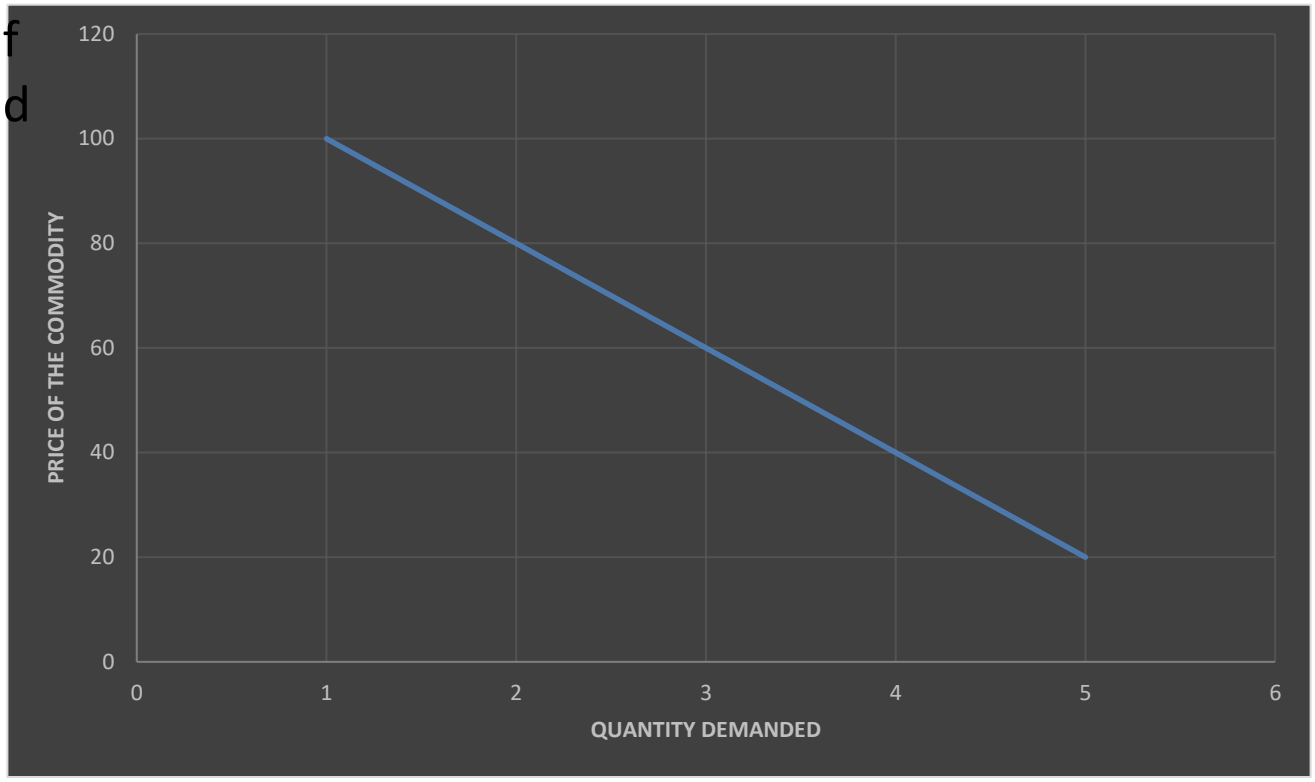
- Demand schedule:
  It shows the relationship between the price of a commodity and its quantity demanded.

Price (in Rs)	Quantity demanded (units)
100	1
80	2
60	3
40	4
20	5

This table shows an inverse relationship between the prices and the quantity demanded.

- Demand curve:
  It is the graph of the relationship between the price of a commodity and its quantity demanded.

f
d



It slops downwards from left to right. i.e. it is negatively sloped. The negative slope of the demand curve shows the inverse relationship between the price of the commodity and its quantity demanded.

- Exceptions of the law of demand:
  a) Exceptions regarding future price: When consumers expect arise in the price of a durable commodity, they buy more of it despite rise in its price. Similarly, when consumers expect a further fall in the price, they postpone their purchase, as a result demand decreases.
  b) Prosperity and depression: All the time of general prosperity, people buy more even when the price goes up. It is due to the increase in purchasing power of the consumer on the other hand, during the depression period, despite the fall in price, demand of the things

also decreases. This is because of the fall in purchasing power of consumers.

c) Ignorance: If the consumer is not aware of the competitive price of the commodity, he/she purchases more of the commodity even at higher price. It may also be due to the phobia that high priced commodity are always superior in quality. Such attitude of ignorance of the consumer makes the law of demand ineffective.
d) Change in fashion, habit and preference: Change in such behaviour of the consumer is also responsible for making the law of demand ineffective and not working.
e) Prestigious goods: The law of demand does not apply to the commodities, which serve as a status symbol, enhances social prestige or displays wealth and riches, i.e. gold, precious stone, rare paintings, etc.
f) Giffen goods: Giffen goods are those goods whose demand is higher price and whose demand is decrease with lower price. It is applicable incase of inferior goods. All giffen goods are inferior goods.

- Causes of downward slopping demand curve:
  a) Income effect: When the price of the commodity falls, the real income of the consumer will increase. Therefore, he/she will buy more quantities even at the same income. On the contrary, with the rise in the price of the commodity, the real income of the consumer will fall. Therefore, he/she will buy less even at the same income. This is called income effect.

b) Substitution effect: When the price of the commodity falls it becomes cheaper in comparison to its substitutes. The consumer will buy more of this commodity. For example, when the price of coco-cola falls, the price of pepsi remaining the same, the demand for coco-cola will increase and vice-versa.
c) Diminishing marginal utility: Marginal utility is the utility derived from the consumption of an additional unit of the commodity. According to this law, the marginal utility of the commodity declines continuously. Therefore, the consumer will buy more units of the commodity when its price falls. Thus, the demand will be more at a lower price and it will be less at a higher price.
d) Entry of new consumers: When the price of a commodity falls, some new consumers, who did not used to buy it all the previous price, they buy into purchase. If consequently, demand increases and vice-versa. Thus, demand will increases and decreases respectively.
e) Different uses: Many things such as electricity and coal have different uses. For example, when the price of electricity is high, it will be used only for important purpose. Thus, its demand will fall and vice-versa.

- Demand function:

Demand function is a functional or mathematical relationship between demand for a commodity and its determinants. It is expressed as:

$$D_X = f\{P_x, P_y, Y, A, W, F, \ldots\}$$

Where,

D_x = Demand of commodity X

P_x = Price of commodity X

P_y = Price of commodity Y

Y = Income of consumer

A = Advertisement

W = Weather and season

F = Fashion

For simplicity, demand function is also written as $D_x = f(P_x)$

- Types of demand function:
  a) Linear demand function: The demand function is said to be linear when the slope of demand curve remains constant throughout its length. It is expressed as:

$$Q_x = a - bP_x$$

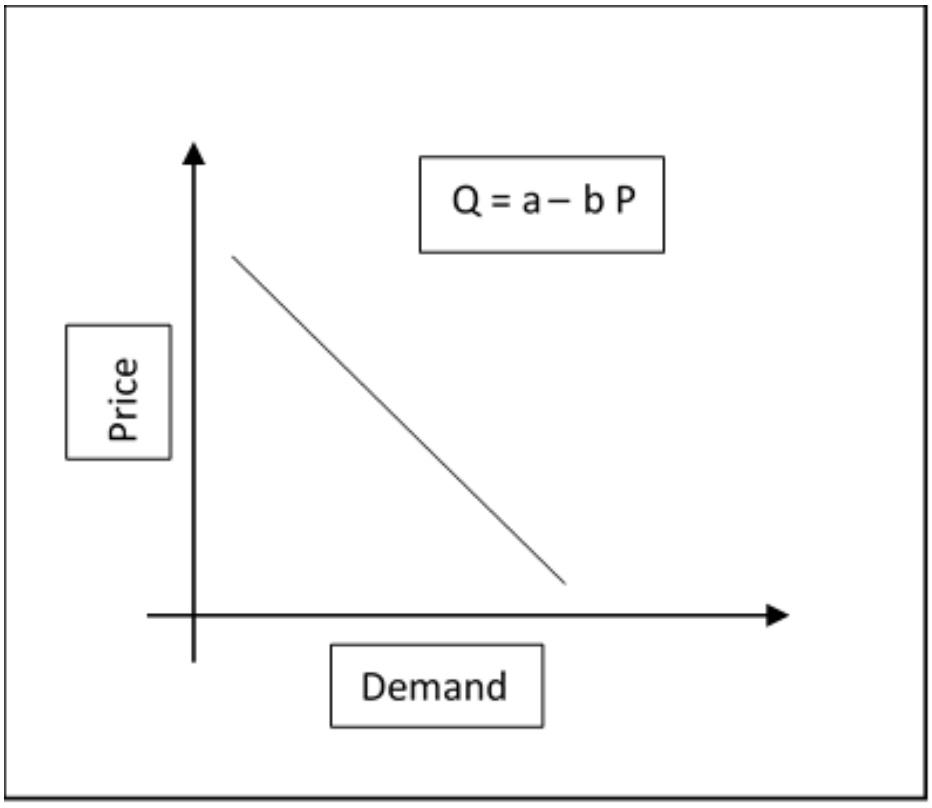
Where,

Q_x = Quantity demand of X

a = autonomous demand/demand at 0 price

b = slope of demand curve

P_x = Price of good X



b) Non-linear demand function: The demand function is said to be non-linear when the slope of demand curve changes throughout its length. It is expressed as:

$$Q_x = a\,(P_x)^{-b}$$

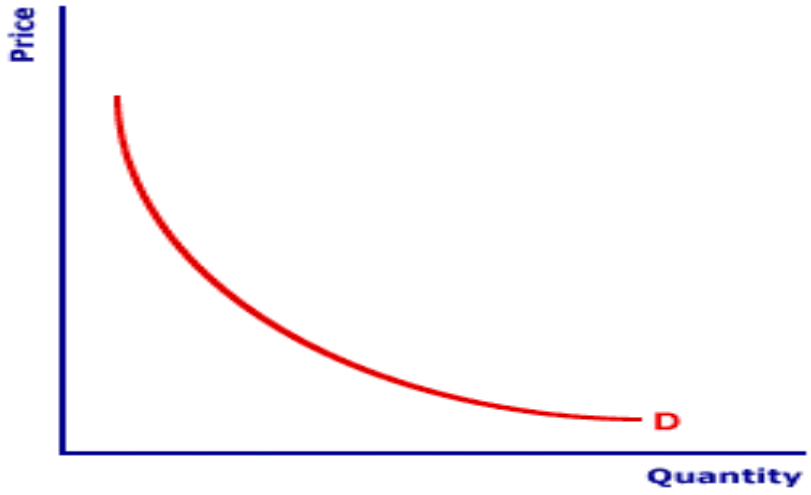
Where,

Q_x = Quantity demand of X

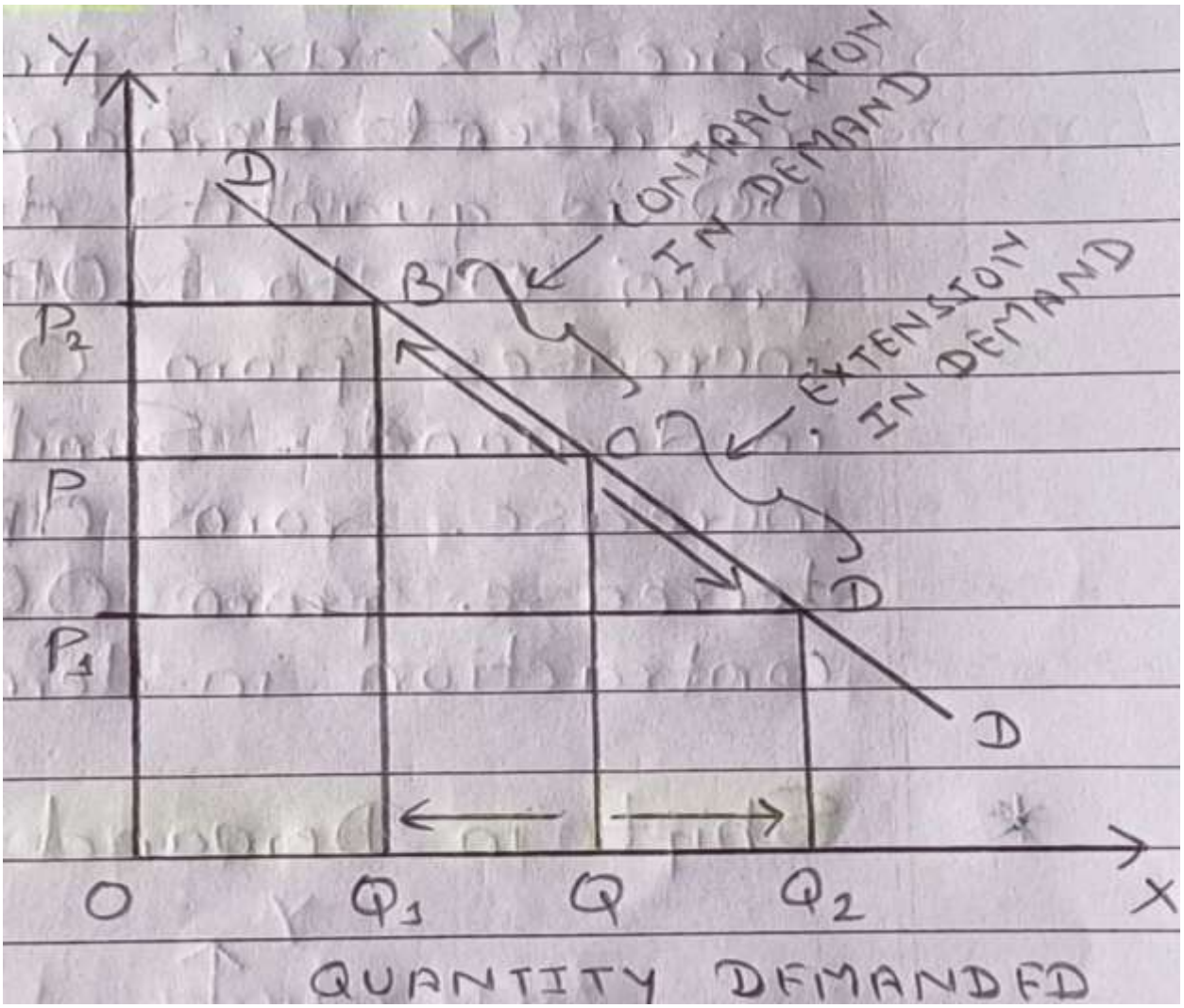
a = autonomous demand/demand at 0 price

b = slope of demand curve

P_x = Price of good



- Movement along a demand curve:



Movement along a demand curve is defined as the change in demand for a commodity due to change in its price, other things remaining same. When the change in demand is cause by change in price, then it is called extension or contraction in demand. The concept of extension and contraction in demand is explained as follows:

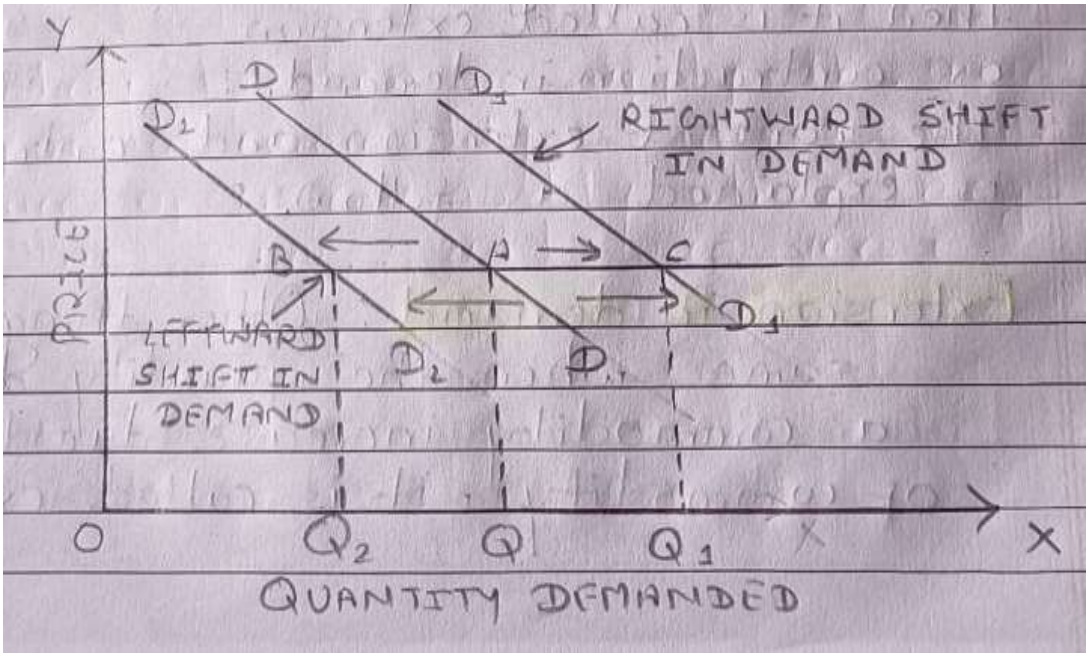
a) Extension in demand: Other things remaining the same, when the quantity demanded for a commodity increase due to fall in price of commodity, it is called extension in demand.

b) Contraction in demand: Other things remaining the same, when the quantity demanded for a commodity decreases with rise in price of a commodity, it is called contraction in demand.

