

Chapter-4 Elasticity of Demand

Short Answer Type Questions

(3/4 Marks)

Q1. The market demand for a good at ₹ 4 per unit is 100 units. The price rises and as a result its market demand falls to 75 units. Find out the new price if the price elasticity of demand of that good is (-) 1.

Ans. $P = ₹ 4$ $Q = 100$ units
 $P_1 = ?$ $Q_1 = 75$ units $\epsilon_D = (-)1$

$$\frac{\Delta Q = 25 \text{ units}}{\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}}$$
$$\Rightarrow 1 = \frac{25}{\Delta P} \cdot \frac{4}{100} \Rightarrow \Delta P = \frac{100}{25} = 4 \quad \therefore P_1 = P + \Delta P = 4 + 1 = ₹ 5$$

Q2. The market demand for a good at ₹ 5 per unit is 100 units. When price changes market demand rises to 150 units. Find out the new price if price elasticity of demand is (-) 2.5.

Ans. $P = ₹ 5$ $Q = 100$ units
 $P_1 = ?$ $Q_1 = 150$ units $\epsilon_D = (-) 2.5$

$$\frac{\Delta Q = 50 \text{ units}}{\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}}$$
$$\Rightarrow 2.5 = \frac{50}{\Delta P} \cdot \frac{5}{100} \Rightarrow \Delta P = \frac{250}{50} = 5 \quad \therefore P_1 = P - \Delta P = 5 - 1 = ₹ 4$$

Q3. The market demand for a good at a price of ₹ 10 per unit is 100 units. When its price changes its market demand falls to 50 units. Find out the new price if the price elasticity of demand is (-) 2.

Ans. $P = ₹ 10$ $Q = 100$ units
 $P_1 = ?$ $Q_1 = 50$ units $\epsilon_D = -2$

$$\frac{\Delta Q = 50 \text{ units}}{\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}}$$
$$-2 = \frac{50}{\Delta P} \cdot \frac{10}{100}$$
$$\Rightarrow \Delta P = \frac{500}{200} = 2.5 \quad \therefore P_1 = P + \Delta P = 10 + 2.5 = ₹ 12.50$$

Q4. A consumer buys 160 units of a good at a price of ₹ 8 per unit. Price falls to ₹ 6 per unit. How much quantity will consumer buy at a new price if price elasticity of demand is (-) 1?

Ans. $P = 8$ $Q = 160$
 $P_1 = 6$ $Q_1 = ?$ $e_D = (-) 1$
 $\underline{\Delta P = 2}$

$$e_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$\Rightarrow 1 = \frac{\Delta Q}{2} \cdot \frac{8}{160}$$

$$\Rightarrow \Delta Q = 40 \quad \therefore Q_1 = Q + \Delta Q = 160 + 40 = 200 \text{ units}$$

Q5. A consumer buys 200 units of a good at a price of ₹ 5 per unit. When the price changes he buys only 100 units. If price elasticity of demand is (-) 1, find the changed price.

Ans. $P = 5$ $Q = 200$
 $P_1 = ?$ $Q_1 = 100$ $e_D = (-) 1$
 $\Delta Q = 100$
 $e_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$
 $\Rightarrow 1 = \frac{100}{\Delta P} \cdot \frac{5}{200} \Rightarrow \Delta P = 2.5 \quad \therefore P_1 = P + \Delta P = 5 + 2.5 \Rightarrow P_1 = ₹ 7.50$

Q6. When the price of a commodity is ₹ 20 per unit, its quantity demanded is 800 units. When its price rises by ₹ 5 per unit, its quantity demanded falls by 20 per cent. Calculate its price elasticity of demand. Is its demand elastic? Give reasons for your answer.

Ans. $P = 20$ $\therefore \text{Percentage change in price} = \frac{5}{20} \times 100 = 25\%$
 $P_1 = 25$
 $\underline{\Delta P = 5}$

$$e_D = \frac{\% \text{ Change in quantity demanded}}{\% \text{ Change in price}} = \frac{20}{25} = 0.8$$

Since, value of e_D is between zero and one, it is inelastic.

Q7. When the price falls from ₹ 20 per unit to ₹ 16 per units, its quantity demanded rises from 1000 units to 1160 units. Calculate e_D . Is it inelastic? Give reason.

Ans. $P = 20$ $Q = 1,000$
 $P_1 = 16$ $Q_1 = 1,160$
 $\underline{\Delta P = 4}$ $\underline{\Delta Q = 160}$

$$e_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$= \frac{160}{4} \cdot \frac{20}{1000} \\ = \frac{8}{10} = 0.8$$

Since, value of ϵ_D is between zero and one, it is inelastic.

Q 8. Price elasticity of demand is (-2) . 40 units of this good are bought at a price of ₹ 10 per unit. How many units will be bought at a price of ₹ 11 per unit. Calculate.

