supply curve. From the diagram it is seen that the market supply curve SS_3 is upward rising. Therefore the market supply curve will be upward rising if the individual supply curve is upward rising.

2.5. Elasticity of Supply

Other things remaining constant, the percentage change in quantity supplied of any commodity due to one per cent change in the price of that commodity is called **elasticity of supply.** Therefore.

$$\text{Elasticity of supply } (E_s) = \frac{\text{Percentage change in quantity supplied of the commodity}}{\text{Percentange change in price of the commodity}}$$

$$\textit{i.e.,}\ \text{Elasticity of supply } (E_s) = \frac{\dfrac{\text{Change in quantity supplied}}{\text{Initial quantity supplied}} \times 100}{\dfrac{\text{Change in price}}{\text{Initial price}} \times 100}$$

Elasticity of supply is now expressed with the help of symbols.

Let, q = initial quantity supplied.

Δq = small change in quantity supplied (Δ = small change, this symbol is called delta).

P = initial price.

Δp = small change in price.

$$\text{Therefore, Elasticity of supply } (E_s) = \frac{\dfrac{\Delta q}{q} \times 100}{\dfrac{\Delta p}{P} \times 100} = \frac{\Delta q}{q} \times \frac{P}{\Delta p} = \frac{\Delta q}{\Delta p} \cdot \frac{P}{q}.$$

Elasticity of supply is of different types.

(1) **Unit Elasticity of Supply :** If the percentage change in quantity supplied of the commodity is equal to the percentage change in price then it is called unit elasticity of supply. Here $E_s = 1$ *i.e.* the value of the elasticity of supply is equal to one. In Fig. 2.27., OS_1 is the unit elasticity supply curve.

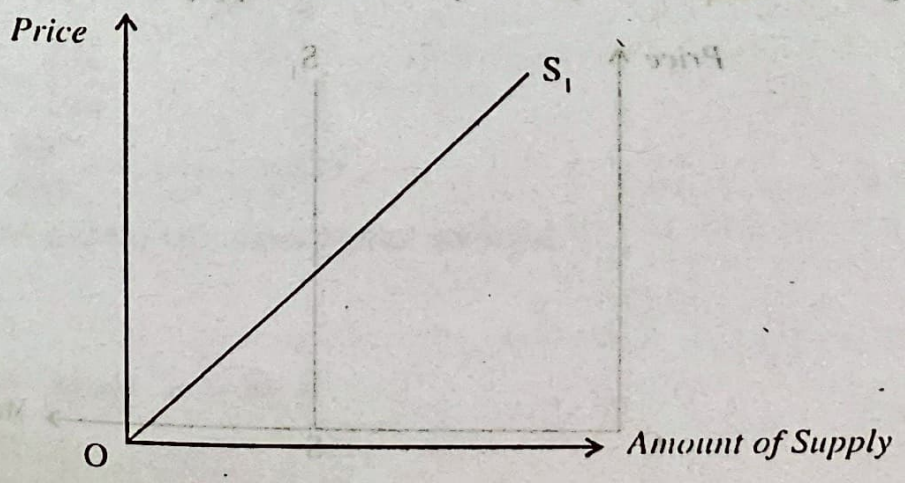

Fig : 2.27.

(2) **Elastic Supply :** If the percentage change in quantity supplied of the commodity is greater than the percentage change in price then it is called elastic supply. Here $E_s > 1$ *i.e.* the value of the elasticity of supply is greater than one.

(3) **Inelastic Supply :** If the percentage change in quantity supplied of the commodity is less than the percentage change in price, then it is called inelastic supply. Here $E_s < 1$ *i.e.*, the value of the elasticity of supply is less than one.

(4) **Perfectly Elastic Supply :** If the price of the commodity remain constant *i.e.*, if the percentage change in price of the commodity is zero, even though there is a change in supply then it is called perfectly elastic supply. Here $E_s = \infty$ (infinity) *i.e.*, the value of the elasticity of supply is equal to infinity.

In Fig 2.28., SS_1 is the perfectly elastic supply curve.

