Chapter-3 Elasticity of Demand & Supply

Elasticity of Demand

Elasticity of demand is the responsiveness of demand for the commodity to the change in anyone of the determinants. It measures the percentage or proportionate change in anyone of the determinants such as price, income, price of the related goods. It shows how much change in a particular determinant of demand causes how much change in demand.

$$E_D = \frac{\%\text{ change in quantity}}{\%\text{ change in demand}}$$

Types of elasticity of demand

1) Price elasticity of demand (E_p)
2) Income elasticity of demand (E_y) (E_I)
3) Cross elasticity of demand (E_{xy})

1) Price elasticity of demand (E_p)

The change in quantity demanded in response to the change in price of the commodity, other things remaining the same. Since, price & quantity demanded are inversely related, the coefficient of price elasticity of demand is negative.

$$E_p = \frac{\%\text{ change in } Q_d}{\%\text{ change in price}}$$

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

$$= \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} \quad //$$

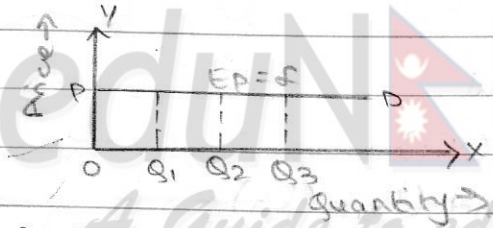
where, Q = Initial Quantity Demanded
P = Initial Price
ΔQ = Change in QD
ΔP = Change in Price
E_p = Coefficient of price elasticity of demand

Types or Degree of Price Elasticity of Demand

a. Perfectly Elastic Price Elasticity of Demand ($Ep = \infty$)
b. Relatively Elastic Price Elasticity of Demand ($Ep > 1$)
c. Unitary Elastic Demand ($Ep = 1$)
d. Relatively Inelastic Price Elasticity of Demand ~~($Ep = 0$)~~ ($Ep < 1$)
e. Perfectly Inelastic Price Elasticity of Demand ($Ep = 0$)

a. Perfectly elastic price elasticity of Demand ($Ep = \infty$)

Very small (insignificant) change in price leads to huge (infinitive) change in quantity demanded of that commodity is known as perfectly elastic price demand.

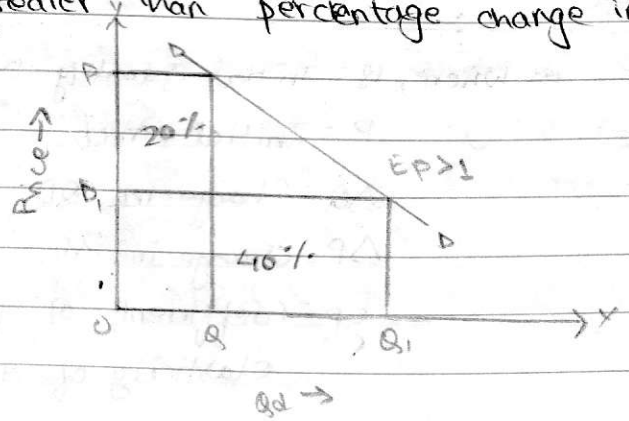


Perfectly elastic demand curve is a horizontal straight line parallel to the x-axis. It means that at price OP, the q.d may be OQ_1 or OQ_2 or OQ_3.

$$Ep = \frac{\infty}{0} = \infty$$

b. Relatively elastic price elasticity of Demand ($Ep > 1$)

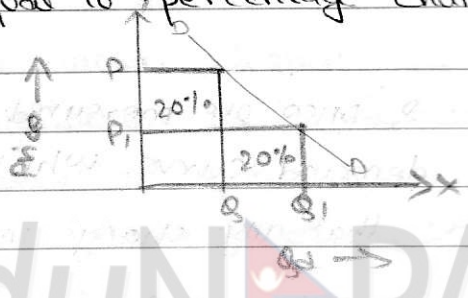
Percentage change in quantity demanded of a commodity is greater than percentage change in price.



