ELASTICITY OF DEMAND (Ed)

Elasticity means degree responsiveness of change in demand to the change in price of the product, Income of the consumer and price of the related goods.

Three types of Elasticity of demand (Ed)

1. Price Elasticity of demand (Epd)

2. Income Elasticity of demand (Eyd)

3. Cross Elasticity of demand (Ecd)

Price Elasticity of demand (Epd)

Price Elasticity is the degree responsiveness of demand to change in price or percentage change in demand due to percentage change in price.

Epd = % change in quantity demanded / % change in price

= **Change in demand/ Original demand**

Change in price / Original price

= $\Delta Q / Q \times 100 / \Delta P / P \times 100$

= $\Delta Q / \Delta P \times P/Q$

Exmp: When the price of CD increased from Rs.20 to Rs.22, the quantity of CDs demanded decreased from 100 to 87.

What is the price elasticity of demand for CDs?

Calculating a Percentage

- The price increases from Rs.20 to Rs.22. Therefore % change = 2/20 = 0.1 (10%)
0.1 = 10% (0.1 *100)

- Quantity fell by 13/100 = – 0.13 (13%)
- Therefore PED = 13/-10
- Therefore **PED =** $\left| -1.3 \right|$ **or 1.3 (Elastic)**

Degrees of Price Elasticity:

Different commodities have different price elasticity's. Some commodities have more elastic demand while others have relative elastic demand. Basically, the price elasticity of demand ranges from zero to infinity. It can be equal to zero, less than one, greater than one and equal to unity.

1. Perfectly Elastic Demand:

Perfectly elastic demand is said to happen when a little change in price leads to an infinite change in quantity demanded. A small rise in price on the part of the seller reduces the demand to zero. In such a case the shape of the demand curve will be horizontal straight line as shown in figure 1.


Fig. 1.
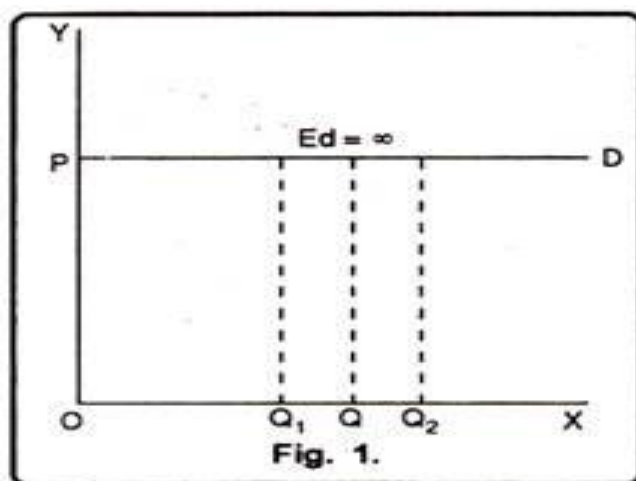
$$\Delta Q / \Delta P \text{ X } P/Q = \infty$$

The figure 1 shows that at the ruling price OP, the demand is infinite. A slight rise in price will contract the demand to zero. A slight fall in price will attract more consumers but the elasticity of demand will remain infinite (ed=∞). But in real world, the cases of perfectly elastic demand does not exist.

2. Perfectly Inelastic Demand:

Perfectly inelastic demand is opposite to perfectly elastic demand. Under the perfectly inelastic demand, irrespective of any rise or fall in price of a

commodity, the quantity demanded remains the same. The elasticity of demand in this case will be equal to zero (ed = 0).

Fig. 2.
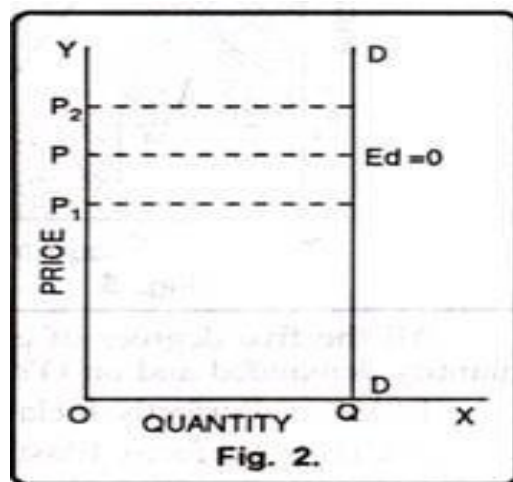
$$\Delta Q / \Delta P \text{ X } P/Q = 0$$