- The concept of movement along a demand curve is shown in above figure:

In the above figure, Y axis represent, X axis represent quantity demanded and DD represent demand curve. At initial price OP, OQ is quantity demand, when price decrease from OP to OP_1, the quantity demand increase from OQ to OQ_2. This is extension in demand. Similarly, when the price is increase from OP to OP_2, the quantity demand decrease from OQ to OQ_1. This is called contraction in demand.

- Shift in demand curve:



Shift in demand curve is defined as the change in quantity demand, price of the commodity remaining constant, due to change in other factors. There are two types in shift in demand curve , which are as follows:

a) Rightward shift in demand curve (Increase in demand): Rightward shift in demand curve is defined as more demand for a commodity due to favourable change in other factors, price of the commodity remaining constant. It is also increase in demand.

b) Leftward shift in demand curve (Decrease in demand): Leftward shift in demand curve is defined as less demand due to unfavourable change in factors other than price of commodity. It is also called decrease in demand.

➢ The concept of shift in demand curve can be clearly explained by the help of above figure:

In the above figure, Y axis represent price of commodity, X axis represent quantity demand for a commodity and DD represent the initial demand curve at quantity demand OQ and price OP. When DD curve shift leftward to D_2D_2 at quantity demand OQ to OQ_2 at same price OP. This is called leftward shift in demand curve. And when DD curve shift rightward to D_1D_1 at OQ_1 quantity demand even at same price OP, it is called rightward shift in demand curve.

→ SUPPLY

- Meaning of supply:

The quantity of commodity that individual firm is willing and able to offer in sale over a given period is defined as supply.

In the words of prof. Thomas Sowell, "The supply of goods in the quantity offered for sale in a given market of a given time at various prices."

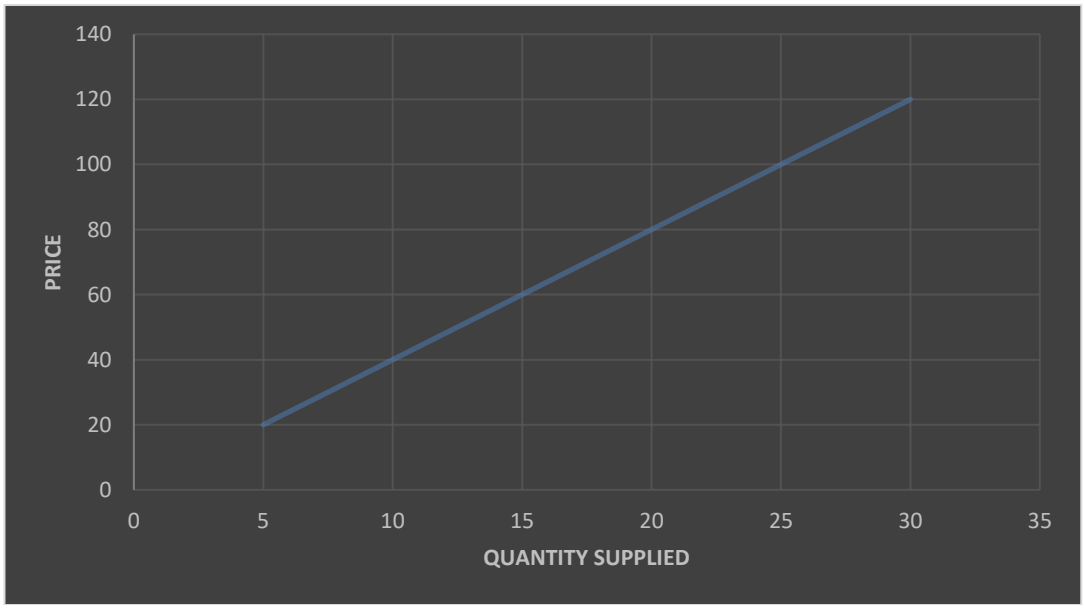
- Law of supply:

  According to law of supply, the quantity supplied for a commodity is increase with the rise in the price of commodity other things remaining same and vice-versa.

- Supply schedule:

Price (in Rs.)	Quantity supplied (units)
20	5
40	10
60	15
80	20
100	25

- Supply curve:



The upward slopping SS curve shows the positive relationship between quantity supplied and price.

- Exceptions to the law of supply:

a) Expected price: When price is expected to fall much, sellers sell more even at lower price in order to clear their stocks. When prices is expected to rise in future, sellers sell less even at higher price in the present time.
b) Change in other factors: Change in habit, taste, fashion, weather and national and international disturbances also effect the supply of commodity.
c) Agricultural goods: The supply of agricultural goods more depend upon natural factors rather than price of the commodity. For example, natural disaster like flood reduces supply of paddy.
d) Perishable goods: Sellers want to sell more units of perishable goods although their prices may be falling because the sellers cannot hold perishable goods.
e) Auction sale: When a firm wants to sell its old stock, it sells through auction sale. In the case of auction sale, sellers sale more goods at a reduced price. The motive behind such sale is to clear off old stock.

- Determinants of supply:

a) Price of the commodity: Price of the commodity is important determinants of quantity supply. When the price of the commodity increase, the quantity supply also increase and vice-versa. It shows positive

relationship between quantity supply and price of the commodity.

b) The price of the other goods: The supply of a particular commodity is inversely related with the price of other goods. For example, a rise in the price of Coca-Cola will fall the demand of Pepsi because it encourage suppliers to produce more Pepsi instead of Coca-Cola.
c) The price of factors of production: Land, labour, capital and organizations are the factors of production. When the price of factors of production increase, the supplier produce less commodity due to increase in cost of production. It results decrease in supply and vice-versa.
d) Goal of the firm: If the goal of the firms is to maximize profit, it produce less quantity of the commodity to sale at higher price. And, if the goal of the firm is to increases sales, it produce more and more commodity which increase quantity supply.
e) Improvement in technology: If an organization used modern equipment in production of goods and commodities, it reduces cost of production which encourage producers to produce more commodities. As a result, quantity supply increases.
f) Expected future price: If the producer expect rise in price of commodity in near future, current supply of the commodities decreases and vice-versa.
g) Numbers of firms: Market demand of a commodity also depends upon number of firms in the market. Increase in the number of firms increase production which results increase in supply and vice-versa.

h) Government policy: Taxation and subsidy policies of the government also affect market supply of the commodity. Increase in taxation tends to reduce the supply, whole subsidies tends to induce greater supply of the commodity.

- Supply function:

Supply function is defined as the functional relationship between quantity supply and its determinants. It is expressed as:

$$S_x = f \{ P_x, P_y, P_f, G, G_P, N, \ldots\ldots\}$$

Where,

S_x = Supply of commodity X
P_x = Price of commodity X
P_y = Price of other related
P_f = Price of factors of production
G = Goal of the firm
G_P = Government policy
N = Number of firms

In simple, it is expressed as: $S_x = f \{ P_x\}$

- Types of supply function:

a) Linear supply function: The supply function is said to be linear when the slope of supply curve remains constant throughout its length. It is expressed as:

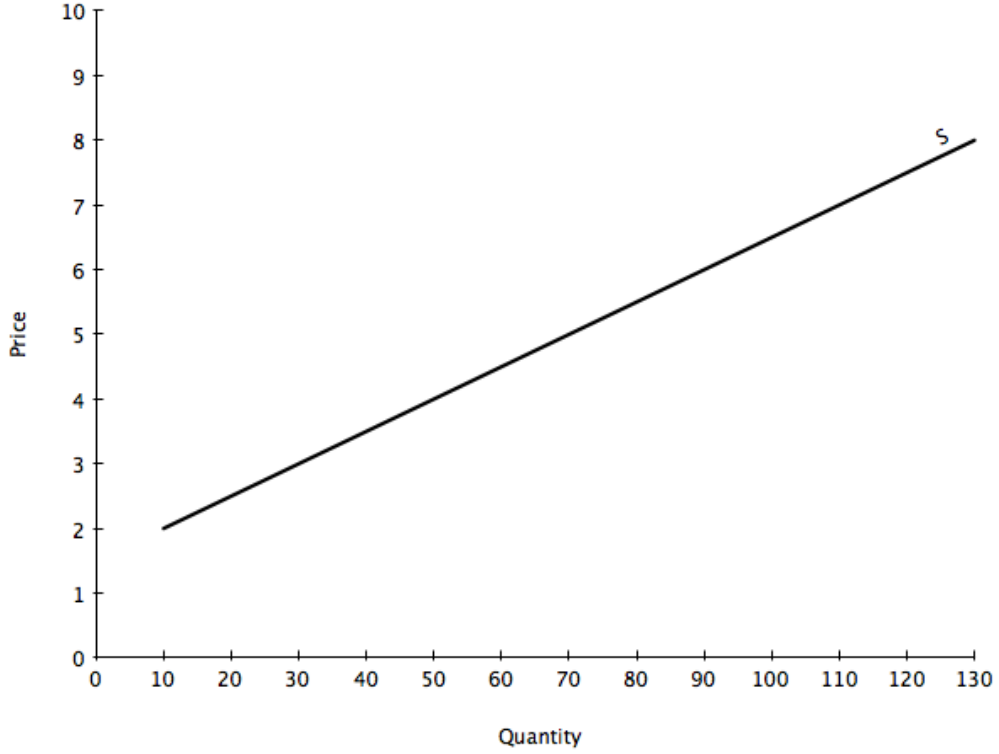
$$Q_x = a + bP_x$$

Where,

Q_x = Quantity supply of X
a = autonomous supply/ supply at 0 price

b = slope of supply curve

P_x = Price of good X



b) Non-linear supply function: The supply function is said to be non-linear when the slope of supply curve changes throughout its length. It is expressed as:

$$Q_x = a\,(P_x)^{-b}$$

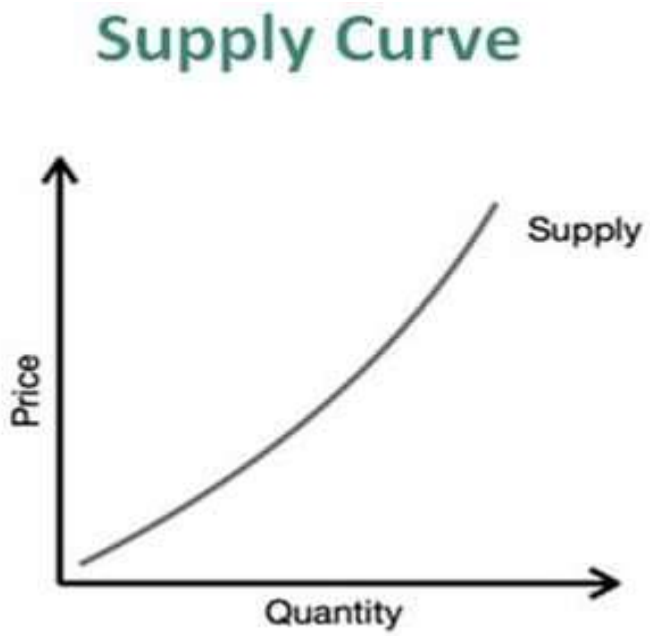
Where,

Q_x = Quantity supply of X

a = autonomous supply/supply at 0 price

b = slope of supply curve

P_x = Price of good



- Movement along a supply curve:

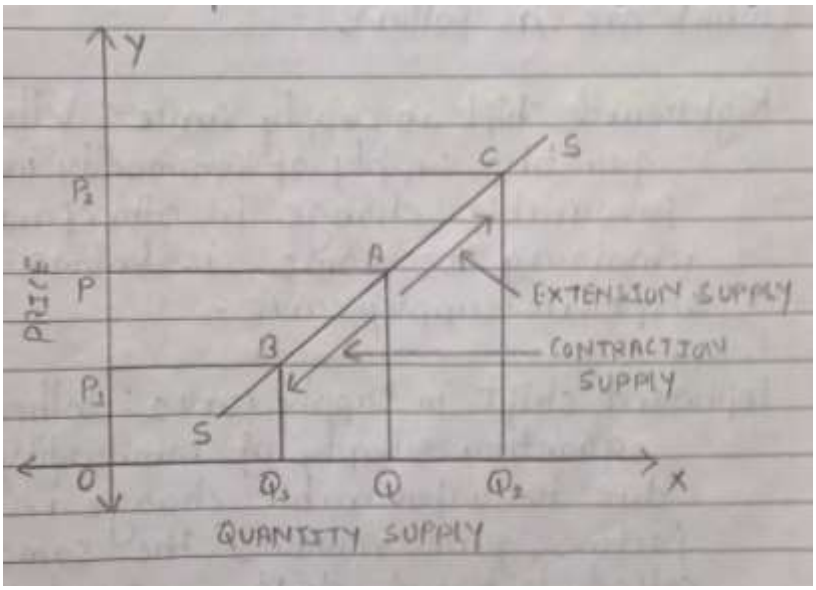
  Movement along a supply curve is defined as the change in the quantity supply due to change in price of the commodity, others factors remains constant.

  When quantity supplied changes due to change in price, it is called extension or contraction in supply. The concept of extension and contraction in supply is explained as follows:

  a) Extension in supply: When there is increase in quantity supply due to increase in price of the commodity, other things remaining the same is known as extension in supply.

  b) Contraction in supply: Other things remaining same, when quantity supplied of a commodity decreases with the fall in price of commodity is known as contraction in supply.