In the given figure, DD is the relatively elastic demand curve. It indicates that % change in price of the commodity is less than the % change in quantity demanded. $Ep = \frac{40\%}{20\%} = 2 > 1$

c. Unitary Elastic Price Elasticity of Demand ($Ep = 1$)

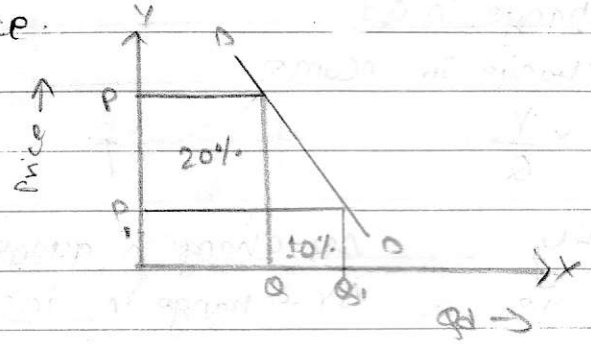
Percentage change in quantity demanded of a commodity is equal to percentage change in price.



In the fig., DD is the unitary elastic demand curve which shows the equal % change in price & Qd. $Ep = \frac{20\%}{20\%} = 1$

d. Relatively Inelastic Price elasticity of Demand ($Ep < 1$)

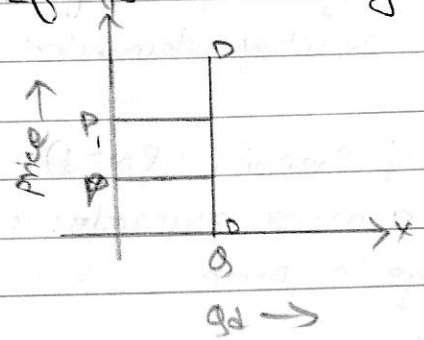
Percentage change in qd is less than percentage change in price.



In the fig, DD is the relatively inelastic demand curve. It indicates that % change in price is greater than the % change in quantity demand. $Ep = \frac{10\%}{20\%} = 0.5 < 1$

e. Perfectly inelastic price elasticity of demand ($E_p = 0$)

If QD remaining constant at any level of change in price.



In the given fig. Qd & price are measured along X-axis & Y-axis P respectively. DD is the demand curve which is vertical St. Lin parallel to Y-axis. It indicates that any change in price doesn't affe qd. of a commodity.

2) Income Elasticity of Demand (E_y or E_I)

The change in quantity demanded in response to the change in income of a consumer, other things remaining the same is incom elasticity of demand.

$$E_y \text{ or } E_I = \frac{\% \text{ change in } Q_d}{\% \text{ change in income}}$$

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

When, Q = Initial quantity ΔQ = Change in quantity

Y = Initial income ΔY = Change in income

E_y = Coefficient of income elasticity.

Types of Income Elasticity of Demand.

a. Positive income elasticity of demand ($E_y > 0$)

i → Greater than Unity ($E_y > 1$)

ii → Less than Unity ($E_y < 1$)

iii → Equal to Unity ($E_y = 1$)

b. Zero income elasticity of demand ($E_y = 0$)

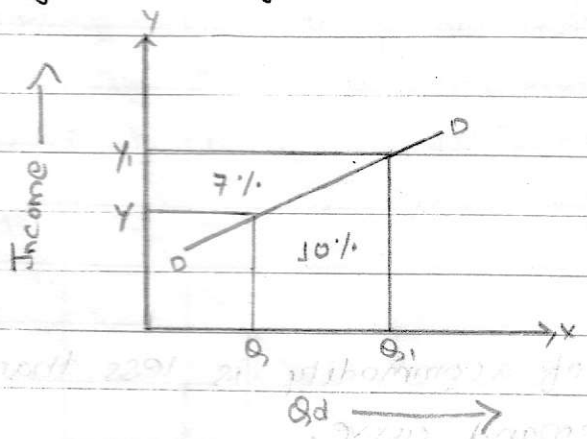
c. Negative income elasticity of demand ($E_y < 0$)

a. Positive income elasticity of demand ($E_y > 0$)

If increase in income leads to increase in demand for a commodity & vice-versa, it is called positive income elasticity of demand. This is applied in normal good. Positive income elasticity of demand is further divided into three types:

i Elasticity greater than Unity ($E_y > 1$)

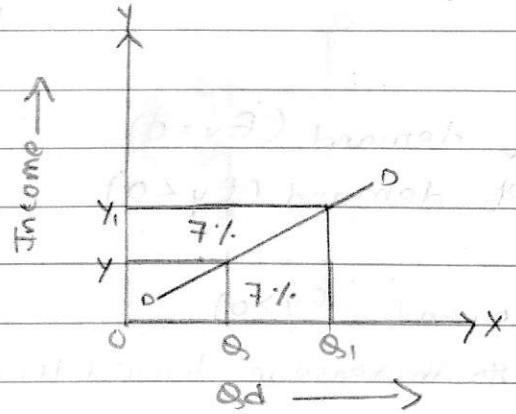
The percentage change in QD of a commodity is greater than the percentage change in income of a consumer, other things remaining the same.