Example: A 30% rise or fall in price leads to no change in the quantity demanded of a good.

$$E_d = \frac{0}{30\%} \quad => \quad E_d = 0$$

In diagram 2 DD shows the perfectly inelastic demand. At price OP, the quantity demanded is OQ. Now, the price falls to OP1, from OP, the demand remains the same. Similarly, if the price rises to OP2 the demand still remains the same.   it is difficult to come across the cases of perfectly inelastic demand because even the demand for, necessary goods of life does show .

3. Unitary Elastic Demand:

The demand is said to be unitary elastic when a given proportionate change in the price level brings about an equal proportionate change in quantity demanded. The numerical value of unitary elastic demand is exactly one $E_{pd} = 1$

Fig. 3.

ΔQ / ΔP X P/Q = 1

P   Q
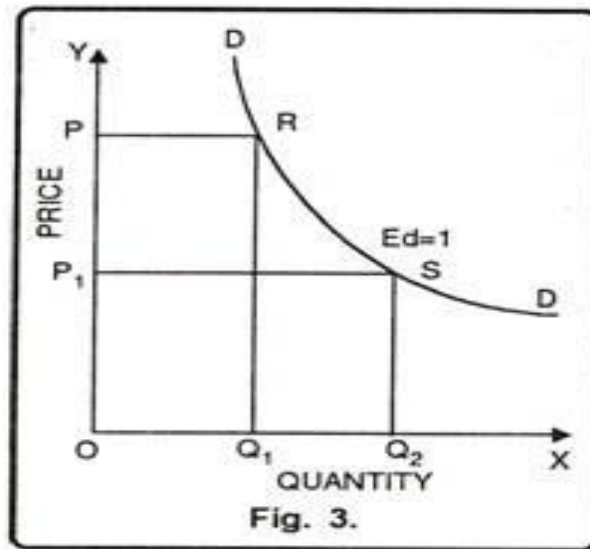
40   10   Epd = 3/3 X 1/1 = 1   (Min P & Min Q has been taken)

10   40

In figure 3, DD demand curve represents unitary elastic demand. This demand curve is called rectangular hyperbola. When price is OP, the quantity demanded is OQ\. Now price falls to OP1 the quantity demanded increases to OQ2. The area OQ\RP = area OP\SQ2 in the fig. denotes that in all cases price elasticity of demand is equal to one.

4. Relatively Elastic Demand:

Relatively elastic demand refers to a situation in which a small change in price leads to a greater change in quantity demanded. In such a case elasticity of demand is said to be more than one (ed > 1). This has been shown in fig.4
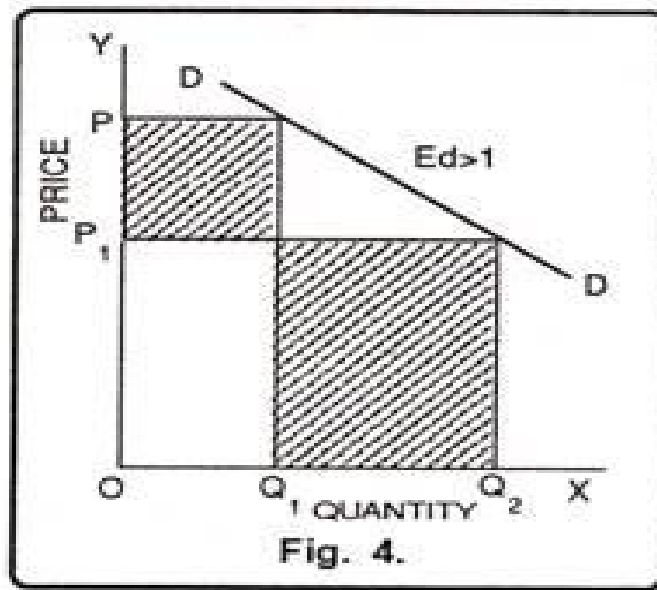
Fig. 4.

$$\Delta Q / \Delta P \text{ X } P/Q > 1$$

Example

P Q

40 10 **Epd > 1** (Min P & Min Q has been taken)

10 60

In fig. 4, DD is the demand curve which indicates that when price is OP the quantity demanded is OQ1. Now the price falls from OP to OP1, the quantity demanded increases from OQ1 to OQ2 i.e. quantity demanded changes more than change in price.'