Ans. $P = 10$ $Q = 40$

$P_1 = 11$ $Q_1 = ?$

$\Delta P = 1$

$$\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \quad \epsilon_D = -2$$

$$\Rightarrow 2 = \frac{\Delta Q}{1} \cdot \frac{10}{40} \Rightarrow \Delta Q = 8$$

$$\therefore Q_1 = Q - \Delta Q = 40 - 8 = 32 \text{ units.}$$

Q 9. The quantity demanded of a commodity at a price of ₹ 8 per unit is 600 units. Its price falls by 25 per cent and quantity demanded rises by 120 units. Calculate its price elasticity of demand. Is its demand elastic? Give reason for your answer.

Ans. Percentage change in quantity demanded = $\frac{120}{600} \times 100 = 20\%$

$$\epsilon_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}} = \frac{20}{25} = 0.8$$

Since, value of ϵ_D is between zero and one, it is inelastic.

Q 10. A consumer buys 80 units of a good at a price of ₹ 5 per unit. Suppose price elasticity of demand is (-2) . At what price will he buy 64 units?

Ans. $P = 5$ $Q = 80$ $\epsilon_D = (-2)$

$P_1 = ?$ $Q_1 = 64$

$\Delta Q = 16$

$$\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$\Rightarrow 2 = \frac{16}{\Delta P} \cdot \frac{5}{80} \Rightarrow \Delta P = 0.5$$

$$\therefore P_1 = P + \Delta P = 5 + 0.5 = ₹ 5.50$$

Q 11. Price of a good rises from ₹ 10 per unit to ₹ 11 per unit. As a result, quantity demanded of that good falls by 10 per cent. Calculate its price elasticity of demand.

Ans. Percentage change in price = $\frac{1}{10} \times 100 = 10\%$

$$\epsilon_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}}$$

$$= \frac{10}{10} = 1$$

Q 12. Price of a good falls from ₹ 6 to ₹ 3 per unit. As a result, its demand rises from 30 units to 60 units. Find out price elasticity of demand by total expenditure method.

Ans. $P = 6$ $Q = 30$, $PQ = ₹ 180$
 $P_1 = 3$ $Q_1 = 60$, $P_1Q_1 = ₹ 180$

∴ Since, there is no change in expenditure when price changes, price elasticity of demand is one.

Q 13. A consumer buys 50 units of a good at a price of ₹ 10 per unit. When price falls to ₹ 5 per unit he buys 100 units. Find out price elasticity of demand by the 'Total Expenditure Method'.

Ans. $P = 10$ $Q = 50$, $PQ = 10 \times 50 = ₹ 500$
 $P_1 = 5$ $Q_1 = 100$, $P_1Q_1 = 5 \times 100 = ₹ 500$

$\epsilon_D = 1$ by the total expenditure method. According to this method, if there is no change in expenditure when price changes then $\epsilon_D = 1$.

Q 14. A consumer buys 40 units of a good at a price of ₹ 3 per unit. When price rises to ₹ 4 per unit he buys 30 units. Calculate price elasticity of demand by the total expenditure method.

Ans. $P = 3$ $Q = 40$, $PQ = 40 \times 3 = ₹ 120$
 $P_1 = 4$ $Q_1 = 30$, $P_1Q_1 = 30 \times 4 = ₹ 120$

∴ $\epsilon_D = 1$ by the total expenditure method.

Q 15. A consumer buys 70 units of a good at a price of ₹ 7 per unit. When price falls to ₹ 6 per unit he buys 90 units. Use Total expenditure Method to find whether the demand for the good is elastic or inelastic.

Ans. $P = 7$ $Q = 70$, $PQ = 7 \times 70 = ₹ 490$
 $P_1 = 6$ $Q_1 = 90$, $P_1Q_1 = 6 \times 90 = ₹ 540$

ϵ_D is elastic by the total expenditure method. According to this method if total expenditure rises when price falls then $\epsilon_D > 1$ or elastic.

Q 16. When price of a good falls by 10 per cent, its quantity demanded rises from 40 units to 50 units. Calculate price elasticity of demand by the percentage method.

Ans. Percentage change in demand = $\frac{10}{40} \times 100 = 25$

$$\epsilon_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}} = \frac{25}{10} = 2.5$$

Q 17. The price of a commodity rises from ₹ 10 to ₹ 12 and consequently the demand falls from 100 units to 80 units. Determine the price elasticity of demand for that commodity.

Ans. $P = 10$ $Q = 100$
 $P_1 = 12$ $Q_1 = 80$
 $\underline{\Delta P = 2}$ $\underline{\Delta Q = 20}$

$$\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$\Rightarrow \frac{10}{2} \cdot \frac{20}{50} = 2$$

Q 22. If the elasticity of demand for salt is zero and a household demands 2 kg of salt in a month at ₹ 5 per kg, how much will it demand at ₹ 7.50 per kg?

Ans. Since $\epsilon_D = 0$, there will be no change in quantity demanded whenever there is a change in price. Thus, the household will demand 2 kg of salt when price of salt is ₹ 7.50.