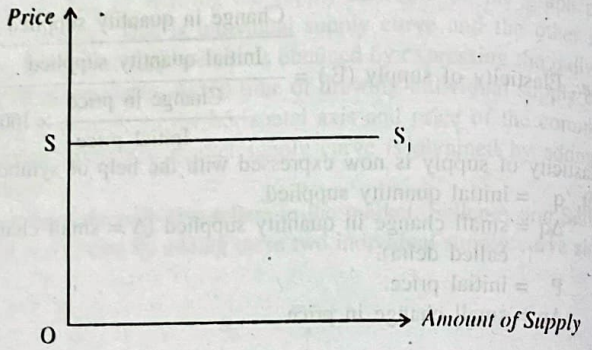

Fig : 2.28.

This supply curve is parallel to the horizontal axis. This is because even though price remain constant there is a change in supply. This means that the supplier supply the commodity at a fixed price.

(5) **Perfectly Inelastic Supply :** If there is a change in price of the commodity even though there is no change in supply *i.e.* if the percentage change in quantity supplied is zero, then it is called perfectly inelastic supply. Here $E_s = 0$ *i.e.*, the value of the elasticity of supply is equal to zero.

In Fig 2.29., SS_1 is the perfectly inelastic supply curve.

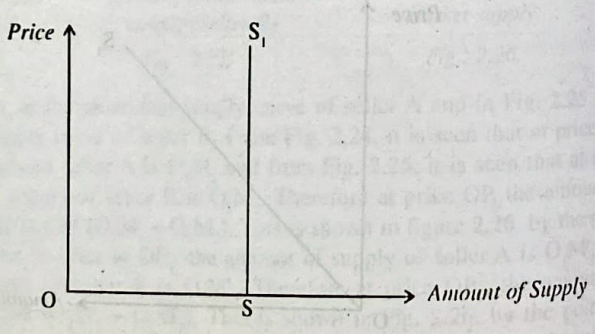

Fig : 2.29.

This supply curve is parallel to the vertical axis. This is because even though there is a change in price supply remain constant at a particular level.

• **2.5.1. Measurement of the Elasticity of Supply : Point Elasticity Method :** In this method elasticity of supply is measured at a particular point on the supply curve. For this the method is called point elasticity method. This method is also called the measurement of elasticity of supply at a particular price. Point elasticity is measured with the help of Fig. 2.30.

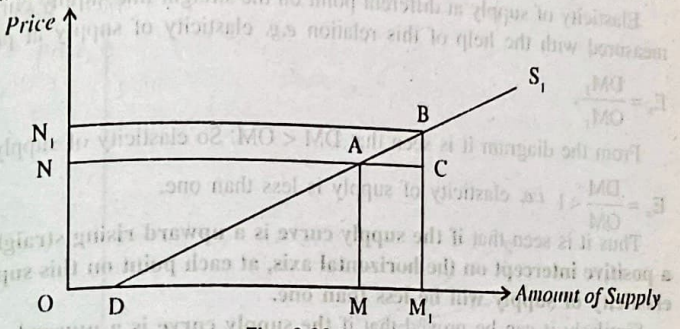

Fig : 2.30.

In Fig. 2.30 the amount of supply is measured on the horizontal axis and price is measured on the vertical axis. In the diagram DS_1 is the straight line supply curve. On this supply curve A is a point. Elasticity of supply is measured at point A. From point A, the perpendicular AM on the horizontal axis and the perpendicular AN on the vertical axis are drawn. Another point B is taken near the point A. From the point B, the perpendicular BM_1 on the horizontal axix and the perpendicular BN_1 on the vertical axis are also drawn. Comparing the points A and B the following informations are derived.

Initial price (P) = ON = AM ;
small change in price (ΔP) = NN_1 = BC ;
initial quantity supplied (q) = OM ;
small change in quantity supplied (Δq) = MM_1 = AC.
Therefore, at point A,

elasticity of supply $(E_s) = \frac{\Delta q}{\Delta P} \times \frac{P}{q}$

i.e. $E_s = \frac{MM_1}{NN_1} \times \frac{ON}{OM}$

or, $E_s = \frac{AC}{BC} \times \frac{AM}{OM}$ .....(1)

Here ΔBAC and ΔADM are equiangular traingle,

$\therefore \frac{AC}{BC} = \frac{DM}{AM}$.