The concept of movement along supply curve is described clearly with the help of the given figure:



In the given figure, X-axis and Y-axis represents quantity supply and price of commodity, respectively. The upward sloping curves represent supply curves. At initial price OP, the quantity supply is OQ, when price increases from OP to OP_2, the quantity supplied increases from OQ to OQ_2 which is called extension in supply. And, when price fall from OP to OP_1 the quantity supply decreases from OQ to OQ_2 which called contraction in supply.

- Shift in supply curve:
  Shift in supply curve is defined as the change in quantity supply due to change in other factors, price remaining the same. There are two types of shift in supply curve, which are as follows:
  a) Rightward shift in supply curve: When the quantity supply of commodity increase with favourable change in other factor, price remaining the same, is known as rightward shift in supply curve.
  b) Leftward shift in supply curve: When the quantity supply of commodity decrease due to favourable change in

other factors, price remains the same, it is called leftward shift in supply curve.

The concept of shift in supply curve is explained by the given figure:

In the above figure, X-axis represents quantity supply, Y-axis represents price and upward slopping curve SS represent initial supply curve. At same price OP, the initial supply curve is SS. SS curve shift leftward to S_1S_1 at quantity supply decreases from OQ to OQ_1 , which is called leftward shift in supply curve. When SS curve shift rightward at quantity supply S_2S_2 even at the same price OP, it is called rightward shift in supply.

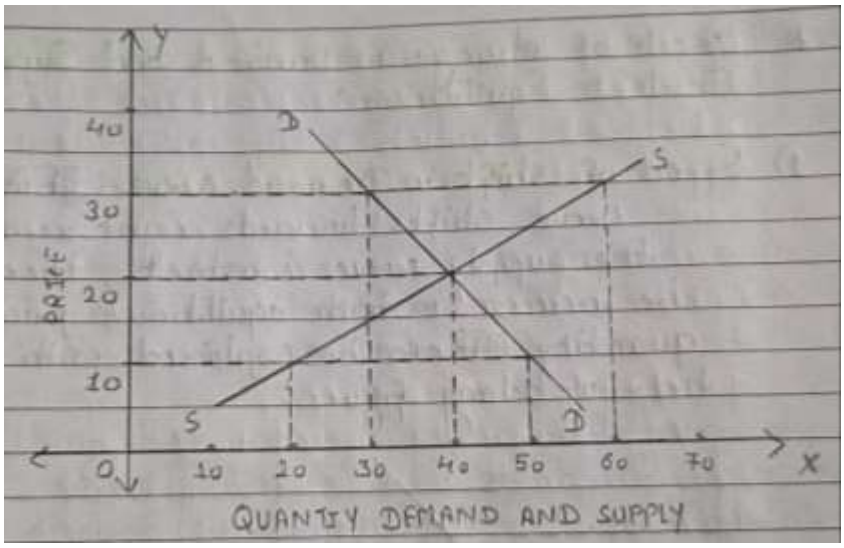
- Market Equilibrium:

  Equilibrium is the balance between opposite forces where quantity demand equals quantity supplied. Similarly, equilibrium price is the price at which quantity demand equals quantity supply and equilibrium quantity is the quantity demanded and supplied at the equilibrium price. This concept can be explained with the help of given table:

Price	Quantity demanded	Quantity supply
30	30	60
20	40	40
10	50	20

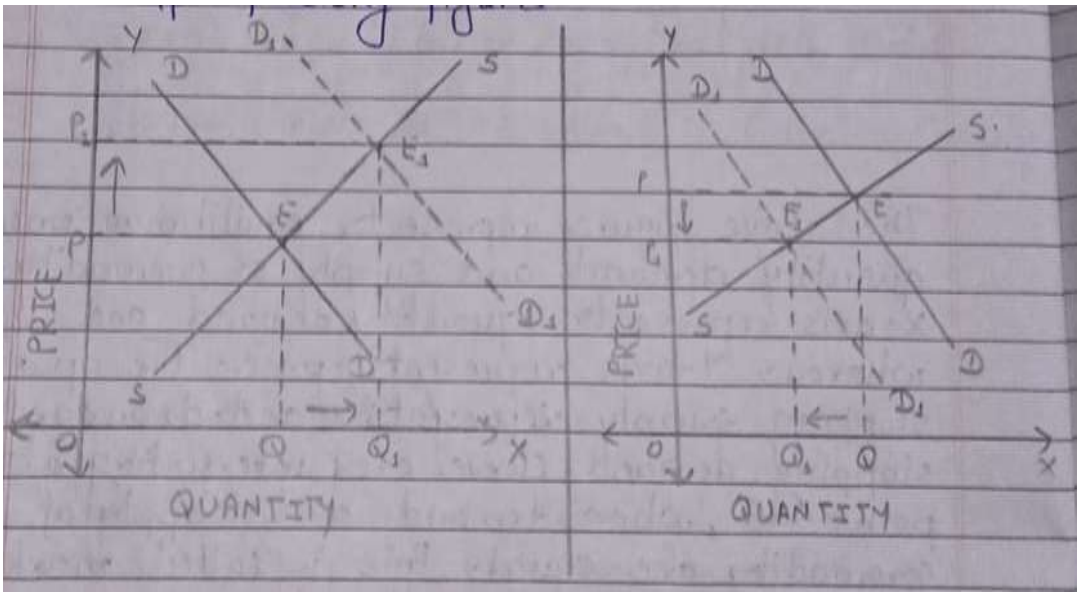
The table shows opposite relationship between price and quantity demanded and direct relationship between price and quantity supplied. Here, Rs 20 is the equilibrium price where quantity demand and quantity supply equals with 40 units.

This can be explains with the help of given figure:



The above figure represents equilibrium price, quantity demand and supply of commodity. X-axis represents quantity demand and supply whereas Y-axis represent price. The upward slopping supply curve (SS) and downward slopping demand curve are intersecting at point E, where demand and supply of a commodity are equal, this is called market equilibrium at Rs 20. When the price is increases from Rs 20 to Rs 30, there is excess of supply and when the price decreases for Rs 20 to Rs 10, there is excess in demand in the market.

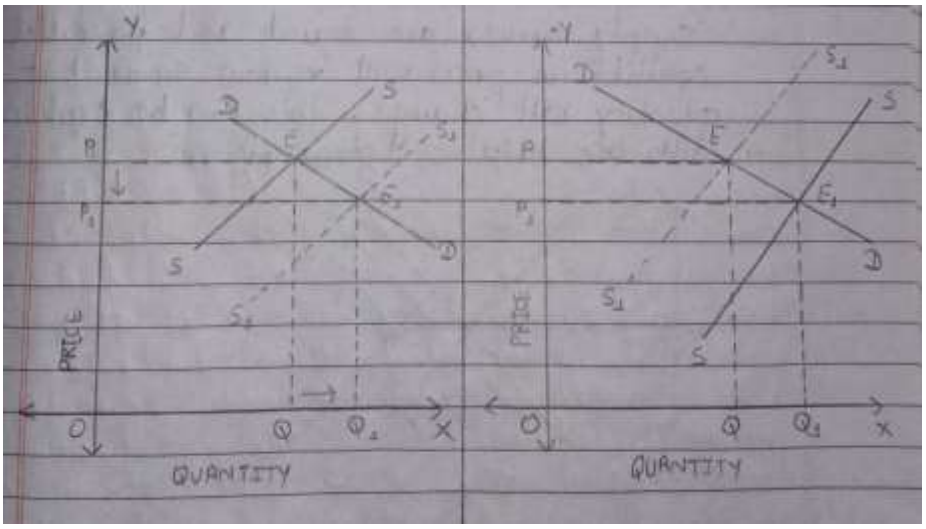
- Effect of change in demand and supply in market equilibrium:
  a) Effect of shift in demand curve: If the demand curve shifts towards right remaining the supply curve constant, there will be increase in both equilibrium price and quantity. It can be expressed with the help of below figure:



Here, DD is the initial demand curve and SS is the supply curve and these curves are intersecting each other at point E which is the initial equilibrium point. At this point, initial equilibrium price and quantity are OP and OQ, respectively. Let us suppose, the initial demand curve shifts towards right which changes the equilibrium from E to E_1, as a result both equilibrium price and quantity increases from OP to OP_1 and OQ to OQ_1, respectively.

On the other hand, if the demand curve shift leftward, then there will fall in both equilibrium price and quantity.

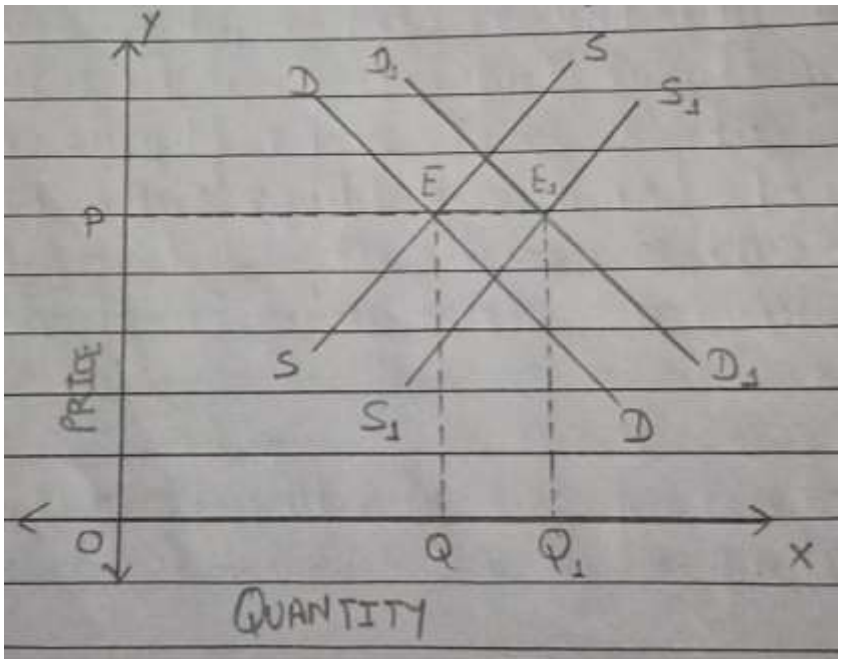
b) Effect of shift in supply curve: If the supply curve shift towards right remaining the demand curve constant the equilibrium price decreases and quantity increases. This can be explained with the help of below figure:



In the figure, initial supply curve SS and demand curve DD are intersecting each other at point E which is the initial equilibrium point. Let us suppose, the initial supply curve shifts towards right from SS to S_1S_1, remaining curve constant. Consequently, new equilibrium point E_1 is attained by reducing the price OP to OP_1 and increase in the quantity from OQ to OQ_1.

If the supply curve shifts towards left, the price will increase and quantity will decrease.

c) Effect of shift in both demand and supply curve: If the relative shift in demand and supply curves are equal and parallel equilibrium price will remain same but the quantity will change. This can be explain with the help of given figure:

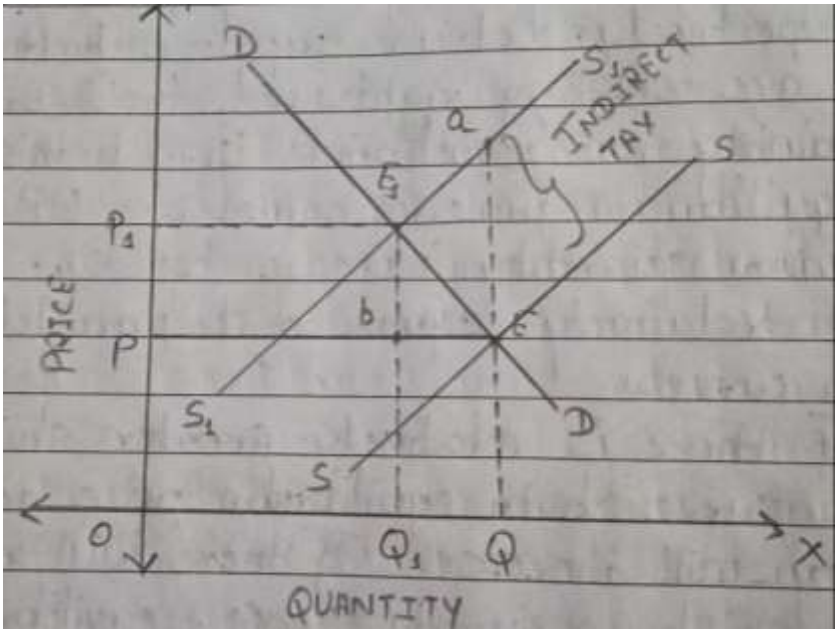


In the figure, DD and SS are the initial demand and supply curve and these curves are intersecting at point E which is the initial equilibrium point. At this point, initial equilibrium price and quantity are OP and OQ respectively. Let us suppose, both these curves are shifting rightward to D_1D_1 and S_1S_1 by attaining new equilibrium E_1. At this point, the equilibrium price is same i.e. OP and equilibrium quantity increase to OQ_1. Since, there is relatively equal and parallel shift in both curves.

If there is relatively greater shift in demand curve, both equilibrium price and quantity will increase. If there will relatively greater shift in supply curve, equilibrium quantity will rise and price will fall.

- Effect of Government policy on market equilibrium:
  a) Effect of tax policy on market equilibrium: Tax is the regulation by the government to influence the pattern of consumption, production and distribution. There are two types of taxes: direct taxes and indirect taxes. Here, we

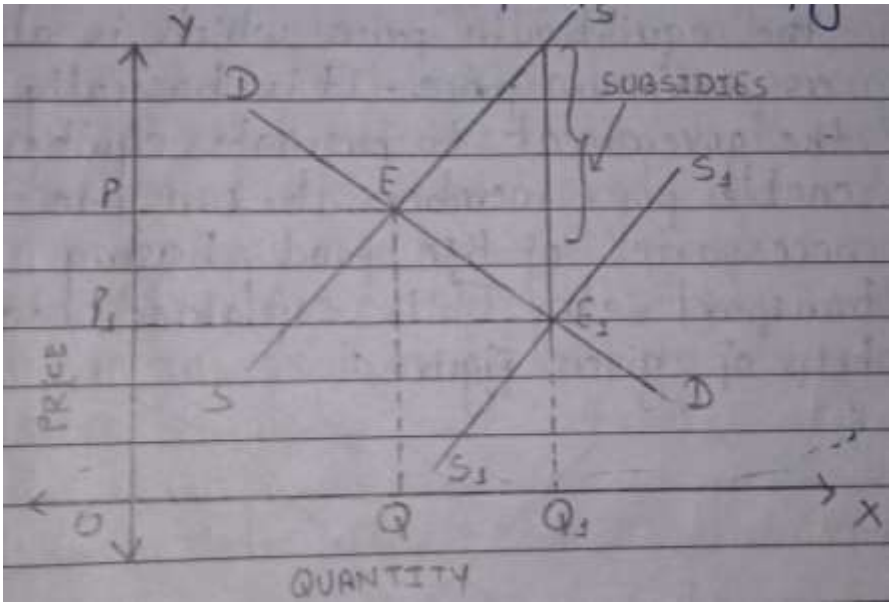
study the effect of indirect tax (VAT, sales tax, excise duty, etc.) on market equilibrium. As the taxes are levied on goods and services, it increases the cost of production and supply falls. Consequently, there will be change in market equilibrium and efficiency. It can be explained with the help of given figure:



Here, E is the initial equilibrium price and quantity respectively. Let us suppose, government imposes direct tax i.e. VAT equal to AE per unit output which results in the shift of supply curve from SS to S_1S_1. Consequently, new equilibrium point E_1 at attained which shows the decrease in supply from OQ to OQ_1 and rise in price from OP to OP_1.