In the fig, Qd & income of a consumer are measured along x-axis & y-axis respectively. DD is the ~~deer~~ demand curve, it indicates income is less than Qd of a commodity.

ii Elasticity equal to unity ($E_Y = 1$)

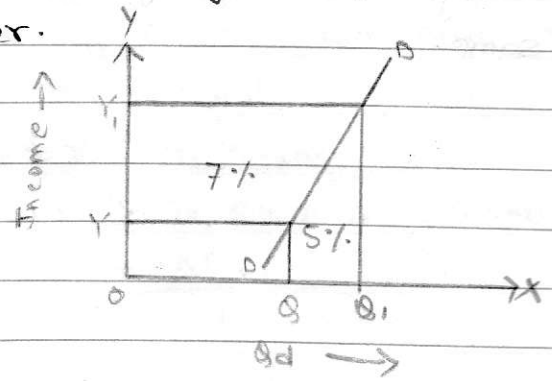
The % change in Qd is equal to the % change in income of a consumer, other things remaining the same.



In the given fig. DD is the demand curve, it indicates income of the consumer is equal to Qd of a commodity.

iii Elasticity less than unity ($E_Y < 1$)

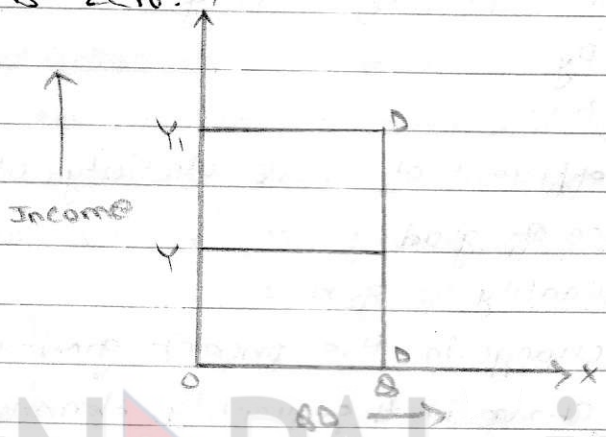
The % change in Qd is less than the % change in income of a consumer.



In the fig. Qd of a commodity is less than income of a consumer. DD is the demand curve.

b. zero Income elasticity of demand ($E_y = 0$)

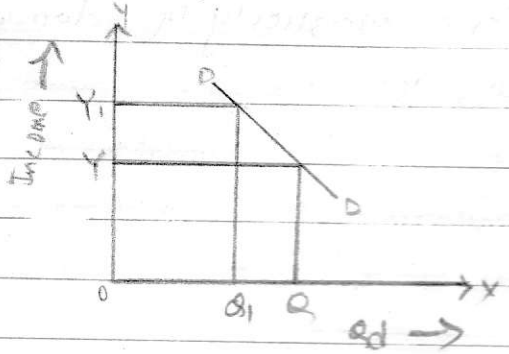
If quantity demanded remains unchanged despite change in income & vice-versa, the income elasticity is said to be zero. In case of neutral goods like salt, income elasticity of demand is zero.



In the fig. income & Qd are measured along Y-axis & x-axis respectively. DD is the demand curve. It indicates that Qd remains constant at any level of change in income of the consumer.

c. Negative elasticity of demand ($E_y < 0$)

If Qd of a consumer decreases due to increment in income of consumer. It is applied in inferior goods.



In the given fig. DD is the demand curve. When income is increases from OY to OY_1, the Qd decreases from OQ to OQ_1. It indicates the negative rel^n bet^n income & Qd.