$\therefore$ Elasticity of supply at point A

$E_s = \frac{AC}{BC} \times \frac{AM}{OM}$ [from relation (1)]

$$i.e.\ E_s = \frac{DM}{AM} \times \frac{AM}{OM}\left[\text{putting } \frac{DM}{AM} \text{ in place of } \frac{AC}{BC}\right]$$

$$\text{or, } E_s = \frac{DM}{OM}$$

Elasticity of supply at different point on the straight line supply curve can now be measured with the help of this relation *e.g.* elasticity of supply at point B will be

$$E_s = \frac{DM_1}{OM_1}.$$

From the diagram it is seen that DM < OM. So elasticity of supply at point A is

$$E_s = \frac{DM}{OM} < 1 \quad i.e.\ \text{elasticity of supply is less than one.}$$

Thus it is seen that **if the supply curve is a upward rising straight line having a positive intercept on the horizontal axis, at each point on this supply curve the elasticity of supply will be less than one.**

Similarly it can be proved that if **the supply curve is a upward rising straight line having a positive intercept on the vertical axis as shown in Fig 2.31., then at each point on this supply curve the elasticity of supply will be greater than one.**

From Fig. 2.31. it is seen that DM > OM. So elasticity of supply at point A is

$$E_s = \frac{DM}{OM} > 1 \quad i.e.\ \text{elasticity of supply is greater than one.}$$

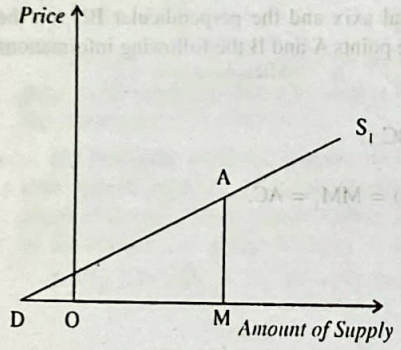

Fig : 2.31.

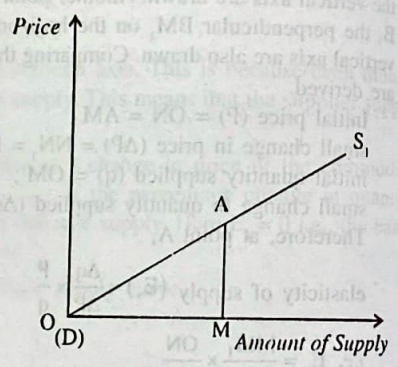

Fig : 2.32.

Finally **if the supply curve is a upward rising straight line through the origin, then at each point on it the elasticity of supply is equal to one** which is shown in Fig 2.32. From Fig. 2.32. it is seen that DM (OM) = OM. So elasticity of supply at point A is $E_s = \frac{OM}{OM} = 1$ *i.e.* elasticity of supply is equal to one.

Again if the two straight lines intersect each other then elasticity of supply will be smaller whose slope is larger (more steep) and elasticity of supply will be larger whose slope is smaller (less steep). This is shown in Fig. 2.33.

In Fig. 2.33., two straight line supply curves DS_1 and ES_2 intersect each other at point A. If the point A is taken on the supply curve DS_1, then at point A, elasticity of supply $E_s = \frac{DM}{OM}$. Again if the point A is taken on supply curve ES_2 then at point A, elasticity of supply $E_s = \frac{EM}{OM}$.

Therefore $\frac{DM}{OM} > \frac{EM}{OM}$ as DM > EM.

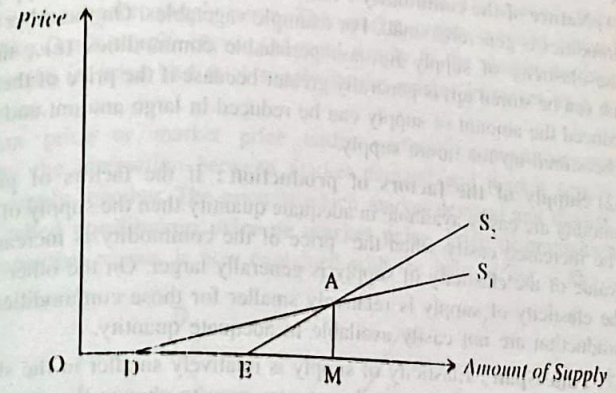

Fig : 2.33.