b) Effect of subsidy policy on market equilibrium: Subsidies may be regarded as the negative taxes which are provided by the government to the producer and consumer in order to encourage production and consumption of goods and

services which had positive extranalities or which are under produced by the free market products like healthcare and education have positive extranalities and are under produced by the three market. Subsidies reduces market price, and help to increase supply. It can be explained with the help of below figure:

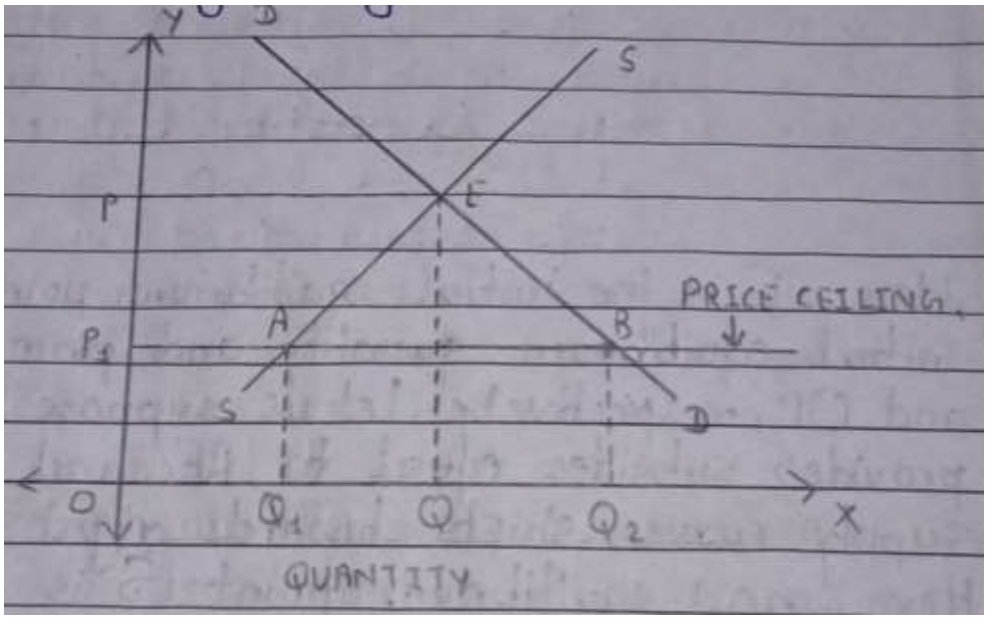


Here, E is the initial equilibrium point where initial equilibrium quantity and price are OQ and OP, respectively. Let us suppose, government provides subsidies equal to AE_1 and the supply curve shifts towards right to S_1S_1. Here, new equilibrium point E_1 is attained with equilibrium price OP_1 and quantity OQ_1. Thus, it is clear that subsidies reduce price and rise supply.

c) Effect of price control policy on market equilibrium:

i. Price ceiling (Maximum price): Price ceiling is the maximum price fixed by the government for a particular products produced by the firms. It is set below the equilibrium price which is also known as

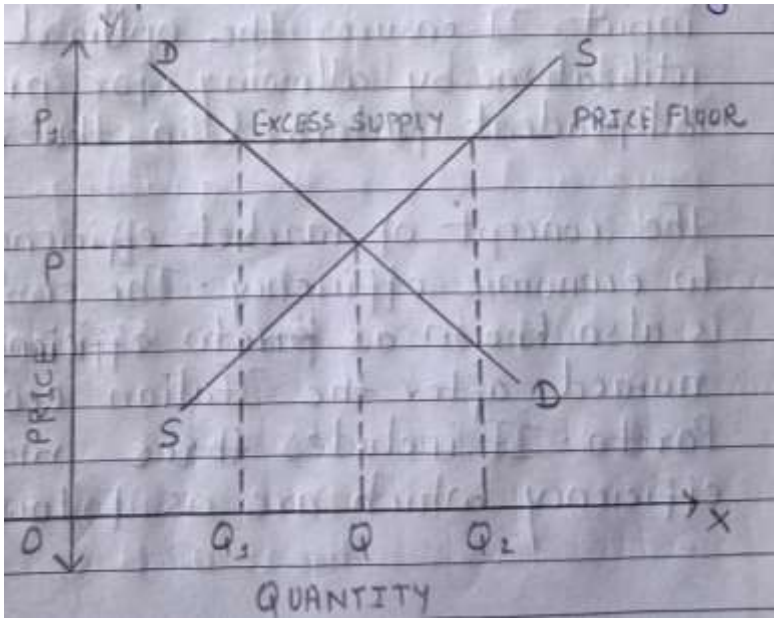
maximum price. It is basically done by the government to promote equity and enable poor members to consume the necessaries of life food, hosing, public transport, etc. It is explained with the help of given figure:



In the figure, E is the equilibrium point where equilibrium price is OP and equilibrium quantity is OQ when maximum price OP_1 is imposed by the government (below the equilibrium price) quantity demand increases to OQ_2 whereas quantity supplied decreases to OQ_1. A shortage of Q_1, Q_2 rises in the market due to the setting of ceiling price.

ii. Price Floor (Minimum price): If the price is set above the equilibrium price, it is known as price flour. It is also called minimum price which is imposed by the government. The main objective of this policy is to protect the Small producers, raise. wages and reduces

the Consumption of harmful goods which creates excess supply or surplus supply in the market. It can be explained with the help of given figure:



In the figure, DD and SS are demand and supply curves respectively and these curves are intersecting at point E which is the equilibrium point. At this point, equilibrium price is OP and quantity is OQ. Let us Suppose, government imposes minimum price OP_1 which results contraction in demand to OQ_1 and extension in supply to OQ_2. Here, Q_2Q_2 level of excess supply which is the measure problem of price floor.

- Market efficiency:

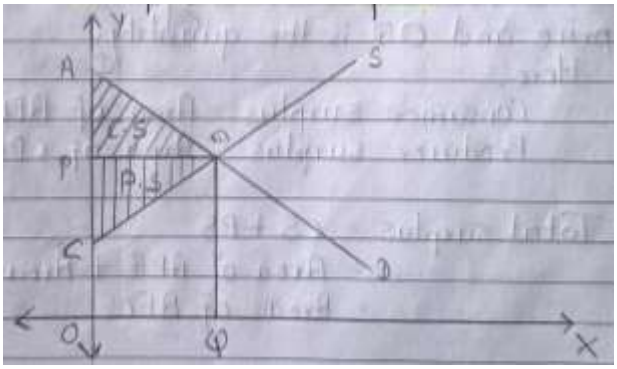
  A market is said to be efficient if the maximum amount of goods and services are being produced with a given level of resources and if no additional output is possible without increasing the amount of input. It ensures the optimal

resources utilization by allowing for prices to motivate independent factors in the market.

The concept of market efficiency is similar to economic efficiency. The economic efficiency is also known as Pareto Efficiency which was named after the Italian economist Vilfredo Poreto. It includes two main measures of efficiency which are as follows:

a) Productive efficiency: This occurs when output is produced at the lowest possible cost where marginal cost equals average cost. It is achieved only in the perfect competition in the long-run. i.e. x-efficiency is achieved when average cost and marginal cost are low as possible. It is also occurs under the perfect competition.
b) Allocative efficiency: Allocative efficiency is a Situation of the economy in which production represents consumers preference and output is produced at the level where price (AP) equals to MC. So, allocative efficiency is achieved when marginal utility of goods equal to the marginal cost i.e. MU=MC. This is also possible only in the perfectly competitive market.

- Measuring market efficiency by consumer surplus and producer surplus:



Market efficiency is measured by the help of total surplus. Total surplus is the sum of consumers surplus and producer surplus.

Here, Consumer surplus= willingness to pay – market price(actual payment)

Producer surplus(PS)=Market price (MP)- cost of seller

Total surplus= willingness to pay-cost of sellers

If allocation of resources maximizes total surplus, it is known as the allocative efficiency So, we can measure market efficiency by the help of total surplus. It can be explained with the help of above figure.

In the above figure, E is the equilibrium point where demand curve (AD) and supply curve (CS) are intersecting OP is the equilibrium price and OQ is the quantity.

Here,

Consumer Surplus = Area of APE

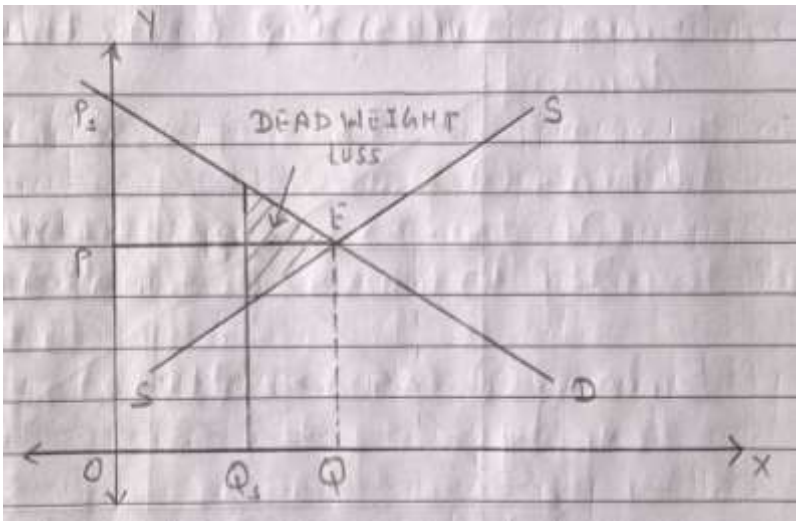
Producer Surplus = Area of CPE

Total surplus = CS + PS

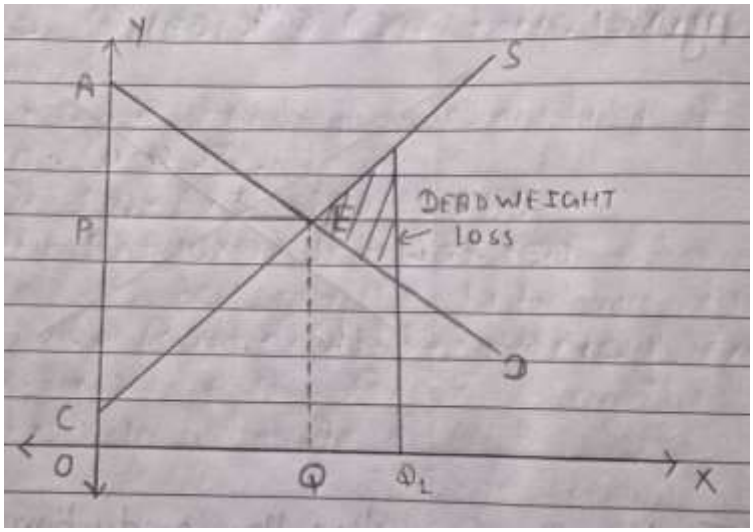
= Area of APE + Area of CPE

= Area of AEC

The total surface AFC is the maximum surplus obtained by the market. If there is over or under production, i.e. more or less than equilibrium quantity, there will be market inefficiency. Since, there is no maximum total surplus. The loss of surplus is called dead- weight loss (DWL). This is shown in the below figure:



In the figure when the production is decrease to OQ_1 (under production) there is the loss if total surplus by the shaded area KEL which is known as dead weight loss. This represents loss of economic welfare or market inefficiency caused by the under production.



In the figure, if the economy or firm produces output more than equilibrium to OQ_1 (over production), there will be loss of total surplus which is known as dead weight loss (EKL). This represents loss of economic welfare. or market inefficiency due to the over production.

- Elasticity of demand:

The concept of elasticity was first introduced classical economist A.A. Cournot and I.S. Mill and later explained scientifically by the neo- classical economist Alfred Marshall book principles of economics. The law of demand only shows the direction of change in demand due to the change in price but fails to explain about the quantity or magnitude or changes. This explanation is possible through elasticity of demand.

The elasticity of demand is defined as the a measure of responsiveness of demand for a commodity to the change in any of its determinants like price, income, consumers expectation etc.

→ Types of elasticity of demand:

There are as types of elasticity of demand as its determinants. The important types are as follows:

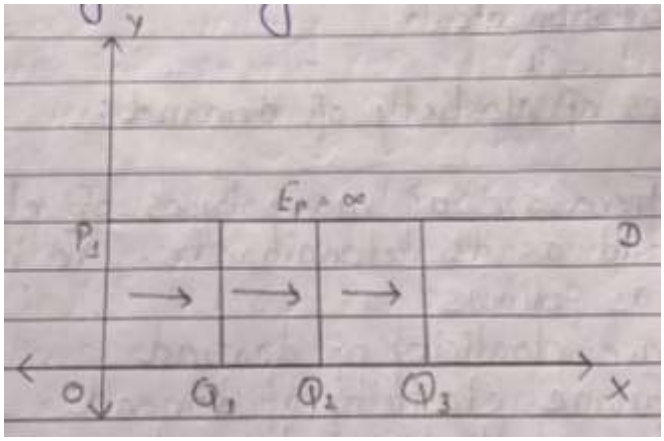
a) Price elasticity of demand
b) Income elasticity of demand
c) Cross elasticity of demand
d) Advertisement elasticity of demand

a) Price elasticity of demand: Price elasticity of demand is defined as the responsiveness of change in quantity demanded of a commodity to the change in its price. It can be expressed as

$$E_p = \frac{\%\ change\ in\ quantity\ demanded}{\%change\ in\ price}$$

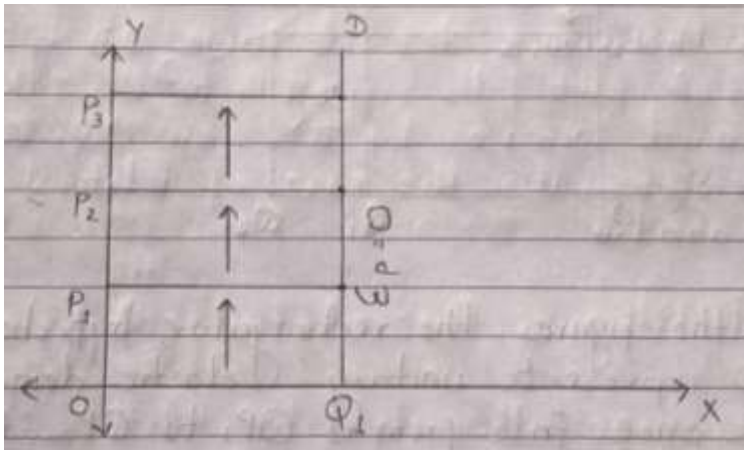
There are five types of price elasticity of demand. They are:

i. Perfectly elastic demand (Ep = ∞): Demand is said to be perfectly elastic if intangible change in price leads to infinite change in the quantity demanded. It can be explain by the given diagram:



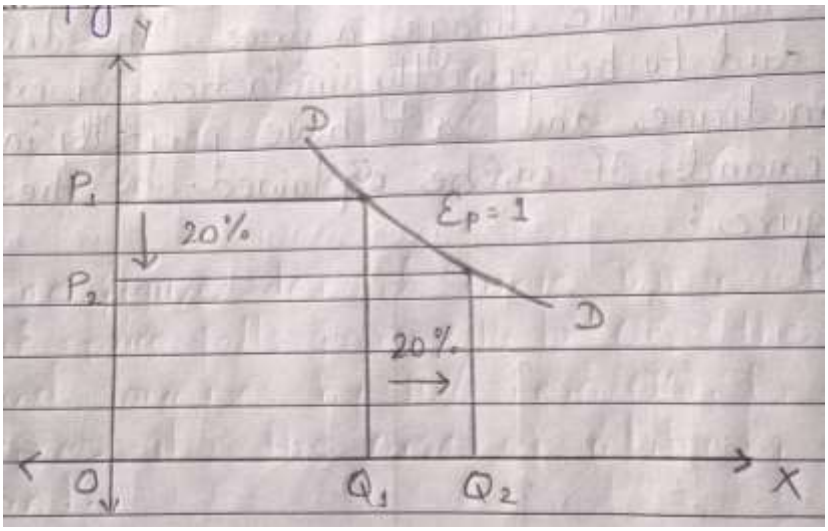
In the figure, the demand curve P_1D is perfectly elastic, which is a horizontal straight line parallel to X-axis. It means that at price OP_1, the quantity demand be OQ_1, OQ_2, OQ_3.

ii. Perfectly inelastic demand (Ep = 0): When the demand for a commodity does not change with the change in price, the demand is said to be perfectly inelastic. For example, medicine and salt have perfectly inelastic demand. It can be explained by the below figure:



In figure, demand curve DQ_1 is perfectly inelastic, which is vertical straight line or parallel to Y-axis. It means that the quantity demand be always OQ_1 at different price OP_1, OP_2, OP_3.