5. Relatively Inelastic Demand:

Under the relatively inelastic demand, a given percentage change in price produces a relatively less percentage change in quantity demanded. In such a case elasticity of demand is said to be less than one (ed < 1). It has been shown in figure 5.

Fig. 5. Fig. 6.
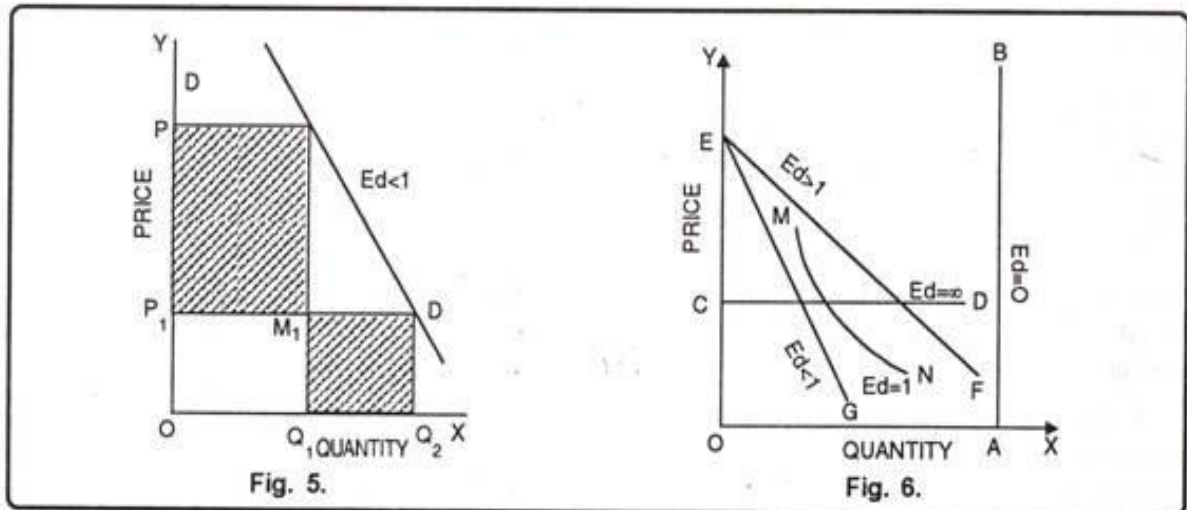
$$\Delta Q / \Delta P \text{ X } P/Q \quad < 1$$

P	Q		
40	10	Epd < 1	(Min P & Min Q has been taken)
10	20		

All the five degrees of elasticity of demand have been shown in figure 6. On OX axis, quantity demanded and on OY axis price is given.

Income Elasticity of Demand (Eyd)

Income elasticity of demand is the percentage change in the quantity demanded due to the percentage in income.

Eyd   is $\dfrac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$

= $\dfrac{\text{New quantity demanded } (\Delta Q)/\text{Original quantity demanded } (Q)}{\text{New income } (\Delta Y)/\text{original income } (Y)}$

= $\Delta Q / \Delta Y \text{ X } Y/Q$ or $\Delta Q / \Delta Y \text{ X } (Y1+Y2)/(Q1+Q2)$

Example: Suppose the monthly income of an individual increases from Rs. 6,00(Y) to Rs. 12,00 (Y1). Now, his demand for clothes increases from 30 units (Q) to 60 units (Q1).

Ans: Eyd = 30/600 X 600/30 = 1 (equal to unity)

i. Positive Income Elasticity of Demand: (Epd >0)

when the demand for a product increases with increase in consumer's income and decreases with decrease in consumer's income. The income elasticity of demand is positive for normal goods. It may be Epd >1, Epd=1, Epd<0
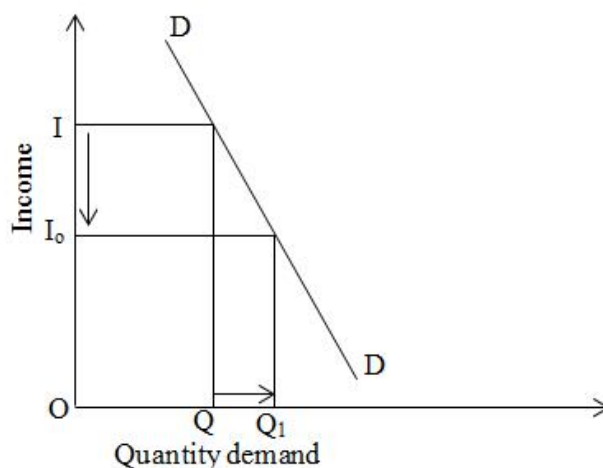