Thus elasticity of supply of the supply curve DS_1 is greater than the elasticity of supply of the supply curve ES. Thus **it is seen that if the two straight lines intersect each other then elasticity of supply will be smaller whose slope is larger and elasticity of supply will be larger whose slope is smaller.** Because here slope of the supply curve ES_2 is larger but elasticity is smaller and the slope of the supply curve DS_1 is smaller but elasticity of supply is larger.

If the supply curve is curvedly then to measure elasticity of supply at any point on the curve, a tangent will be drawn at that point. Elasticity of supply will be measured with the help of tangent as in the case of straight line supply curve. It is shown in Fig. 2.34.

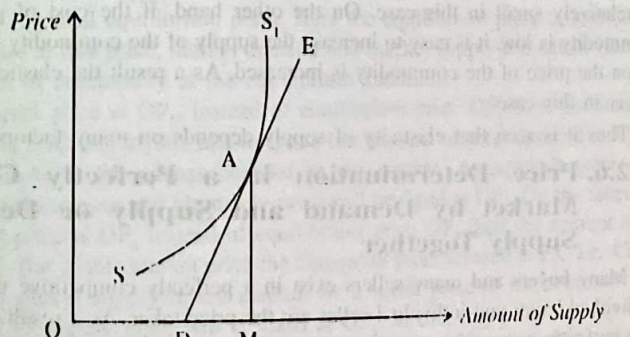

Fig : 2.34.

In Fig. 2.34. elasticity of supply at point A is $(E_s) = \frac{DM}{OM}$. In this way it is possible to determine elasticity of supply at any point on the supply curve SS_1.

• **2.5.2. Factors Determining Elasticity of Supply or Determinants of Elasticity of Supply :** Elasticity of supply for a commodity depends on many factors. The main factors for determinants of elasticity of supply are discussed below :

(1) **Nature of the commodity :** The value of the elasticity of supply for perishable commodities is generally small. For example vagetables. On the other hand, the value of the elasticity of supply for non perishable commodities (*i.e.*, the commodities which can be stored up) is generally greater because if the price of these commodities is reduced the amount of supply can be reduced in large amount and the commodity can be stored up for future supply.

(2) **Supply of the factors of production :** If the factors of production for a commodity are easily available in adequate quantity then the supply of the commodity can be increased easily when the price of the commodity is increased. As a result the value of the elasticity of supply is generally larger. On the other hand, the value of the elasticity of supply is relatively smaller for those commodities whose factors of production are not easily available in adequate quantity.

(3) **Time Span :** Elasticity of supply is relatively smaller in the short run than in the long run. This is because it is not very easy to change the amount of supply in the short run but it is relatively easy to change the amount of supply in the long run.

(4) **Alternative market, alternative commodity and alternative production process :** If the seller supply the commodity in different market the supplier can reduced supply in larger quantity in a market where the price is reduced. As a result the elasticity of supply is generally larger because the seller can increase sell in one market by reducing the sell in other market. In the same way elasticity of supply is relatively larger if the producer can produces different commodities or can employ different production process.

(5) **Nature of production cost :** If the cost of production of a commodity is very high it is not possible to increase the supply of the commodity in large quantity even though the price of the commodity is increased. As a result the elasticity of supply is relatively small in this case. On the other hand, if the cost of production of a commodity is low, it is easy to increase the supply of the commodity in large amount when the price of the commodity is increased. As a result the elasticity of supply is larger in this case.

Thus it is seen that elasticity of supply depends on many factors.

■ 2.6. Price Determination in a Perfectly Competitive Market by Demand and Supply or Demand and Supply Together

Many buyers and many sellers exist in a perfectly competitive market. For this individual buyer and individual seller are the price taker. As a result market price of the perfectly competitive market is determined by the interaction of market demand and market supply of that commodity.