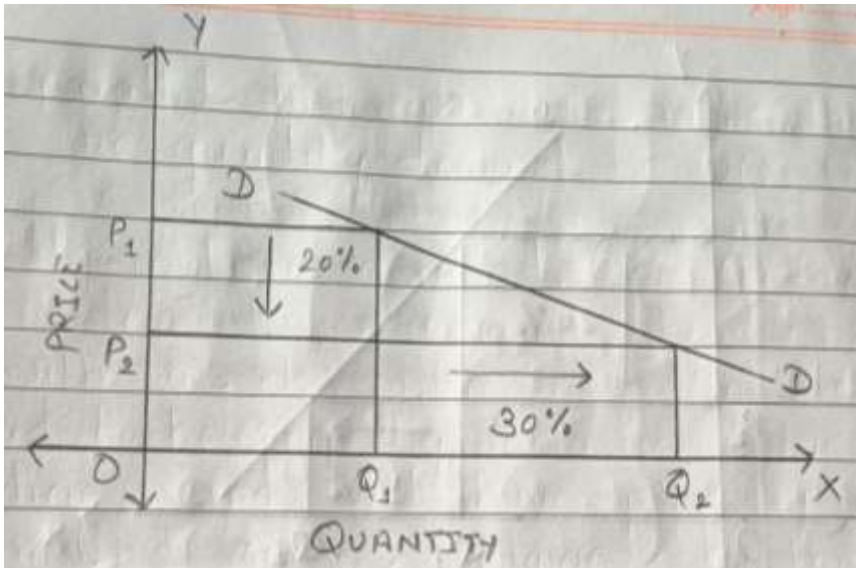
iii. Unitary elastic demand (Ep = 1): When the percentage change in the quantity demanded is equal to the percentage change in price, the demand for a commodity is said to be unitary elastic demand. For example, if a 20% change in price causes 20% change in demand, it is the case of unitary elastic demand. It can be explained by the given figure:



In the figure, the rectangular hyperbola curve DD represents unitary elastic demand. When the price falls from OP_1 to OP_2 the quantity demand increases from OQ_1 to OQ_2.

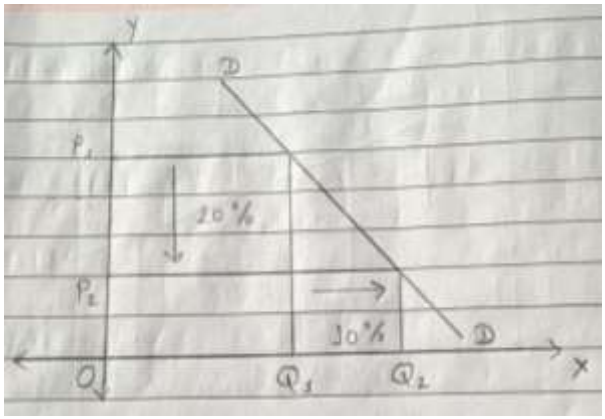
iv. Relatively Elastic Demand (Ep>1): When the percentage change in the quantity demanded for commodity is more than percentage change in its price, it is called relatively elastic demand. Such kind of elasticity of demand is found in case of luxury good

like LED television, refrigerator car, etc. It can be explained in the figure:



In figure, the demand curve DD is steeper. When price falls from OP_1 to OP_2, the quantity demand increases for OQ_1 to OQ_2 i.e. the percentage, change in price is less than the percentage change in quantity demand. Therefore, it is the case of relatively elastic demand.

v. Relatively inelastic Demand ($E_p < 1$): When the percentage change in quantity demand is less than % change in its price, it is called relatively inelastic demand. It is found in case of necessity or basic good like rice, vegetable, clothes, etc. It can be explained by the help of given figure:



In the figure, demand curve DD is steeper. When price falls from OP_1 to OP_2, the Quantity demand increases by 10% from OQ_1 to OQ_2. Therefore, it is the case of relatively inelastic demand.

- Calculation of Price elasticity of demand:
  i. Percentage/Proportionate method:

$$e_P = - \frac{Percentage\ change\ in\ quantity\ demanded}{Percentage\ change\ in\ price}$$

$$= - \frac{\%\Delta\ Qd}{\%\Delta\ P}$$

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

Where,

e_P = Price elasticity of demand

Q = Original quantity demanded

ΔQ= Change in quantity demanded (Q_1 -Q)

P = Original price

ΔP = Change in price (P_1 -P)

  ii. Arc/Average method:

$$E_p = - \frac{\frac{Change\ in\ Quantity\ Demanded}{Average\ Quantity\ Demanded}}{\frac{Change\ in\ Price}{Average\ Price}}$$

$$= - \frac{\frac{\Delta Q}{(Q1+Q2)/2}}{\frac{\Delta P}{(P1+P2)/2}}$$

$$= - \frac{\Delta Q}{\Delta P} \times \frac{P1+P2}{Q1+Q2}$$

$$= - \left(\frac{Q2-Q1}{P2-P1}\right) \times \left(\frac{P1+P2}{Q1+Q2}\right)$$

Where,

Q1 = Initial Quantity Demanded

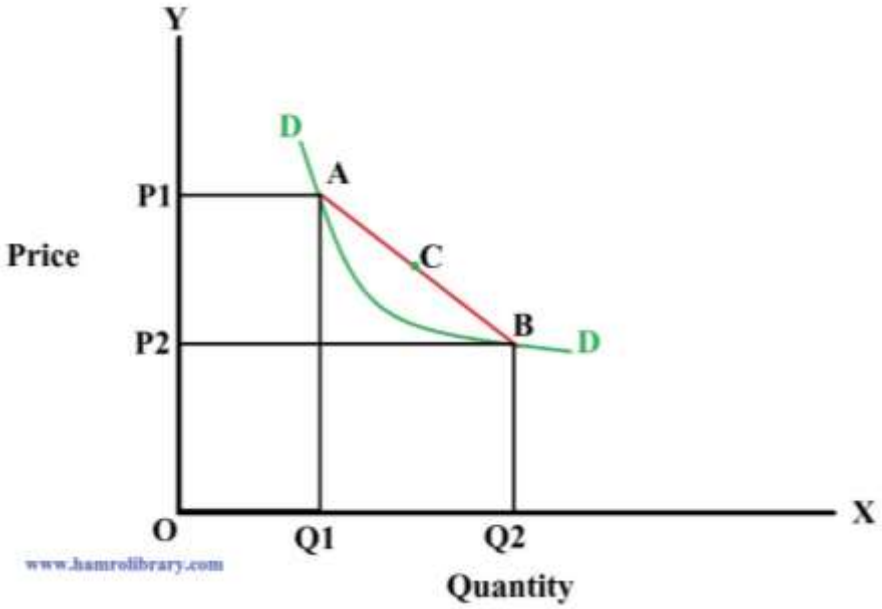
Q2 = New Quantity Demanded

P1 = Initial Price

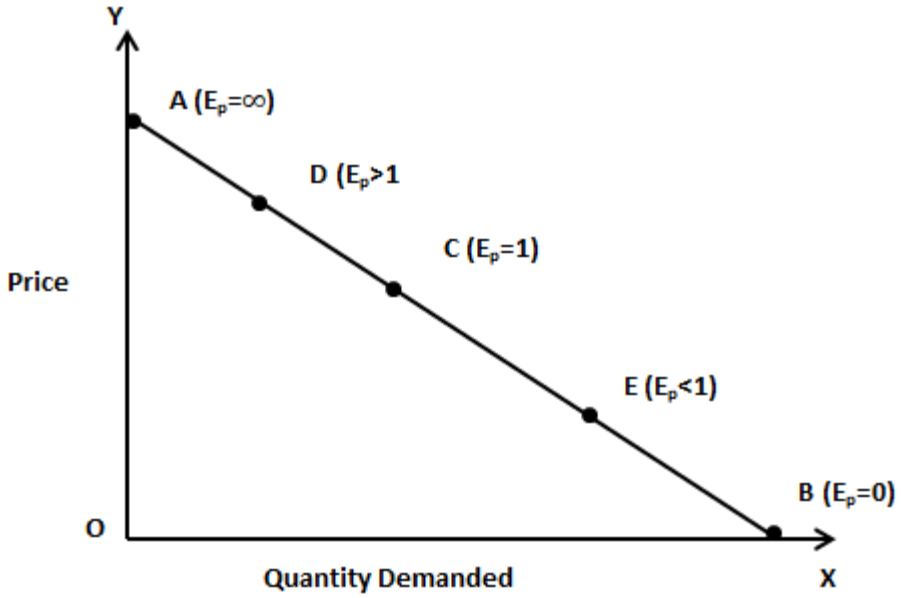
P2 = New Price

ΔQ = Change in Quantity Demanded

ΔP = Change in Price



iii. Point method:



→ Point elasticity at point A = $\frac{lower\ segment}{upper\ segment}$

$= \frac{AB}{AA}$

$= \frac{AB}{0}$

$= \infty$

→ Point elasticity at point D = $\frac{DB}{DA} > 1$

→ Point elasticity at point C = $\frac{CB}{CA} = 1$

→ Point elasticity at point E = $\frac{EB}{EA} < 1$

→ Point elasticity at point B = $\frac{BB}{BA} = 0$

- Revenue:

  Total revenue (TR) = P×Q

  Where,

  P = price per unit

  Q = quantity sold

  Average revenue (AR) = $\frac{TR}{Q} = \frac{P \times Q}{Q} = P$

  Marginal revenue (MR) $= \frac{\Delta TR}{\Delta Q} = \frac{dTR}{dQ}$

- Relationship between elasticity of demand and marginal revenue:

  We know,

  $TR = P \times Q$

  Differentiating both sides with respect to Q,

  $\frac{dTR}{dQ} = \frac{d(P \times Q)}{dQ}$

  or, $MR = P \times \frac{dQ}{dQ} + Q\frac{dP}{dQ}$

or, $MR = P \times 1 + Q\frac{dP}{dQ}$

or, $MR = P \times 1 + \frac{Q}{P} \times P \times \frac{dP}{dQ}$

or, $MR = P(1 + \frac{Q}{P} \times \frac{dP}{dQ})$

or, $MR = P(1 + \frac{1}{\frac{P}{Q} \times \frac{dQ}{dP}})$

or, $MR = P(1 + \frac{1}{-E_p})$

or, $MR = P(1 - \frac{1}{E_p})$

$\therefore MR = P(\frac{E_p - 1}{E_p})$

$\rightarrow$ If $E_p = 1$, MR = 0, TR remains same either price rise of fall.

$\rightarrow$ If $E_p > 1$, MR > 0, TR increases with the fall in price.

$\rightarrow$ If $E_p < 1$, MR < 0, TR increases with the rise in price.

- Relationship between elasticity of demand and average revenue:

  Here,

  $MR = P(\frac{E_p - 1}{E_p})$

  At perfect competition, AR = P then

  $MR = AR(\frac{E_p - 1}{E_p})$

  or, $E_p.MR = AR.E_p - AR$

  or, $AR = AR.E_p - E_p.MR$

or, $AR = E_p(AR - MR)$

$\therefore \quad E_p = \frac{AR}{AR-MR}$

- Uses or importance of price elasticity of demand:
    i. Monopoly price determination: A monopolist while fixing the price of the product has to see whether the demand for that product Is elastic or inelastic. For elastic demand, he can get more profit by fixing low price. And for inelastic demand and he can more profit by fixing high price.
    ii. Price determination of public utilities: The concept of price elasticity of demand is also useful to determine the price of public utilities like postal service, drinking water, electricity, etc. For inelastic demand a high price is charged and for service with elastic demand, low price is charged.
    iii. Wage determination: The concept of price elasticity is also important in the determination of wages of a particular type of Labour. If the demand for service of Labour is inelastic, it can force the employers to increase the wage by strikes. If the demand for service of labour is elastic, strikes and trade union power cannot work.
    iv. International Trade: The terms of trade depends upon relative elasticity of goods exported and imported between the countries. A country gains when exported good have hand inelastic demand

in importing countries and imported goods for which demand is elastic in domestic market.

v. Importance to finance Minister: The Finance minister gets idea how can be more and more revenue collected through price elasticity. Imposition of higher tax an necessary goods which have inelastic demand may increase the revenue of the government but it is not socially justifiable.

b) Income elasticity of demand: It is defined as the degree of responsiveness of demand for a commodity to the change in income of consumers. Also, it is defined as the ratio of % change in quantity demand to the %. change in income.
Symbolically,

$$Ey = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in income}}$$

$$= \frac{\frac{\text{change in quantity demanded}}{\text{initial quantity demanded}} \times 100\%}{\frac{\text{change in income}}{\text{initial income}} \times 100\%}$$

$$= \frac{\frac{Q2 - Q1}{Q1}}{\frac{Y2 - Y1}{Y1}}$$

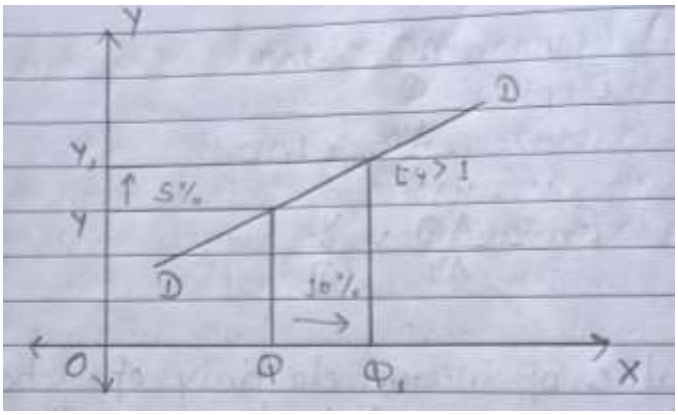
$$= \frac{\Delta Q}{\Delta Y} \times \frac{Y1}{Q1}$$

The value of income elasticity may be positive, negative or zero. Depending upon the nature of the