Q 23. Following are the demand schedules for commodities *A* and *B*. Which one of them has more elastic demand?

Commodity <i>A</i>		Commodity <i>B</i>	
Price	Quantity DD	Price	Quantity DD
10	100	20	100
12	90	18	110

Ans. $\epsilon_D^A = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{10}{2} \cdot \frac{10}{100} = 0.5$

$$\epsilon_D^B = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{10}{2} \cdot \frac{20}{100} = 1$$

Thus, elasticity of demand for commodity *B* is more elastic.

Q 24. Determine price elasticity of demand by the total expenditure method.

Price	Total Expenditure
11	121
10	50

Ans. As price falls, total expenditure also falls. It means elasticity of demand is less than one or it is inelastic.

Q 25. Following is the demand schedule for a commodity *Y*:

Price	15	16	17	20
Demand	100	80	50	40

Calculate elasticity of demand when price rises from ₹ 15 to ₹ 20 and when price falls from ₹ 20 to ₹ 15.

Ans. ϵ_D when price rises from ₹ 15 to ₹ 20 = $\frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{60}{5} \cdot \frac{15}{100} = 1.8$

ϵ_D when price falls from ₹ 20 to ₹ 15 = $\frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{60}{5} \cdot \frac{20}{40} = 6$

Q 26. Determine price elasticity of demand using percentage method. Given are:

Quantity	Total Outlay (₹)
20	200
15	300

Ans. When $Q = 20, PQ = 200 \therefore P = \frac{PQ}{Q} = \frac{200}{20} = 10$

When $Q_1 = 15, P_1 Q_1 = 300 \therefore P_1 = \frac{P_1 Q_1}{Q_1} = \frac{300}{15} = 20$

$$\therefore e_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$= \frac{5}{10} \cdot \frac{10}{20} = 0.25$$

Q 27. A consumer spends ₹ 80 on a commodity at a price of Re. 1 per unit and ₹ 100 at a price of ₹ 2 per unit. What is the price elasticity of demand?

Ans. When $P = 1, PQ = 80 \Rightarrow Q = \frac{80}{1} = 80$

When $P_1 = 2, P_1 Q_1 = 100 \Rightarrow Q_1 = \frac{100}{2} = 50$

$$\therefore e_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$= \frac{30}{1} \cdot \frac{1}{80} = 0.38$$

Q 28. The price of X falls from ₹ 5 to ₹ 4 and the quantity rises from 4 to 6 units. Calculate elasticity of demand. What would you say about the elasticity if quantity demanded remained unchanged?

Ans. $P = 5 \quad Q = 4$

$$\begin{array}{r} P_1 = 4 \\ \hline \Delta P = 1 \end{array} \quad \begin{array}{r} Q_1 = 6 \\ \hline \Delta Q = 2 \end{array}$$

$$e_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$= \frac{2}{1} \cdot \frac{5}{4} = 2.5$$

e_D when quantity demanded remains unchanged is zero.

Q 29. The price of a commodity rises from ₹ 4 to ₹ 20 per unit. Consequently, its demand falls by 40 units and becomes 80 units. Determine the elasticity of demand.

Ans. $P = 4 \quad Q = 120$

$$\begin{array}{r} P_1 = 20 \\ \hline \Delta P = 16 \end{array} \quad \begin{array}{r} Q_1 = 80 \\ \hline \Delta Q = 40 \end{array}$$

$$\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$= \frac{20}{2} \cdot \frac{10}{100} = 1$$

Q 18. The price of a commodity Y falls from ₹ 4 to ₹ 3 per unit. This leads to an increase in the total expenditure on Y from ₹ 20 to ₹ 30 per month. Determine the elasticity of demand for Y .

$$\begin{array}{lll} \text{Ans. } P = 4 & PQ = 20 & \Rightarrow Q = \frac{PQ}{P} = \frac{20}{4} = 5 \\ & P_1 = 3 & P_1 Q_1 = 30 \Rightarrow Q = \frac{P_1 Q_1}{P_1} = \frac{30}{3} = 10 \\ \hline & \Delta P = 1 & \\ & & \epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \\ & & = \frac{5}{1} \cdot \frac{4}{5} = 4 \end{array}$$

Q 19. With a 10% fall in the price of a commodity, the number of units demanded rises from 20 to 25. Determine the price elasticity of demand.

$$\begin{array}{l} \text{Ans. Percentage change in demand} = \frac{5}{20} \times 100 = 25\% \\ \epsilon_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}} = \frac{25}{10} = 2.5 \end{array}$$

Q 20. The price of a good decreases from ₹ 10 to ₹ 5 per unit. If the price elasticity of demand for it is 3 and the original quantity demanded is 40 units, calculate the new amount demanded.