Fig. 18.
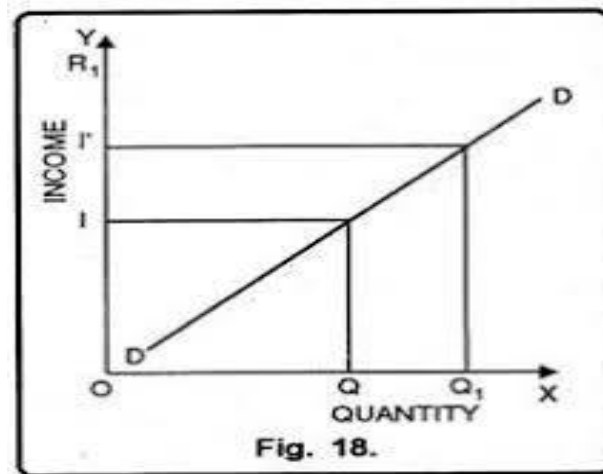
| Y	Q	
20	10	Eyd >0
50	80	

Negative Income Elasticity of Demand:

income elasticity of demand in which the demand for a product decreases with increase in consumer's income. The income elasticity of demand is negative for inferior goods, also known as Giffen goods.

Zero Income Elasticity (Eyd=0) : . This is because there is no effect of increase in consumer's income on the demand of product. The income elasticity of demand is zero (Eyd = 0) in case of essential or necessary goods.
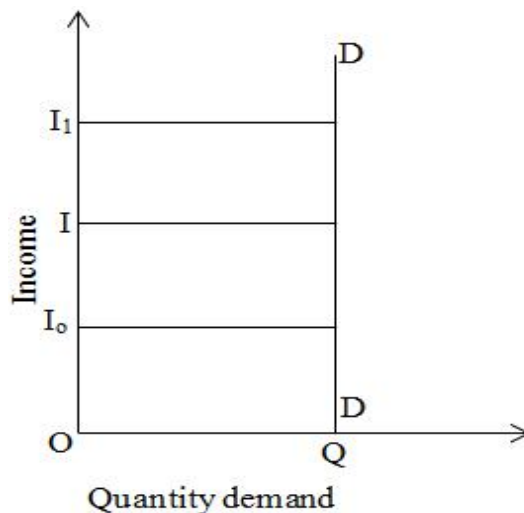
Quantity demand

Y	Q	
20	80	Eyd = 0
50	80	

Cross Elasticity of Demand

It is the ratio of proportionate change in the quantity demanded of a product (X) to a given proportionate change in the price of the related commodity (Y).

It is a measure of relative change in the quantity demanded of a commodity due to a change in the price of its substitute/complement.

Ecd   is   <u>Percentage change in quantity demanded of (X)</u>
          Percentage change in price of (Y)

<u>Change in quantity demand of X (ΔQx)/Original quantity demand(Qx)</u>

Change in price of Y (ΔY)/original price of Y(Py)

$$= \quad \Delta Qx / Qx \text{ X } \Delta Py/Py$$

$$= \Delta Qx / \Delta Py \quad \text{X} \quad Py/ Qx$$

1. Positive(Ecd >0):

Change in price of one commodity directly proportional to change in demand of another commodity.

When an increase in the price of Y leads to an increase in the demand of X. For instance, I case of substitute goods.with the increase in price of tea, demand of coffee will increase and vice versa.