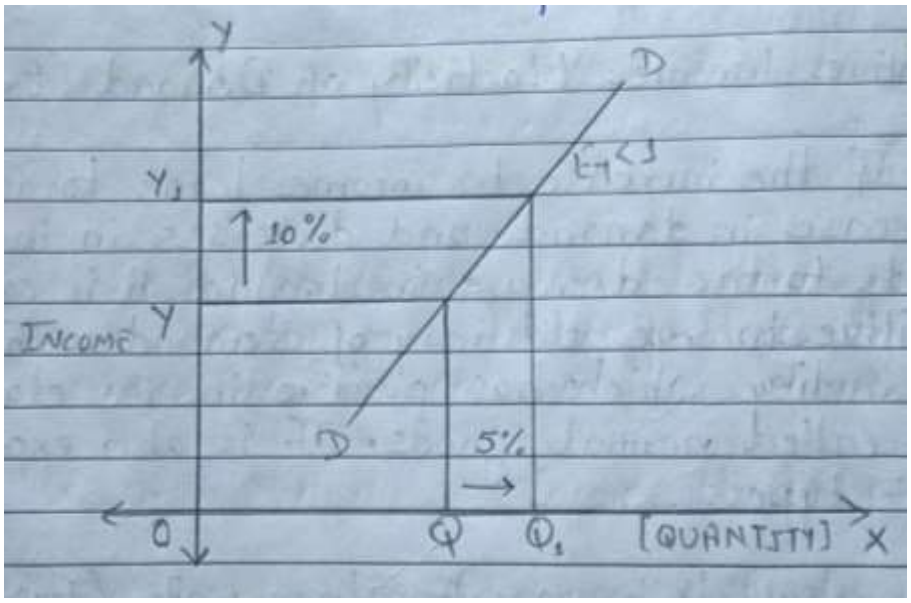
commodity. There are 3 types of income elasticity of demand which are as follows:

i. Positive Income Elasticity of Demand ($E_y>0$):If the increase in income leads to the increase in demand and decreases in income leads to the decrease in demand it is called positive income elasticity of demand. The commodity which has positive income elasticity are called normal goods. It is also explain in 3 types:

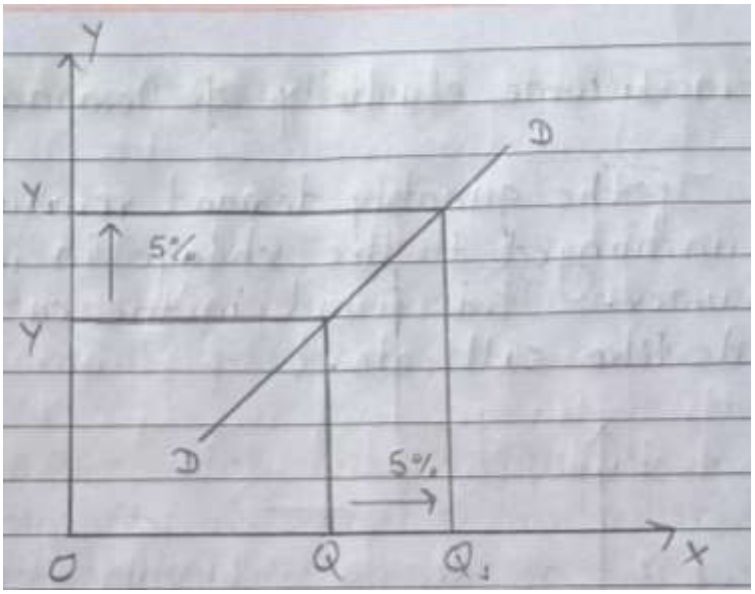
- Income elasticity greater than unity ($E_y>1$): If the % change in quantity demand is greater than the % change in income then it is called income elasticity greater than unity.



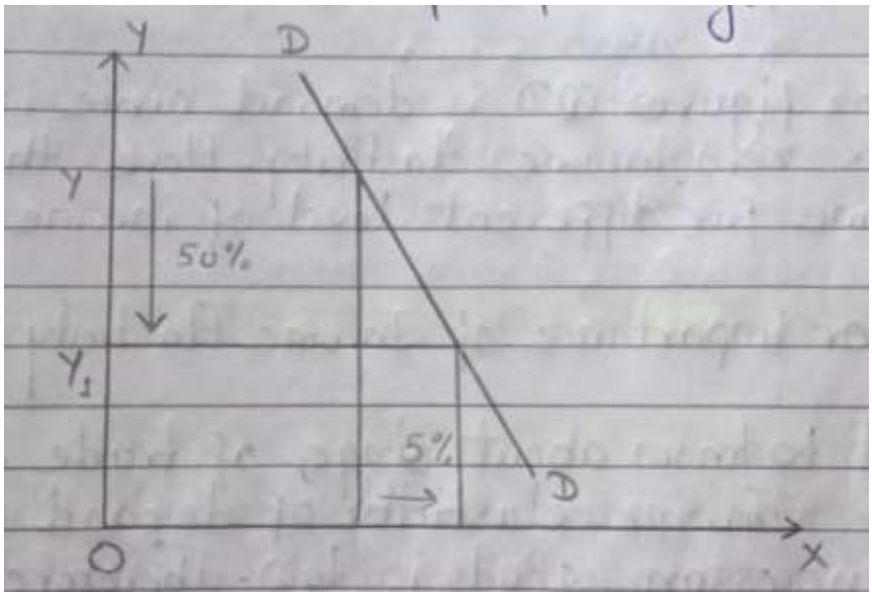
- Income elasticity less than unity ($E_y<1$): If the % change, in quantity demand is less than % change In income then it is called income elasticity less than unity.



- Unitary income elasticity (E_y<1): If the % change in quantity demand is just equal to the % change in income. then it is called unitary income elasticity.

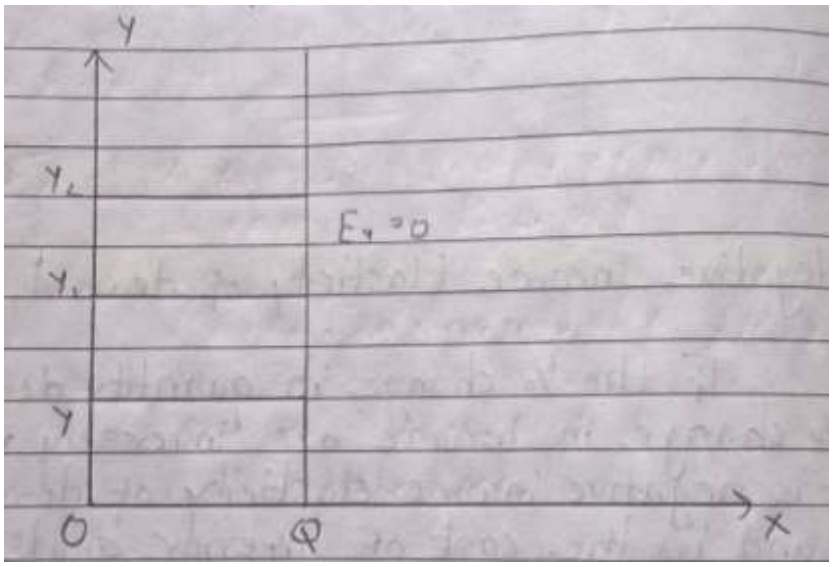


ii. Negative Income elasticity of demand (E_y<0): If the % change in quantity demand and % change in income are inversely related then it is negative income elasticity of demand. It is found in the case of inferior goods.



In the Figure DD is the demand curve which shows negative income elasticity of demand. As the Income falls, quantity demand rises.

iii. Zero Income elasticity of Demand (E_y=0): If the quantity demand remains irresponsive or unchanged to the change in income of consumer. It is found in the case of negative goods like salt, etc.



In the figure QD is demand curve, which shows zero income elasticity. Here, the demand is same for different level of income.

- Uses or importance of income elasticity of demand:
    i. Useful to know about stage of trade cycle: Income elasticity of demand for goods is low. Therefore, during prosperity, the sellers of such goods will not be benefited much and during depression they are not affected much. During prosperity, income of the consumer increase and hence they are capable of affording goods that are more luxurious. The sellers of such goods are benefited. During depression period, demand for such goods decrease rapidly and sellers are adversely affected.
    ii. Useful for forecasting demand: The concept of income elasticity of demand can be used for Forecasting demand for a product over a period. Therefore, it helps in estimating the required production level of different commodities at a certain point of time in the future. This Knowledge is also important for economic planning.
    iii. Useful for classification of normal and inferior goods: The concept of income elasticity of demand can also be used to define the normal and inferior goods. The goods whose income elasticity is positive for all level of income are

termed as normal goods. On the other hand, the goods for whose income elasticity is negative beyond a certain level of income are termed as inferior goods.

iv. Useful for making marketing strategy: Concept of income elasticity of demand can be useful in making marketing strategy. For example, firm producing luxury items should concentrate its marketing effort on media that reach the high-income group of the people.

c) Cross elasticity of demand: It is defined as a measure of responsiveness of quantity demand of commodity "x" to the change in price of "y".
Symbolically,

Calculate Cross elasticity of Demand

$$E_{XY} = \frac{percentage\ change\ in\ quantity\ Demanded\ for\ Commodity - X}{Percentage\ chagne\ in\ price\ of\ Commodity - Y}$$

$$= \frac{\frac{change\ in\ quantity\ Demanded\ for\ Commodity - X}{Initial\ quantity\ Demanded\ for\ commodity - X}}{\frac{change\ in\ price\ of\ Commodity - Y}{initial\ price\ of\ Commodity - Y}}$$

$$= \frac{\frac{\Delta Q_X}{Q_X} \times 100\%}{\frac{\Delta P_Y}{P_Y} \times 100\%}$$

$$E_{XY} = \frac{\Delta Q_X}{\Delta P_Y} \times \frac{P_Y}{Q_X}$$

Where,

E_{XY}= Coefficient of Cross elasticity of demand

Q_x= Initial quantity demanded for commodity-X

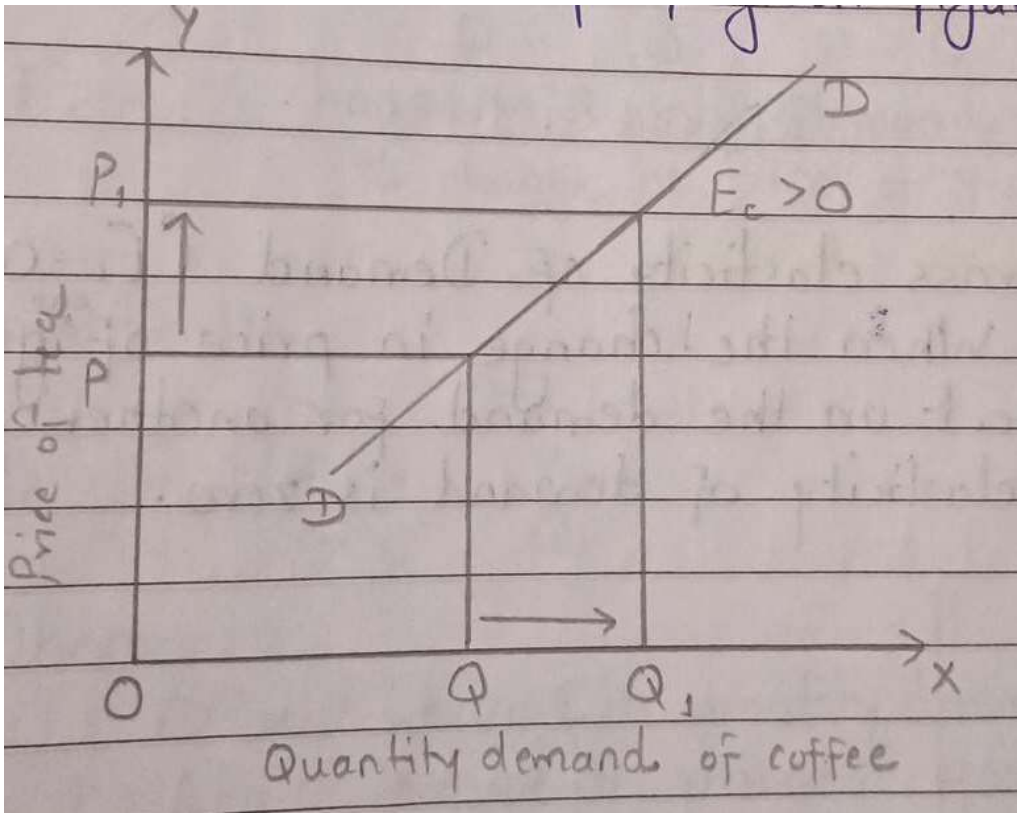
ΔQ_X= Change in quantity Demanded of Commodity-X (calculation: - New quantity demanded of Commodity X – Initial Quantity Demanded of Commodity-X)

P_Y = Initial Price of Commodity-Y

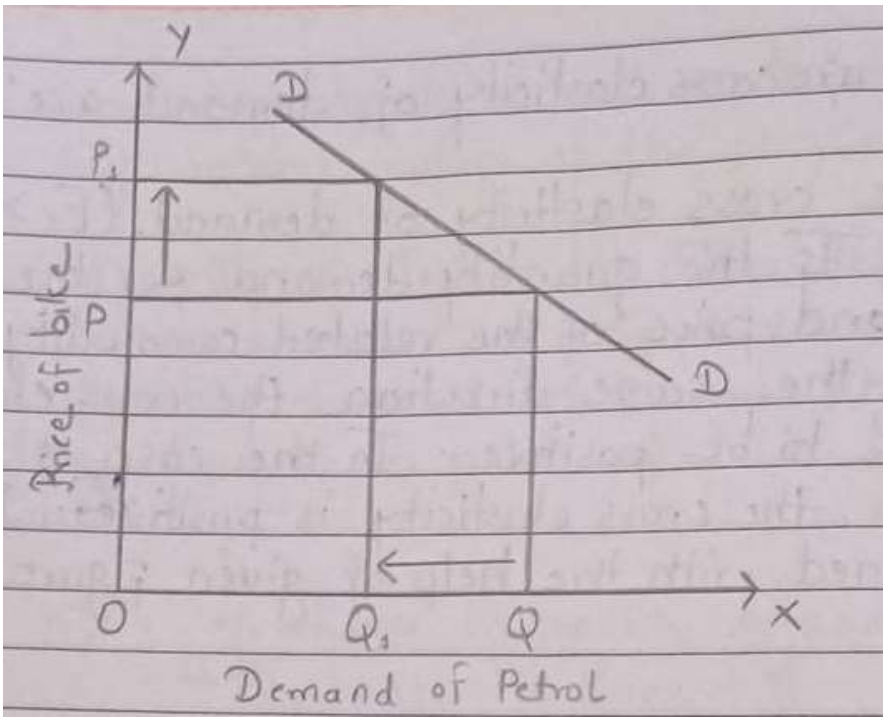
ΔP_Y = change in price of Commodity-Y (calculation: - New price of Commodity-Y – initial price of Commodity-Y)

- Types of cross elasticity of demand are:

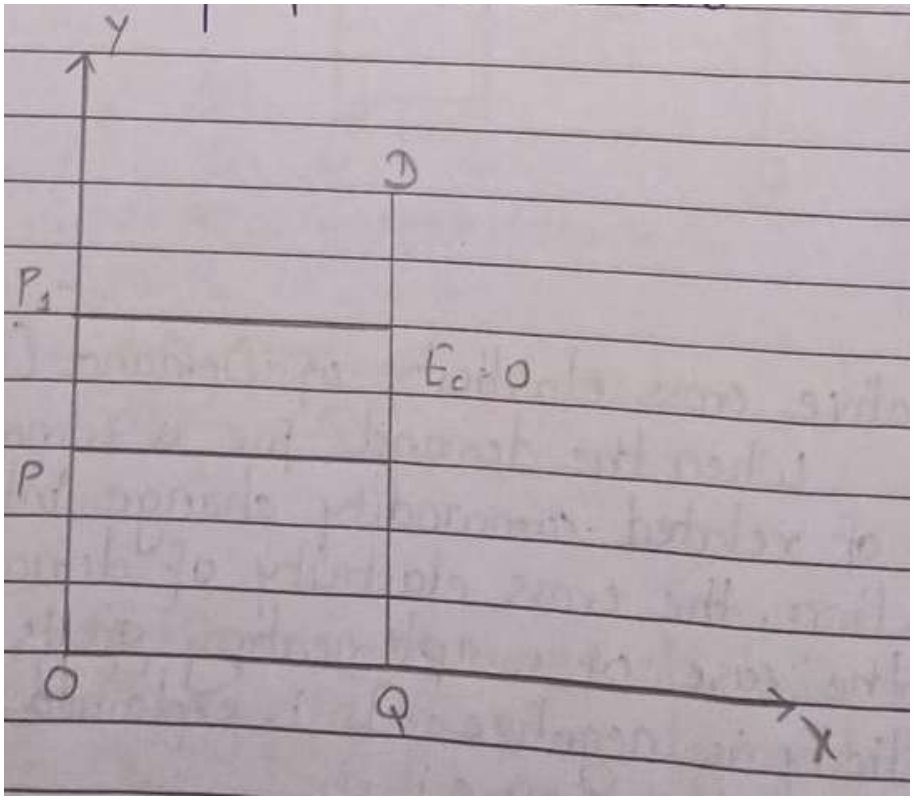
i. Positive cross elasticity of demand ($E_c>0$): If the quantity demand for the commodity and price of the related commodity change in to the same direction, the cross elasticity is said to be positive. In the case of substitute goods, the cross elasticity is positive. It is explained with the help of given figure:



ii. Negative cross elasticity of Demand ($E_c<0$): When the demand for a commodity and price of related commodity change into opposite direction, the cross elasticity of demand is negative. In the case, of complementary goods, the cross elasticity is negative. It is explained with the help of below figure:



iii. Zero cross elasticity of demand (E_c=0): When the change in price of one good has no effect on the demand for another good, the cross elasticity of demand is zero.