$$\begin{array}{lll} \text{Ans. } P = 10 & Q = 40 & \\ & P_1 = 5 & Q_1 = ? \Rightarrow \epsilon_D = 3 \\ \hline & \Delta P = 5 & \\ & & \epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \\ & \Rightarrow & 3 = \frac{\Delta Q}{5} \cdot \frac{10}{40} \\ & \Rightarrow & \Delta Q = 60 \\ & \therefore & Q_1 = Q + \Delta Q = 40 + 60 = 100 \text{ units.} \end{array}$$

Q 21. A decline in the price of X by ₹ 2 causes an increase of 10 units in demand which goes up to 60 units. The new price is ₹ 18. Calculate the ϵ_D .

$$\begin{array}{lll} \text{Ans. } P = 20 & Q = 50 & \\ & P_1 = 18 & Q_1 = 60 \\ \hline & \Delta P = 2 & \Delta Q = 10 \end{array}$$

$$\begin{aligned}\epsilon_D &= \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \\ &= \frac{40}{16} \cdot \frac{4}{120} = \frac{1}{12}\end{aligned}$$

Q 30. A consumer buys 10 units of a commodity when its price was ₹ 5 per unit. He purchases 12 units of the commodity when its price fell to ₹ 4 unit. What is elasticity of demand for the commodity at the price.

$$\begin{array}{ll} \text{Ans. } P = 5 & Q = 10 \\ \frac{P_1 = 4}{\Delta P = 1} & \frac{Q_1 = 12}{\Delta Q = 2} \\ \hline & \epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \\ & = \frac{2}{1} \cdot \frac{5}{10} = 1 \end{array}$$

Q 31. Price of a good falls from ₹ 8 to ₹ 6. As a result, its demand rises from 100 units to 125 units. Find out ϵ_D by percentage method.

$$\begin{array}{ll} \text{Ans. } P = 8 & Q = 100 \\ \frac{P_1 = 6}{\Delta P = 2} & \frac{Q_1 = 125}{\Delta Q = 25} \\ \hline & \epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \\ & = \frac{25}{2} \cdot \frac{8}{100} = 1 \end{array}$$

Q 32. Price of a good rises by 10%. As a result demand falls by 4%. Find out price elasticity of demand. Is this demand elastic or inelastic?

$$\text{Ans. } \epsilon_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}} = \frac{4}{10} = 0.4$$

Since $0 < \epsilon_D < 1$, it is inelastic.

Q 33. As a result of 5% fall in the price of a good its demand rises by 12%. Find out price elasticity of demand and say whether demand is elastic or inelastic and why?

$$\begin{array}{l} \text{Ans. } \epsilon_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}} \\ = \frac{12}{5} = 2.4 \end{array}$$

Since $\epsilon_D > 1$, it is elastic.

Q 34. The coefficient of price elasticity of demand of a commodity is 0.5. When its price is ₹ 10 per unit, its demand is 40 units. If the price falls to ₹ 5 per unit, how much will be the demand?

Ans. $P = 10$ $Q = 40$ units

$$\begin{array}{c} P_1 = 5 \\ \hline \Delta P = 5 \end{array} \quad \begin{array}{c} Q_1 = ? \\ e_D = 0.5 \end{array}$$

$$\begin{aligned} e_D &= \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \\ \Rightarrow 0.5 &= \frac{\Delta Q}{5} \cdot \frac{10}{40} \quad \Rightarrow Q = 10 \\ &\therefore Q_1 = Q + \Delta Q = 40 + 10 = 50 \text{ units.} \end{aligned}$$

Q 35. When price of a good rises from ₹ 5 per unit to ₹ 6 per unit, its demand falls from 20 units to 10 units. Compare expenditures on the good to determine whether demand is elastic or inelastic.

Ans. $P = 5$ $Q = 20$ $\therefore PQ = 100$
 $P_1 = 6$ $Q_1 = 10$ $\therefore P_1 Q_1 = 60$

By the total expenditure method, as price rises, expenditure falls. It means $e_D > 1$ or the good has elastic demand.

Q 36. When price of a good falls from ₹ 10 per unit to ₹ 9 per unit, its demand rises from 9 units to 10 units. Compare expenditures on the good to find price elasticity of demand.

Ans. $P = 10$ $Q = 9$ $\therefore PQ = 90$
 $P_1 = 9$ $Q_1 = 10$ $\therefore P_1 Q_1 = 90$

By the total expenditure method, as price falls expenditure remains constant. It means $e_D = 1$ or good has unitary elasticity of demand.

Q 37. When price of a good falls from ₹ 8 per unit to ₹ 7 per unit, its demand rises from 12 units to 16 units. Compare expenditures on the good to determine whether demand is elastic or inelastic.

Ans. $P = 8$ $Q = 12$ $\therefore PQ = 96$
 $P_1 = 7$ $Q_1 = 16$ $\therefore P_1 Q_1 = 112$

By the total expenditure method, as price falls total expenditure rises. It means $e_D > 1$ or the good has elastic demand.

Q 38. Price elasticity of demand of a good is (-) 1. At a given price the consumer buys 60 units of the good. How many units will the consumer buy if the price falls by 10 per cent?