3) Cross Elasticity of Demand (E_{xy})

The change in quantity demanded of a commodity x in response to the change in price of a commodity y.

$$E_{xy} = \frac{\% \text{ change in quantity demand for good } x}{\% \text{ change in price of good } y.}$$

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

where, E_{xy} = Coefficient of cross elasticity of demand

P_y = Price of good-y

Q_x = Quantity of good-x

ΔP_x = change in the price of good-y

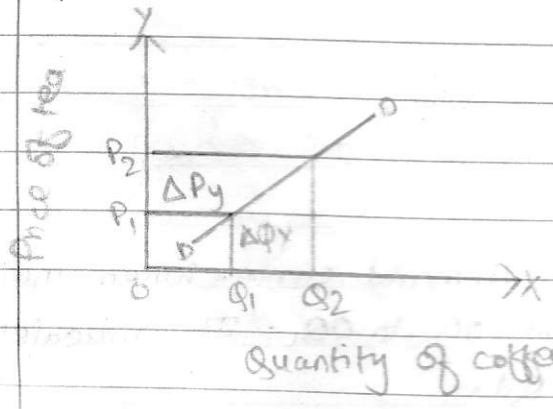
ΔQ_x = change in the quantity demand for good-x.

Types of cross elasticity of Demand.

a. Positive cross elasticity of Demand ($E_{xy} > 0$)
b. Negative cross elasticity of Demand ($E_{xy} < 0$)
c. Zero cross elasticity of Demand ($E_{xy} = 0$)

a. Positive cross elasticity of Demand ($E_{xy} > 0$)

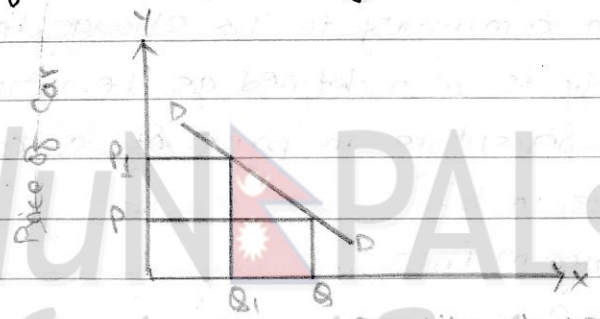
When the QD of a commodity & price of related commodity change into same direction, the cross elasticity of demand is positive. It is applied in substitute goods.



In the fig., the upward sloping demand curve DD shows the positive rel^{n}ship bet^n the demand for coffee & the price of tea. When the price of tea increase, the demand for coffee also increases. Therefore, tea & coffee are substitute goods.

b. Negative cross elasticity of Demand. ($E_{xy} < 0$)

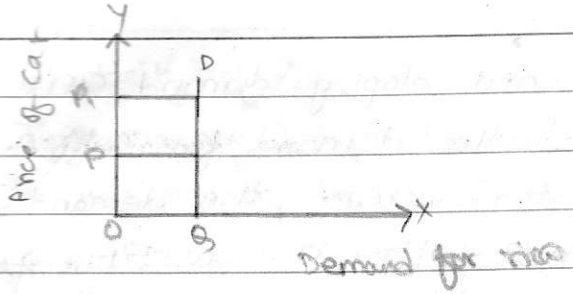
When, the QD of a commodity & price of related commodity change into different direction, the cross elasticity of demand is negative. It is applied in complementary goods.



In the fig., the downward sloping demand curve DD shows the negative rel^{n}ship bet^n the demand for petrol & the price of car. When the price of car decrease, the demand for petrol increases. Therefore, petrol & car are complementary goods.

c. Zero cross elasticity of Demand ($E_{xy} = 0$)

When the change in price of one good has no effect on the demand for another good, the cross elasticity of demand is zero. It is applicable in unrelated goods.



In the fig., when the price of car rises, the q.d for rice remains unchanged. Such goods are unrelated to each other.

Elasticity of Supply

The elasticity of supply is defined as the responsiveness of quantity supplied of a commodity to the change in its price. The price elasticity of supply is also defined as the ratio betn. percentage in quantity supplied & percentage in price of a commodity.

$$E_s = \frac{\%\text{ change in } QS}{\%\text{ change in Price}}$$

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

where, ΔQ = change in QS Q = Initial QS

ΔP = Δ in Price P = Initian Price

E_s = Coefficient of elasticity of supply.