- Calculation of cross elasticity of demand:
  There are mainly three methods for calculating cross elasticity of demand:

i. Percentage method: It is ratio of percentage change in demand of one commodity with percentage change in price of another commodity.

$$E_c = \frac{\%\ change\ in\ quantity\ demanded\ for\ x\ good}{\%\ \text{change in price of y good}}$$

Symbolically,

$$E_c = \frac{\Delta Q_x}{\Delta P_y} \times \frac{P_y}{Q_x}$$

Where,

ΔQx=change in quantity demanded of good x

ΔPy=change in price of good y

Py=initial price of good y

Qx=initial quantity of good x

ii. Proportion method: It is ratio of proportionate change in demand for one commodity with proportionate change in price of another commodity.

$$\text{Ec} = \frac{\frac{Change\ in\ demand\ for\ x\ good}{Initial\ demand\ for\ x\ good}}{\frac{Change\ in\ price\ of\ y\ good}{Initial\ price\ of\ y\ good}}$$

$$\text{Ec} = \frac{\frac{\Delta Q_X}{Q_X}}{\frac{\Delta P_Y}{P_Y}}$$

$$\text{Ec} = \frac{\Delta Q_X}{Q_X} \times \frac{\Delta P_Y}{P_Y}$$

$$\text{Ec} = \frac{\Delta Q_X}{\Delta P_Y} \times \frac{P_Y}{Q_Y}$$

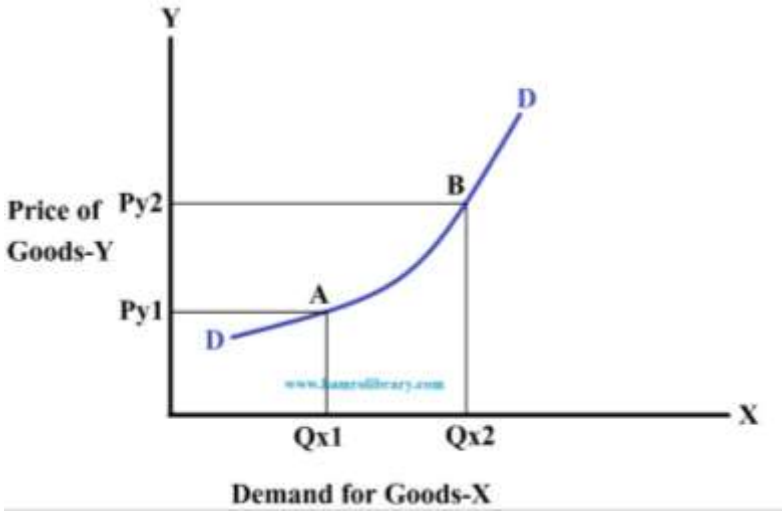
iii. Arc elasticity method: According to arc method, cross elasticity of demand is the average between two points in a cross demand curve.

$$E_{xy} = \frac{\frac{Change\ in\ Quantity\ Demanded\ for\ goods-X}{Average\ Quantity\ Demanded\ for\ goods-X}}{\frac{Change\ in\ Price\ of\ goods-Y}{Average\ Price\ of\ goods-Y}}$$

$$= \frac{\frac{\Delta Qx}{(Qx1+Qx2)/2}}{\frac{\Delta Py}{(Py1+Py2)/2}}$$

$$= \frac{\Delta Qx}{\Delta Py} \times \frac{Py1+Py2}{Qx1+Qx2}$$

$$= \left(\frac{(Qx2-Qx1)}{(Py2-Py1)}\right) \times \left(\frac{Py1+Py2}{Qx1+Qx2}\right)$$



Demand for Goods-X

- Uses/Importance of cross elasticity of demand:

i. Classification of markets: If the cross elasticity of demand is infinite, the market is perfectly competitive. If the cross elasticity is zero or almost zero, the market structure is a monopoly. And if the cross elasticity is high there is an imperfect market.

ii. Classification of goods: There are two types of goods which are substitute goods and complementary goods. If the cross of demand between any is positive, the goods may be considered as substitutes for each other. If the cross elasticity of demand for any two related goods is negative, the two goods may be considered complementary to each other.

iii. Pricing policy: large firms produces different related goods. For example, Nepal liver Limited produces various brands of toothpaste and toothbrush. They are complementary goods. Similarly, Nepal Dairy limited produces ice-cream of different flavors. They are substitues goods. Cross elasticity of demand helps firms to decide whether to increase the price of related products or not.

iv. Determination of boundaries between industries: The concept of cross elasticity of demand is useful in order to decide which product should include in which industry. If related goods having negative cross elasticity, they belong to different industries. If the related goods having positive cross elasticity, they belong to one industry.

- Determinants of elasticity of demand:
  i. Nature of the commodity: The elasticity of demand depends on the nature of the commodity. In case of necessity goods, commodity. the demand for a good is inelastic as their demand cannot be postponed. In case of comport goods, the demand for goods is neither elastic nor inelastic. In case of luxury goods, the demand is highly elastic. In case prestige goods, the demand is inelastic, because people are ready to buy these commodities along price, such as salt, medicine, etc.
  ii. Consumer income: The income of the consumer. also affects the elasticity of demand. For high-income groups, the demand is said to be less elastic as the rise or fall in the price will not have much effect on demand for a product whereas in case of the low-income group, the demand is said to be elastic and rise and fall in the price have a significant effect on the quantity demanded.
  iii. Amount for money spent: The elasticity of a product is determined by the proportion of income spent by the individual on that product. In case of certain goods such as matchbox, salt, a consumer spends a very small amount of higher income. Thus, there is no great change in demand of that goods, which is said to be inelastic demand. But, a consumer or an individual spend major a proportion of his/her income in foods, clothing. etc., if there is any change

in price of these goods, the demand for that good is greatly change.

iv. Joint Demand: Here, the elasticity of demand of secondary commodity depends on the elasticity of demand of the major commodity, such as if the demand for pen inelastic, then the demand for the ink will also be less elastic.

v. Existence of substitutes: The goods having close substitutes are said to have elastic demand. Such as tea and coffee are close substitutes and if the price of tea increases then people are switch to coffee and the demand for tea decreases significantly. Whereas, if there are no close substitutes for a product, then its demand is inelastic. For example, salt and sugar have no close substitutes. Thus, their demand cannot be affected by price.

d) Advertisement elasticity of demand: Other things being equal, it shows a degree of responsiveness in demand for a commodity due to change in sales expenditure.

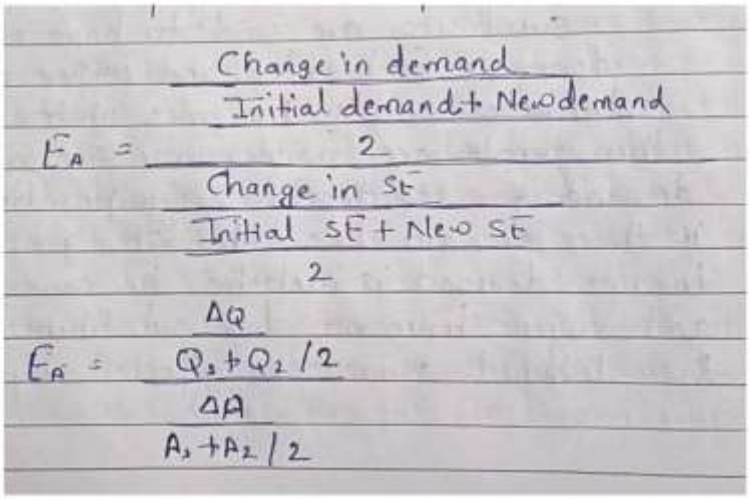
- Calculation of advertisement elasticity of demand:
  i. In terms of percentage:
  It is the ratio of the percentage change in demand with the percentage change in advertisement and expenditure.

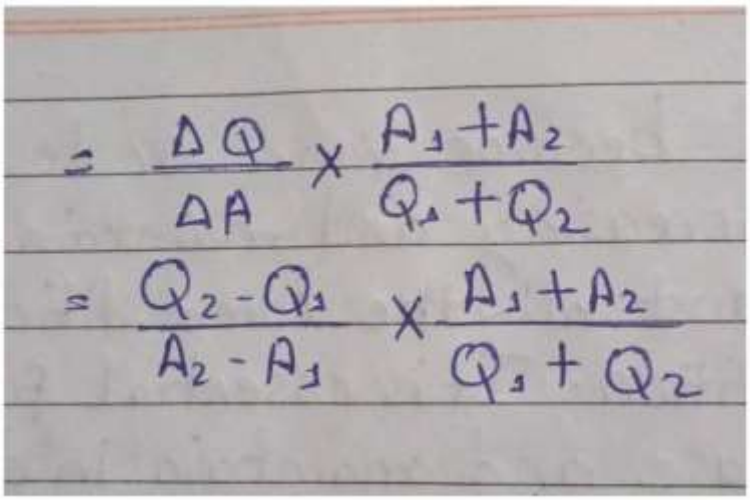
$$E_A = \frac{\%\ change\ in\ demand}{\%\ change\ in\ sales\ expenditure}$$

$$E_A = \frac{\frac{(Q_2 - Q_1)}{Q_1} \times 100}{\frac{(A_2 - A_1)}{A_1} \times 100}$$

$$E_A = \frac{\Delta Q}{\Delta A} \times \frac{A}{Q}$$

ii. In terms of arc elasticity:





- Types of advertisement elasticity of demand :
  i. Advertisement elasticity of demand equal to 1 (E_A=1): If percentage change in demand is equal to percentage change in advertisement expenditure, it is called advertisement elasticity of demand equal to 1.
  ii. Advertisement elasticity of demand more than 1 (E_A>1): If percent change in demand is more than percentage change in advertisement expenditure, it is called advertisement elasticity more than 1.
  iii. Advertisement elasticity of demand less than 1 (E_A<1): If percentage change in quantity demanded is less than the percentage change in advertisement expenditure, it is called advertisement elasticity of demand less than 1.

- Uses or importance of advertising elasticity of demand in decision making:

  This is the time of cut throat competition. Advertising has become more or less essential for creating, increasing and maintaining the demand for almost all the commodities in this world of competition. It is essential for a new product to increase and maintain in demand.

  Advertising includes all the activities by which visual or oral message are given to the users of the product with a view of informing and influencing them to buy the goods and services or to act or to be inclined favourable towards the ideas, persons, trademarks or institutional

features. Advertising makes the consumers familiar with the qualities of a new product being introduced.

Knowledge of advertising elasticity of demand is important for the business-man in the following ways:

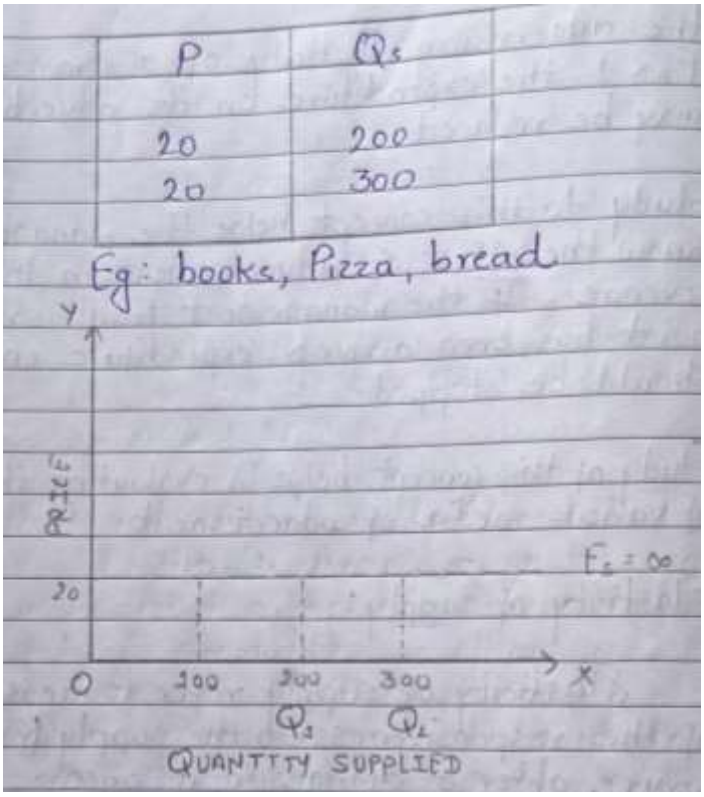
- An important advantage of the study of advertising elasticity of demand is that it helps the management in deciding whether the expenditure on advertisement should be increased or decreased or maintained at present level. If (E_A>1), the expenditure on its advertisement should be maintained at the (E_A=1), the expenditure on advertisement should be maintained at present level. Similarly, if the advertising elasticity of a commodity is (E_A<1), the expenditure on its advertisement may be reduced.
- Study to this concept helps the management to know the effect of advertisement on the sales revenue. If the management finds saturation point has been arrived, expenditure on advertising should be stopped.
- Study of this concept helps in evaluating the effectiveness of various media of advertisement.