Ans. Since $e_D = 1$, thus % fall in price = % rise in demand = 10%

$$\% \text{ rise in demand} = \frac{\Delta Q}{60} \times 100$$

$$\begin{aligned} \Rightarrow 10 &= \frac{\Delta Q}{60} \times 100 \\ \Rightarrow \Delta Q &= 6 \\ \therefore Q_1 &= Q + \Delta Q = 60 + 6 = 66 \text{ units.} \end{aligned}$$

Q 48. Price elasticity of demand of a good is (-)1. The consumer buys 50 units of that good when price is ₹ 2 per unit. How many units will the consumer buy if the price rises to ₹ 4 per unit? Answer this question with the help of the total expenditure method of determining price elasticity of demand.

Ans. Given

$$\epsilon_D = (-)1$$

$$Q = 50 \text{ units} \quad P = ₹ 2$$

$$Q_1 = ? \quad P_1 = ₹ 4$$

When price is ₹ 2, expenditure is ₹ 100

$\epsilon_D = 1$ means when price changes expenditure remains the same.

$$Q_1 = \frac{\text{Expenditure}}{\text{New price}} = \frac{100}{4} = 25 \text{ units.}$$

Q 49. Price elasticity of demand of a good is (-)1. The consumer spends ₹ 50 on the good at the prevailing price. When price changes he buys 25 units. What is the new price? Use the total expenditure method of calculating price elasticity of demand to answer this question.

Ans. Given

$$\epsilon_D = (-)1 \text{ and expenditure} = ₹ 50$$

When $\epsilon_D = 1$, it means, expenditure remains the same with a change in price. The new quantity demanded is given as 25 units.

$$\therefore \text{New price} = \frac{\text{Expenditure}}{\text{New quantity}} = \frac{50}{25} = ₹ 2$$

Q 50. Price elasticity of demand of a good is (-)1. The consumer spends ₹ 90 to buy the good at the current price. How many units will the consumer buy when the price changes to ₹ 2 per unit? Use total expenditure method of measuring price elasticity of demand to answer this question.

Ans.

$$\epsilon_D = (-)1 \text{ and expenditure} = 90$$

$$\therefore \text{New quantity} = \frac{\text{Expenditure}}{\text{New price}} = \frac{90}{2} = 45 \text{ units.}$$

Q 51. A 5 per cent fall in price of a good leads to 10 per cent rise in its demand. A consumer buys 40 units of the good at a price of ₹ 10 per unit. How many units will the consumer buy at a price of ₹ 12 per unit? Calculate.

Ans. Given

$$P = ₹ 10 \quad Q = 40 \text{ units}$$

$$P = ₹ 12 \quad Q_1 = ?$$

$$\underline{\underline{\Delta P = ₹ 2}}$$

$$\epsilon_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}} = \frac{10}{5} = 2$$

$$\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

Q 39. Price elasticity of demand of a good is (-2) . The consumer buys a certain quantity of this good at a price of $\text{₹ } 8$ per unit. When the price falls he buys 50 per cent more quantity. What is the new price?

Ans.

$$\epsilon_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}}$$

$$\Rightarrow 2 = \frac{50}{\% \text{ Change in price}} \Rightarrow \% \text{ fall in price} = \frac{50}{2} = 25\%$$

$$\therefore \% \text{ fall in price} = \frac{\Delta P}{8} \times 100$$

$$\Rightarrow 25 = \frac{\Delta P}{8} \times 100 \Rightarrow \Delta P = \frac{25 \times 8}{100} = 2$$

$$\therefore P_1 = P - \Delta P = 8 - 2 = \text{₹ } 6$$

Q 40. Price elasticity of demand of a good is (-3) . If the price rises from $\text{₹ } 10$ per units to $\text{₹ } 12$ per unit, what is the percentage change in demand?

Ans.

$$\epsilon_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}}$$

$$\Rightarrow 3 = \frac{\% \text{ Change in demand}}{\frac{2}{10} \times 100} \Rightarrow \% \text{ Change in demand} = 60\%$$

Q 41. At a given market price of a good a consumer buys 120 units. When price falls by 50 per cent he buys 150 units. Calculate price elasticity of demand.

$$\text{Ans. } \% \text{ change in demand} = \frac{30}{120} \times 100 = 25\%$$

$$\epsilon_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}} = \frac{25}{50} = 0.5$$

Q 42. A consumer buys a certain quantity of a good at a price of $\text{₹ } 10$ per unit. When price falls to $\text{₹ } 8$ per unit, she buys 40 per cent more quantity. Calculate price elasticity of demand.

$$\text{Ans. } \% \text{ change in demand} = \frac{2}{10} \times 100 = 20\%$$

$$\epsilon_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}}$$

$$= \frac{40}{20} = 2$$

Q 43. A consumer buys 8 units of a good at a price of $\text{₹ } 7$ per unit. When price rises to $\text{₹ } 8$ per unit, he buys 7 units. Calculate price elasticity of demand by comparing expenditures on the good.

