4·2. DEMAND AND SUPPLY

In the theory of economics, mere desire for a commodity does not mean demand, unless one can pay and is willing to pay the necessary amount for it. By the term *demand* we mean the quantity of a commodity which one acquires or is able to acquire at a given price. Demand for any commodity depends on a number of factors such as the price of the commodity, the price of other commodities, income of the consumers, time, place, etc..

"The functional relationship between consumption of a commodity and the factors responsible for the changes in consumption, is defined as the demand function of that commodity". From this function, one can find different quantities of a commodity demanded at different prices.

Similarly, the term *supply* means the amount of commodity available in the market at a given price. Obviously, if the market price is so low that the producer cannot realise the cost of production then he will not be interested in producing the required amount. Consequently, supply is also a function of the price at which commodity is sold in the market.

Thus econometric study of the market data is made to determine the relation between:

(*i*) The price of a given commodity and its absorption capacity for the market, *i.e.*, demand, and (*ii*) The price of the commodity and its output, *i.e.*, supply.

4·2·1. Laws of Demand and Supply. From the traditional concepts of Economics, the laws of demand and supply may be stated as follows :

"Demand for a commodity, in general, varies in the direction opposite to that of price whereas supply in general varies in the same direction as price."

In other words, a rise in the price of a commodity results in decrease in its demand and increase in its supply and *vice versa* if the price falls down. According to **A.A. Cournot** (1801-1877), who first gave the mathematical formulation of the laws of demand and supply in a book published in France in 1838 and entitled *"Research on the Mathematical Principles of the Theory of Wealth", demand (d) is a certain function of price 'p', i.e., d = f(p), the only assumption regarding f(p) is that, as a rule, it is a diminishing function of 'p', i.e., $f'(p) < 0$.* Supply is also a function of *'p' i.e., $s = \phi(p)$, say, where $\phi(p)$ is an increasing function of 'p' i.e., $\phi'(p) > 0$.* The demand and supply functions can be represented graphically as shown in *Fig. 4·1* and *Fig. 4·2* respectively.