Fig. 21.
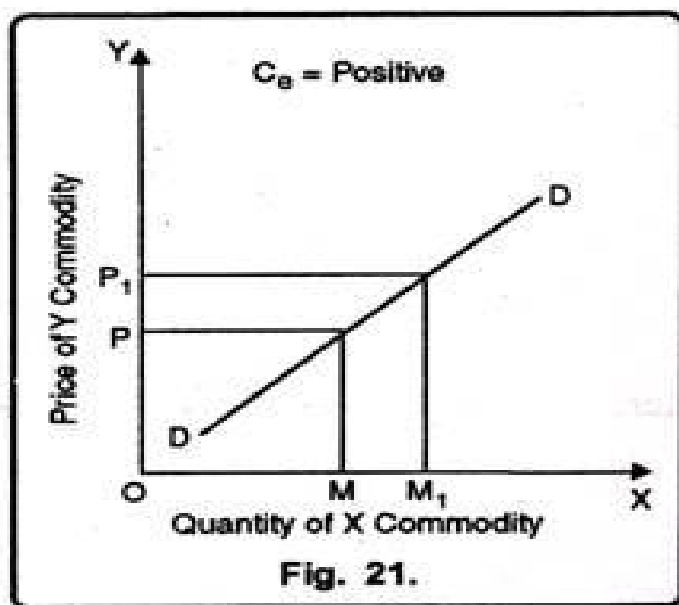
Px	Qy	
10	50	Ecd > 0
60	90	

2. Negative (Ecd<0):

A proportionate increase in price of one commodity leads to a proportionate fall in the demand of another commodity because both are demanded jointly. When the price of commodity increases from OP to OP1 quantity demanded falls from OM to OM1. Thus, cross elasticity of

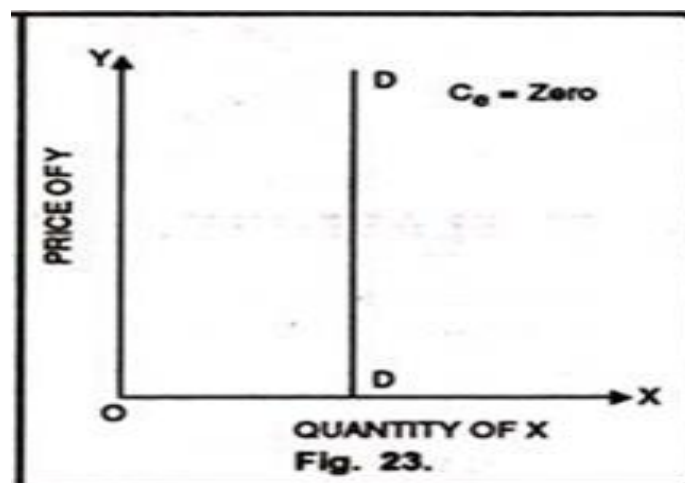demand is negative.I case of complementary goods. Petrol & car, Milk and tea.

Fig. 22.
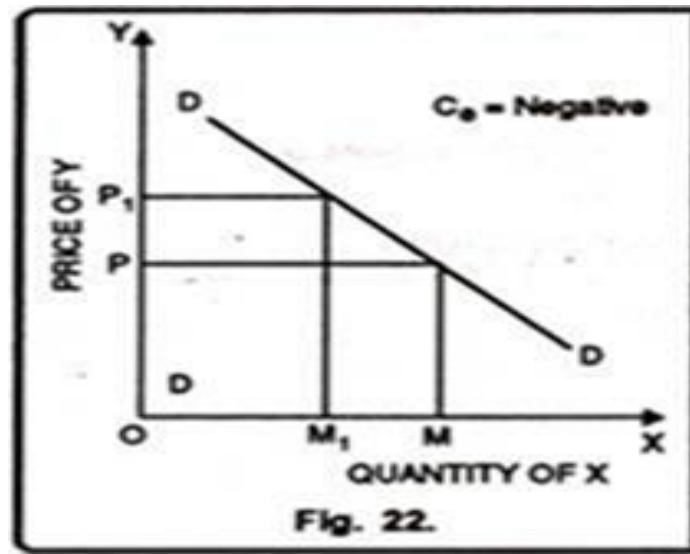
Px	Qy	
10	50	Ecd < 0
60	20	

3. Zero (Ecd=0):

Cross elasticity of demand is zero when two goods are not related to each other. For instance, increase in price of milk does not effect the demand of car. Thus, cross elasticity of demand is zero. It has been shown in fig.

Fig. 23.

Px	Qy	
10	50	Ecd = 0
60	50	