$$\text{Ans. } P = 7 \quad Q = 8 \quad \therefore PQ = 7 \times 8 = 56$$

$$P_1 = 8 \quad Q_1 = 7 \quad \therefore P_1 Q_1 = 8 \times 7 = 56$$

By the total expenditure method, price ϵ_D is one in this case because there is no change in expenditure as price changes.

$$\Rightarrow 2 = \frac{\Delta Q}{2} \cdot \frac{10}{40}$$

$$\Rightarrow \Delta Q = 16$$

$$\therefore Q_1 = Q - \Delta Q$$

$$= 40 - 16$$

$$= 24 \text{ units.}$$

Q52. A 5 per cent rise in price of a good leads to 5 per cent fall in demand. A consumer buys 100 units of the good when price is ₹ 5 per unit. At what price will the consumer buy 120 units? Calculate.

$$\text{Ans. } e_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}} = \frac{5}{5} = 1$$

$$P = ₹ 5 \quad Q = 100 \text{ units}$$

$$\begin{array}{c} P_1 = ? \\ Q_1 = 120 \text{ units} \\ \hline \Delta Q = 20 \text{ units} \end{array}$$

$$\therefore e_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$\Rightarrow 1 = \frac{20}{\Delta P} \cdot \frac{5}{100} \Rightarrow \Delta P = 1$$

$$\therefore P_1 = P - \Delta P = 5 - 1 = ₹ 4$$

Q53. A 5 per cent rise in price of a good leads to 20 per cent fall in its demand. A consumer buys 80 units of the good at a price of ₹ 10 per unit. How many units will the consumer buy at a price of ₹ 11. Calculate.

$$\text{Ans. } e_D = \frac{\% \text{ Change in demand}}{\% \text{ Change in price}}$$

$$= \frac{20}{5} = 4$$

$$Q = 80 \text{ units} \quad P = ₹ 10$$

$$\begin{array}{c} Q_1 = ? \\ P_1 = ₹ 11 \\ \hline \Delta P = ₹ 1 \end{array}$$

$$e_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$\Rightarrow 4 = \frac{\Delta Q}{1} \cdot \frac{10}{80}$$

$$\Rightarrow \Delta Q = 32$$

$$\therefore Q_1 = Q - \Delta Q = 80 - 32$$

$$= 48 \text{ units.}$$

Q 54. When the price of a commodity falls by ₹ 2 per unit, its quantity demanded increases by 10 units. Its price elasticity of demand is (-)1. Calculate its quantity demanded at the price before change which was ₹ 10 per unit.

Ans. Given

$$\begin{array}{lll} \Delta P = 2 & \Delta Q = 10 & \epsilon_D = (-)1 \\ P = 10 & Q = ? & \end{array}$$

$$\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \Rightarrow 1 = \frac{10}{2} \cdot \frac{10}{Q} \Rightarrow Q = 50 \text{ units.}$$

Q 55. When price of a commodity falls by ₹ 1 per unit, its quantity demanded rises by 3 units. Its price elasticity of demand is (-)2. Calculate its quantity demanded if the price before the change was ₹ 10 per unit.

Ans. Given

$$\begin{array}{lll} \Delta P = 1 & \Delta Q = 3 & \epsilon_D = (-)2 \\ P = 10 & Q = ? & \end{array}$$

$$\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \Rightarrow 2 = \frac{3}{1} \cdot \frac{10}{Q} \Rightarrow Q = 15 \text{ units.}$$

Q 56. The quantity demanded of a commodity falls by 5 units when its price rises by ₹ 1 per unit. Its price elasticity of demand is (-) 1.5. Calculate the price before change if at this price quantity demanded was 60 units.

Ans. Given

$$\begin{array}{lll} \Delta Q = 5 & \Delta P = 1 & \epsilon_D = (-)1.5 \\ Q = 60 \text{ units} & P = ? & \end{array}$$

$$\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \Rightarrow 1.5 = \frac{5}{1} \cdot \frac{P}{60} \Rightarrow P = ₹ 18$$

Q 57. 8 units of a good are demanded at a price of ₹ 7 per unit. Price elasticity of demand is (-) 1. How many units will be demanded if the price rises to ₹ 8 per unit? Use expenditure approach of price elasticity of demand to answer this question.

Ans. Given total expenditure = $7 \times 8 = 56$ (₹)

It is given that $\epsilon_P = -1$

When price rises to ₹ 8 per unit, total expenditure remains unchanged at ₹ 56.
 \therefore Consumer buys = $56 / 8 = 7$ units.