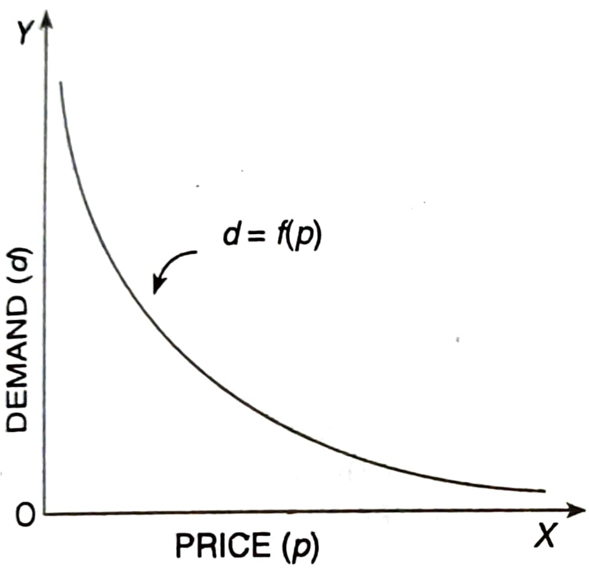

Fig. 4·1 : *Demand Curve*

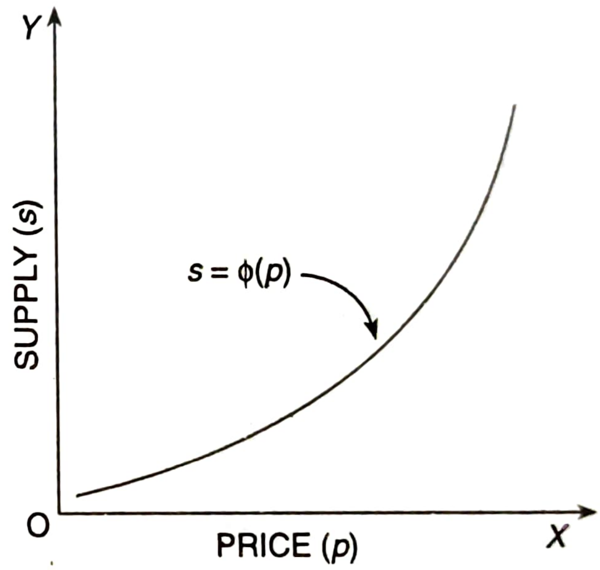

Fig. 4·2 : *Supply Curve*

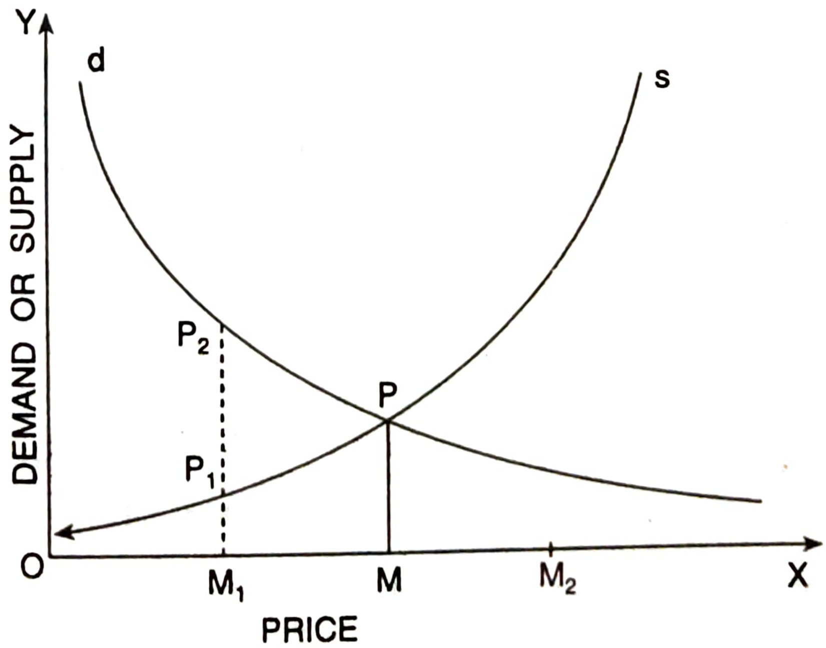

Fig. 4·3 : *Demand Curve and Supply Curve*

These laws further state that *the market price settles at a level* at which supply and demand are equal and is determined by the point of intersection of the two curves $d = f(p)$

and $s = \phi(p)$, *viz.*, OM, as shown in the *Fig. 4·3* and no other point has any chance of lasting in the market.

For example, suppose the price at any time 't' (say) is less than OM and equal to OM_1 (say). Then corresponding values of d and s from the figure are P_2M_1 and P_1M_1 respectively, *i.e.*, demand is greater than supply and naturally the producer will be encouraged to increase the price since under those circumstances, there will be persons willing to pay a higher price in order to get the commodity they need. This will consequently result in reduction in the demand and ultimately a balance between supply and demand will be achieved at point 'P' where demand and supply curves intersect. On the other hand, if the price is greater than OM and equal to OM_2 (say) then $s > d$ and there will be producers willing to sell the goods at a lower price in order to clear their stocks. Consequently the prices of the goods are bound to come down which, in turn, will increase the demand and ultimately there will be balance at the point P.

4·3. PRICE ELASTICITY OF DEMAND

One of the most important characteristics of demand function is what is known as its '*elasticity*'. According to the law of demand, the changes in price and demand are in opposite direction and it is a common experience that price changes affect the demand for different commodities in different degrees. In other words, the demand for some commodities is more sensitive to price changes than is the demand for others. For example, demand for necessities decreases very little when their prices rise whereas only a slight increase in the prices of luxuries will reduce their demand considerably. The quality of demand by virtue of which it extends or contracts with a fall or rise in price is known as '*price elasticity of demand*', a term introduced by **Marshall** for evaluating the influence of variation in prices of the commodity on its demand. It shows the sensitiveness or responsiveness of demand to the changes in price.

Definition. *Price elasticity of demand is defined as the value of the ratio of the relative (or proportionate) change in the demand to the relative (or proportionate) change in the price.*

Mathematically, let x be the quantity demanded of a commodity 'A' such that the demand function of A is $x = f(p)$, where $f(.)$ is a continuous function. Let the increment in demand x, corresponding to an increment δp in p, be δx. Then, by definition, price elasticity of demand (η_p) is given by :

$$\frac{\text{Proportionate change in demand}}{\text{Proportionate change in price}} = \frac{(\delta x)/x}{(\delta p)/p} = \frac{p}{x} \cdot \frac{\delta x}{\delta p} \qquad \ldots (4\cdot3)$$

This is the average elasticity of demand over the price range $(p, p + \delta p)$. The elasticity of demand (η_p) at a particular price level p is given by :

$$\eta_p = \lim_{\delta p \to 0} \frac{p}{x} \cdot \frac{\delta x}{\delta p} = \frac{p}{x} \lim_{\delta p \to 0} \frac{\delta x}{\delta p} = -\frac{p}{x} \cdot \frac{dx}{dp} = -\frac{p}{f(p)} \cdot \frac{df}{dp}$$

$$= -\frac{d \log f}{d \log p} \qquad \ldots (4\cdot3\,a)$$

negative sign being taken, since demand and price move in opposite direction.

Interpretation. (*i*) If the price rises (falls) by 1%, the demand will fall (increase) by η_p%.

(*ii*) If $\eta_p > 1$, demand is said to be *elastic*.

If $\eta_p < 1$, demand is said to be *inelastic*.

If $\eta_p = 1$, demand has unit elasticity.

Example 4·4. *If the demand function is $p = 4 - 5x^2$, for what value of x, the elasticity of demand will be unity ? [x is the quantity demanded and p is the price].*

Solution. Differentiating $p = 4 - 5x^2$ w.r.t p, we get

$$1 = -10\,x \,.\, \frac{dx}{dp} \quad \Rightarrow \quad \frac{dx}{dp} = -\frac{1}{10x}$$

$$\therefore \qquad \eta_p = -\frac{p}{x} \cdot \frac{dx}{dp} = \frac{4 - 5x^2}{10x^2}$$

Elasticity of demand will be unity if

$$\eta_p = 1 \Rightarrow \frac{4 - 5x^2}{10x^2} = 1 \Rightarrow 15x^2 = 4, \text{ i.e., } x = \frac{2}{\sqrt{15}}.$$