- Elasticity of supply:

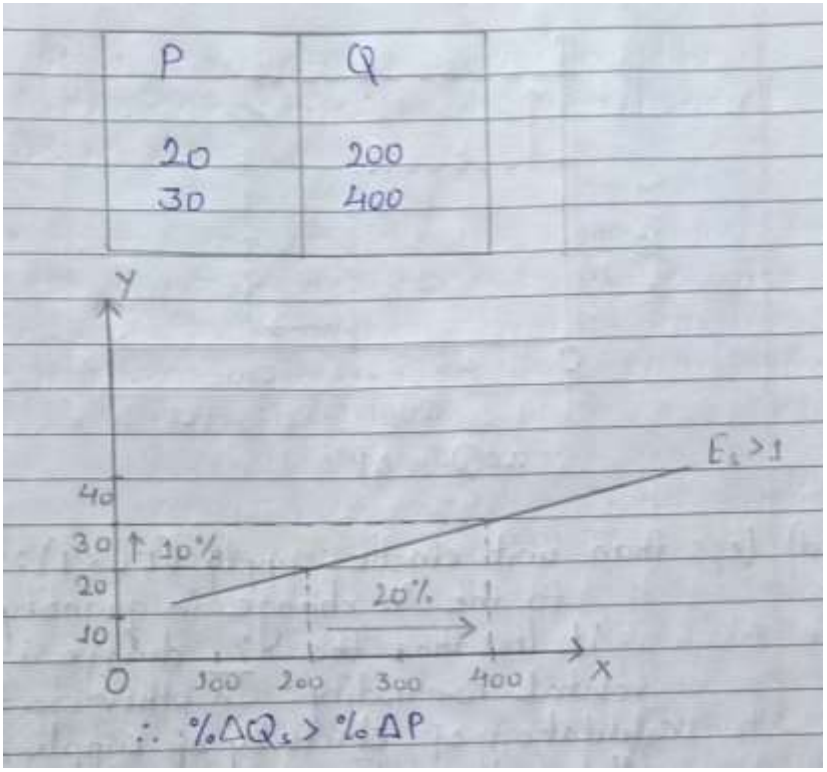
Elasticity of supply refers to measure degree of the responsiveness to the supply of a good or service after a change in its price.

- Types of elasticity of supply:

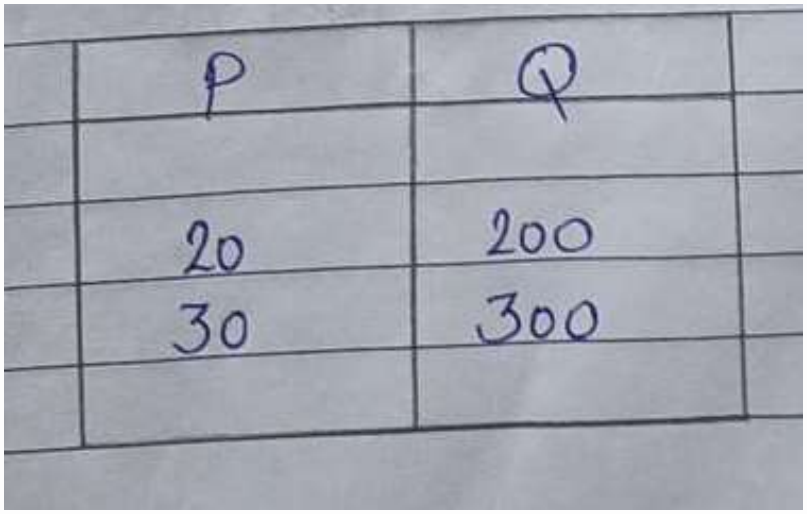
i. Perfectly elastic supply ($E_S = \infty$): It refers to goods that have a price elasticity of supply value equal to infinity. It is cleared by the given table and diagram:

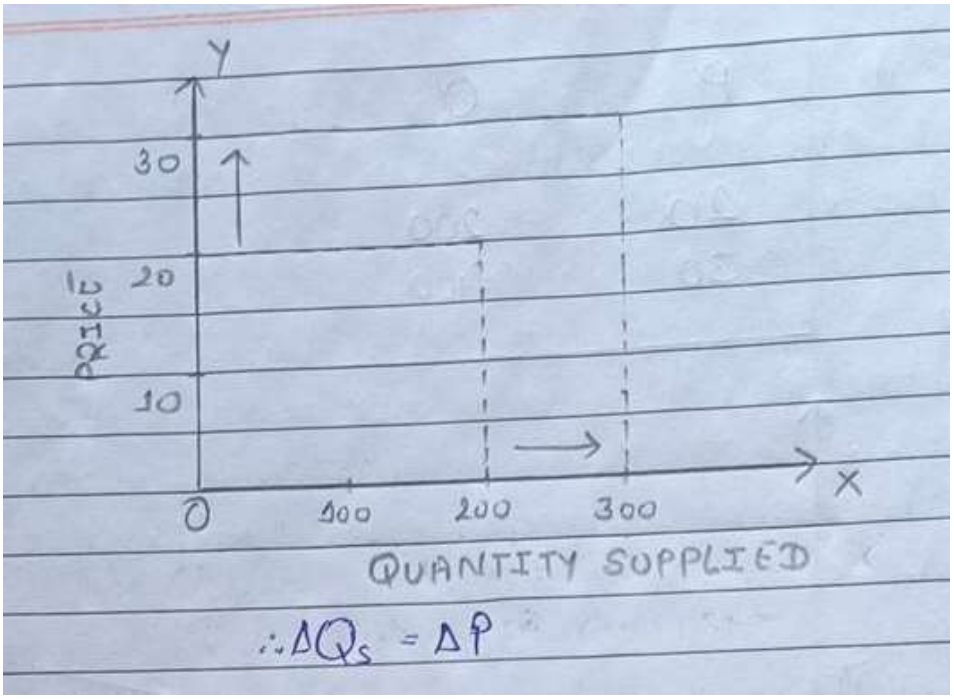


ii. High elastic supply or more than unit elastic supply ($E_S > 1$): It refers to the percentage change in quantity supplied is more than percentage change in price of related commodity. It is also says that when there is change in price, the quantity supplied also change by a larger percentage. It is explained by given table and diagram:



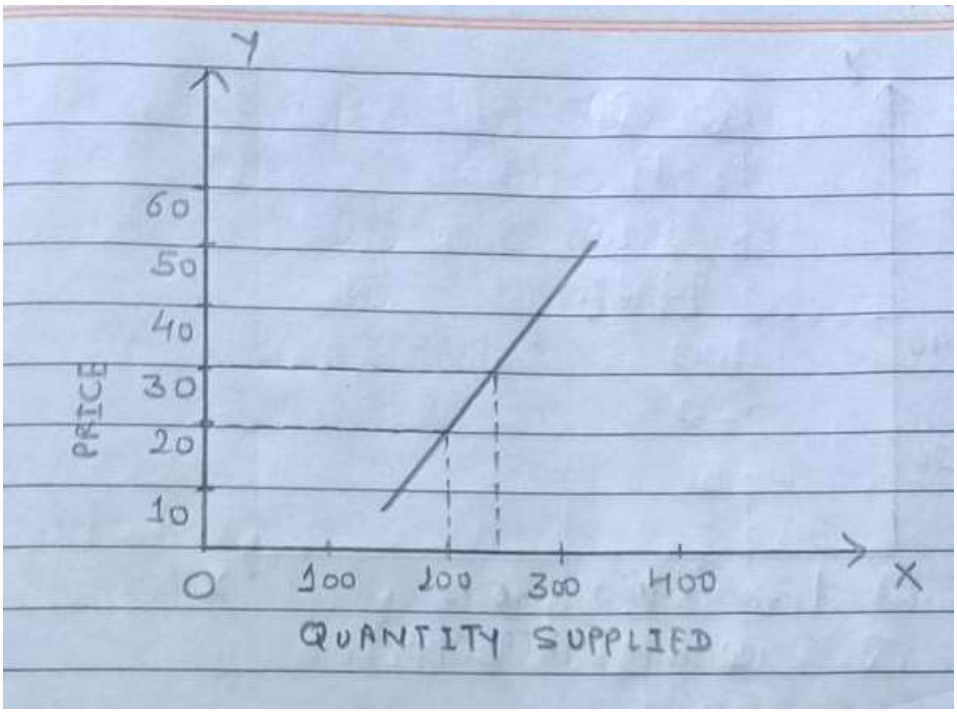
iii. Unit elasticity supply (E_S =1): Unit elastic supply is refers to the percentage change in supply is equal to the percentage change in price. In other words, the elasticity of supply which is equal to one, is called unit elastic supply. It is also explained by given table and diagram:





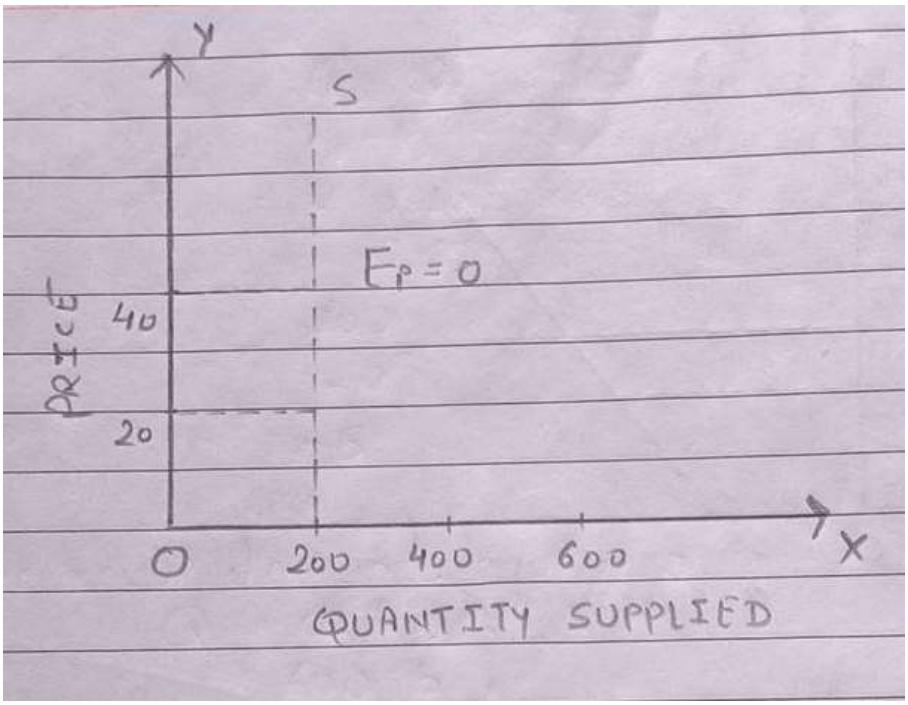
iv. Less than unit elastic supply (E_S <1): It refers to the % change in quantity supply is less than the % change in price of related commodity. In other words, after calculation of elasticity of supply, we get result less than E_S it is also said explained by given table and diagram:

P	Qs
20	200
30	250



v. Perfectly inelastic supply (E_S =0): If there is no change in elasticity of supply by change in price of related commodity, it is said to be perfectly inelastic supply. In other words, if the elasticity of supply of any commodity is equal to zero, it is also said to be perfectly inelastic supply. It is also explained by given table and diagram:

P	Q
20	200
30	200



- Factors influencing elasticity of supply:
  i. Nature of the commodity: The supply elasticity of durable goods is very high because durable goods can be stored for a long time. The producers are not bound to sell them in the market soon. The supply elasticity of perishable goods is low since perishable goods cannot be stored for a long time.
  ii. Cost of production: If production is carried out under the condition of constant return to scale, then supply can be expanded at the given price. In other words, this is a case of relatively elastic supply. If production is carried out under the condition of diminishing returns to scales, which implies that marginal cost rises a the expands, then we have a case of inelastic supply.

iii. Time element: In the long-run the supply elasticity will be relatively elastic because the production can be increased in the long-run. In the short-term the supply elasticity will be relatively inelastic because the productive capacity is limited.
iv. Producers expectation: If producers expect a rise in the price of a commodity in the future, they will cut down the present supply. As a result, the supply will be inelastic. If they expect the price to fall, in the future they will increase the present supply. Consequently, the supply will become elastic.
v. Technical condition of production: Elasticity of supply depends upon technical condition used in the industry. In all those industries, where large plants are set up and production is carried out on large scale, elasticity of supply is very low because for setting up huge plants, large capital and technical expertise is required which is not easily available. Thus, the supply of product in these industries cannot be increased easily. If the technology is simple and capital equipment are less costly, the supply of the product will be relatively elastic.

- Calculation of elasticity of supply:
    i. Percentage method: According to this method, elasticity of supply is calculated dividing percentage change in quantity supplied divided by percentage change in price.

$$E_S = \frac{\%\text{ change in quantity supplied}}{\%\text{ change in price}}$$

$$E_S = \frac{\frac{\text{change in quantity supplied}}{\text{initial quantity supplied}} \times 100}{\frac{\text{change in price}}{\text{initial price}} \times 100}$$

$$E_S = \frac{\frac{\Delta Q}{Q} \times 100}{\frac{\Delta P}{P} \times 100}$$

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

Where,

E_S = coefficient of elasticity of supply

Q = initial quantity supplied

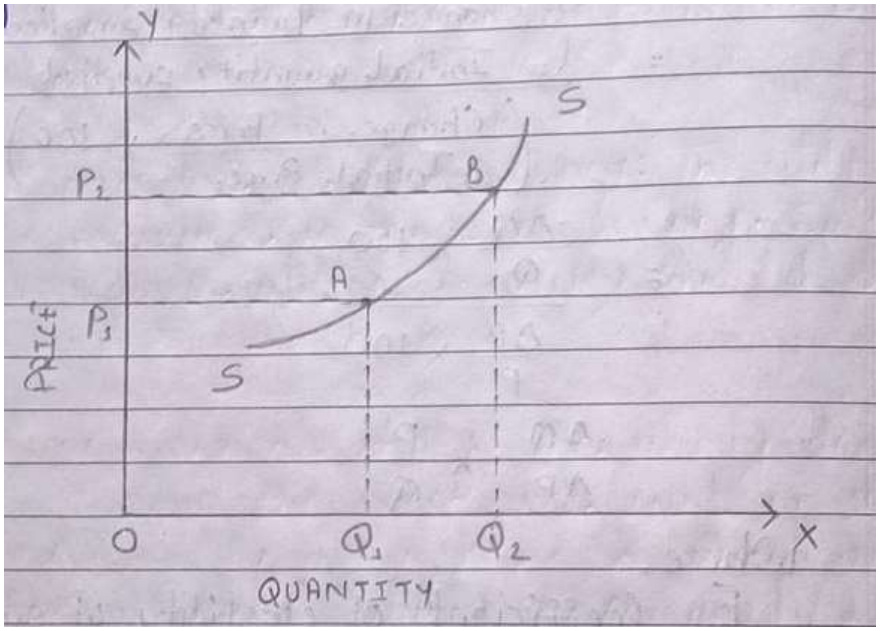
ΔQ = change in quantity supplied

P = initial price

ΔP = change in price

ii. Arc method: The coefficient of elasticity of supply between two points on a supply curve is called arc elasticity. This method is used to measure elasticity

of supply when there is greater change in price and quantity supplied. According to this method, elasticity of supply is the coefficient of average between two points along a supply curve figure shows the measurement of elasticity of supply between two points A and B along the supply curve SS.



$$E_S = \frac{\dfrac{\text{change in quantity supplied}}{\text{average quantity supplied}}}{\dfrac{\text{change in price}}{\text{average price}}}$$

$$E_S = \frac{\frac{\Delta Q}{\frac{Q_1 + Q_2}{2}}}{\frac{\Delta P}{\frac{P_1 + P_2}{2}}}$$

$$E_S = \frac{\Delta Q}{\Delta P} \times \frac{P_1 + P_2}{Q_1 + Q_2}$$

$$E_S = \frac{Q_2 + Q_1}{P_2 - P_1} \times \frac{P_1 + P_2}{Q_1 + Q_2}$$