Q 58. When price of a good is ₹ 13 per unit, the consumer buys 11 units of that good. When price rises to ₹ 15 per unit, the consumer continues to buy 11 units. Calculate price elasticity of demand.

$$\begin{array}{ll} \text{Ans. } P = 13 & Q = 11 \\ P_1 = 15 & Q_1 = 11 \\ \hline \Delta P = 2 & \Delta Q = 0 \end{array}$$

$$E_d = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} = \frac{0}{2} \times \frac{13}{11} = 0$$

Q59. From the following data calculate price elasticity of demand:

Price (₹)	Total Expenditure
9	100
9	150

Ans. $P = 9$ $PQ = 100$

$P_1 = 9$ $P_1Q_1 = 150$

$$\epsilon_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

Since $\Delta P = 0$ $\therefore \epsilon_D = \infty$

Q60. A consumer buys 17 units of a good at a price of ₹ 10 per unit. When price falls to 8 per unit the consumer buys 23 units. Using the expenditure approach, what will you say about price elasticity of demand of the good?

Ans. $P = 10$, $Q = 17$ $P.Q = 170$

$P_1 = 8$, $Q_1 = 23$ $P_1.Q_1 = 184$

Price elasticity of demand is greater than one or elastic because as price falls, expenditure rises.

Q61. When price of a good is ₹ 7 per unit a consumer buys 12 units. When price falls to ₹ 6 per unit he spends ₹ 72 on the good. Calculate price elasticity of demand by using the percentage method. Comment on the likely shape of demand curve based on this measure of elasticity.

Ans.

Price	DD
$P = 7$	$Q = 12$
$P_1 = 6$	$Q_1 = \frac{72}{6} = 12$ since $P_1.Q_1 = 72$

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

$$= \frac{0}{-1} \times \frac{7}{12} = 0$$

The demand curve is parallel to the Y-axis. It is perfectly inelastic.

Q62. A consumer buys 10 units of a good at a price of ₹ 9 per unit. At price of ₹ 10 per unit he buys 9 units. What is price elasticity of demand? Use expenditure approach. Comment on the likely shape of demand curve on the basis of this measure of elasticity.

Ans.

P (₹)	Q	TE
9	10	90
10	9	90

Since with change in price total expenditure is unchanged, elasticity is equal to -1. Demand curve is rectangular hyperbola.

Q63. A consumer buys 20 units of a good at a price of ₹ 5 per unit. He incurs an expenditure of ₹ 120 when he buys 24 units. Calculate price elasticity of demand using the percentage method. Comment upon the likely shape of demand curve based on this information.

Ans.

Price	DD
5	20
$\frac{120}{24} = 5$	24

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

$$= \frac{4}{0} \times \frac{5}{20}$$

$$= \infty$$

The demand curve is parallel to the X -axis

Q64. The price elasticity of demand of X is (-) 1.25. Its price falls from ₹ 10 to ₹ 8 per unit. Calculate the percentage change in its demand.

Ans.

$$e_d = (-) 1.25$$

$$\% \Delta \text{ in price} = \frac{2}{10} \times 100 = 20\%$$

$$\therefore e_d = \frac{\% \Delta \text{ in demand}}{\% \Delta \text{ price}}$$

$$\Rightarrow 1.25 = \frac{\% \Delta \text{ in demand}}{20}$$

$$\therefore \% \text{ change in demand} = 1.25 \times 20 = 25\%$$

Q65. A consumer buys 10 units of a commodity at a price of ₹ 10 per unit. He incurs an expenditure of ₹ 200 on buying 20 units. Calculate price elasticity of demand by the percentage method. Comment upon the shape of demand curve based on this information.

Ans.

P	Q
10	10
$\frac{200}{20} = 10$	20

$e_d = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} = \frac{10}{0} \times \frac{10}{10} = \infty$, Demand curve is a horizontal line parallel to x -axis. It is perfectly elastic.

Q66. A consumer buys 14 units of a good at a price of ₹ 8 per unit. At price ₹ 7 per unit he spends ₹ 98 on the good. Calculate price elasticity of demand by the percentage method. Comment upon the shape of demand curve based on this information.

Ans.

P	Q
8	14
7	$\frac{98}{7} = 14$
$\Delta P = 1$	$\Delta Q = 0$

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

$$= \frac{0}{1} \times \frac{8}{14} = 0$$

The demand curve is a vertical line showing zero elasticity.

Q67. A consumer buys 8 units of a good at a price of ₹ 7 per unit. When price rises to ₹ 8 per unit he buys 7 units. Calculate price elasticity of demand through the expenditure approach. Comment upon the shape of demand curve based on this information.

Ans.

Q	P	P × Q
8	7	56
7	8	56

Price elasticity of demand is one, since there is no change in expenditure when price changes. The demand curve will be a rectangular hyperbola.

Q68. The demand for a good doubles due to a 25 per cent fall in its price. Calculate its price elasticity of demand.

$$\text{Ans. } e_d = \frac{\% \Delta \text{ in demand}}{\% \Delta \text{ in price}}$$

$$= \frac{100 \%}{25 \%} = 4$$

Q69. When the price of a good falls by 10 per cent, its demand rises from 200 units to 220 units. Calculate its price elasticity of demand.

Ans. $\% \Delta$ in price = 10

$$\% \Delta \text{ in demand} = \frac{20}{200} \times 100 = 10$$

$$\therefore e_d = \frac{10}{10} = 1$$

Q 70. A consumer buys 13 units of a good at a price of ₹ 11 per unit. When price rises to ₹ 13 per unit he buys 11 units. Use expenditure approach to find price elasticity of demand. Also comment on the shape of the demand curve based on this information.

Ans.

P	Q	PQ
11	13	$13 \times 11 = 143$
13	11	$11 \times 13 = 143$

Thus, $e_D = 1$, as there is no change in expenditure. The demand curve will be a rectangular hyperbola.

Q 71. A consumer buys 11 units of a good at a price of ₹ 10 per unit. He can buy 13 units of the same by incurring an expenditure of ₹ 130. Calculate price elasticity of demand by the percentage method. Also comment on the shape of demand curve based on this information.

Ans.

P	Q
10	11
$\frac{130}{13} = 10$	13
$\Delta P = 0$	$\Delta Q = 2$

$$e_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{2}{0} \cdot \frac{10}{11} = \infty$$

Price elasticity of demand is infinity. The demand curve is a horizontal line.

Q 72. A consumer buys 10 units of a good at a price of ₹ 11 per unit. When the price falls to ₹ 9 per unit, he spends ₹ 90 on the good. Calculate price elasticity of demand using the percentage method. Also comment upon the shape of demand curve based on this information.

Ans.

P	Q
11	10
9	$\frac{90}{9} = 10$
$\Delta P = 2$	$\Delta Q = 0$

$$e_D = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = 0, \text{ since } \Delta Q = 0$$

∴ The demand curve will be a vertical line.

Q73. The price elasticity of demand for a good is -0.4 . If its price increases by 5 percent, by what percentage will its demand fall? Calculate.

Ans. $E_p = \frac{\text{Percentage change in demand}}{\text{Percentage change in price}}$

$$(-)0.4 = \frac{\text{Percentage change in demand}}{5}$$

$$\text{Percentage change in demand} = -0.4 \times 5 = -2$$

∴ demand falls by 2 percent.

Q74. The demand for good rises by 20 percent as a result of fall in its price. Its price elasticity of demand is $(-)0.8$. Calculate the percentage fall in price.

Ans. $E_d = \frac{\% \text{ change in demand}}{\% \text{ change in price}}$

$$(-)0.8 = \frac{20}{\% \text{ change in price}}$$

$$\therefore \% \text{ change in price} = \frac{20}{0.8} = 25\%$$

Q75. A 5 percent fall in the price of a good raise its demand from 300 units to 318 units. Calculate its price elasticity of demand.

Ans. $E_d = \frac{\text{Percentage change in demand}}{\text{Percentage change in price}}$

$$= \frac{\frac{18}{300} \times 100}{5} = (-)1.2$$

Q76. When the price of a commodity falls by 20 percent, its demand rises from 400 units to 500 units. Calculate its price elasticity of demand.

Ans. $E_d = \frac{\text{Percentage change in demand}}{\text{Percentage change in price}} = \frac{\frac{100}{400} \times 100}{20} = (-)1.25$

Q77. Price elasticity of demand of a good is -0.75 . Calculate the percentage fall in its price that will result in 15 percent rise in its demand.

Ans. $0.75 = \frac{15}{\% \Delta P}$

$$0.75 \Delta P = 15$$

$$\Delta P = \frac{1500}{75} = 20\%$$

Q78. A 20 percent fall in the price of a good, raises its demand from 600 units to 750 units. Calculate its price elasticity of demand.

Ans. $E_d = \frac{\% \text{ change in quantity}}{\% \text{ change in price}} = \frac{\frac{150}{600} \times 100}{20} = \frac{25}{20} = 1.25$

Long Answer Type Questions

(6 Marks)

Q 1. From the information given below, compare the elasticity of demand for commodity *X* and commodity *Y*.

Commodity <i>X</i>		Commodity <i>Y</i>	
Price (₹)	Quantity Demanded (units)	Price (₹)	Quantity Demanded (units)
2	100	4	100
3	40	6	60

Ans.

$$\epsilon_D^X = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$= \frac{60}{1} \cdot \frac{2}{100} = \frac{12}{10} = 1.2$$

$$\epsilon_D^Y = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$= \frac{40}{2} \cdot \frac{4}{100} = \frac{4}{5} = 0.8$$

ϵ_D for good *X* is more than ϵ_D of good *Y*

Q 2. On the basis of information given below, compare the price elasticities of goods *A* and *B*.

Commodity <i>A</i>		Commodity <i>B</i>	
Price per unit (₹)	Total Outlay (₹)	Price per unit (₹)	Total Outlay (₹)
2	10	2	10
3	30	4	20

Ans.

$$\epsilon_D^A = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$= \frac{5}{1} \cdot \frac{2}{5} = 2$$

$$\epsilon_D^B = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$= \frac{0}{2} \cdot \frac{2}{5} = 0$$

ϵ_D for good *B* is less than ϵ_D for good *A*.

