24. Suppose the demand and supply curves of salt are given by:
$q^D = 1000 - p$
$q^S = 700 + 2p$
(a) Find the equilibrium price and quantity.
(b) Now, suppose that the price of an input that used to produce salt has increased so, that the new supply curve is $q^S = 400 + 2p$
How does the equilibrium price and quantity change? Does the change conform to your expectation?
(c) Suppose the government has imposed a tax of Rs 3 per unit of sale on salt. How does it affect the equilibrium rice quantity?

Ans: $q^D = 1000 - p - (1)$

$q^S = 700 + 2p - (2)$

(a) At equilibrium

$q^d = q^s$

1000 – p = 700 + 2p

300 = 3 p

100 = p

p = Rs 100

q^d = 1000 – 100 [Substituting the value of p in equation (1)]

= 900 units

So, the equilibrium price is Rs 100 and equilibrium quantity is 900 units.

(b) New quantity supplied $q's$

$q's = 400 + 2p$

At equilibrium $q^d = q's$

1000 – p = 400 + 2p

600 = 3p

200 = p

p = Rs 200

Prior to the increase in the price of input, the equilibrium price was Rs 100, and after the rise in input's price, the equilibrium price is Rs 200.
So the change in the equilibrium price in Rs 100 (200 – 100).
q^d= 4000 – 200 [Subtitling the value of p in equation (1)]
= 800 units
The change in the equilibrium quantity is 100 units (i.e. 900 – 800 units).

Yes, this change is obvious, as due to the change in the input's price, the cost of producing salt has increased that will shift the marginal cost curve leftward and move the supply curve to the left. A leftward shift in the supply curve results in a rise in the equilibrium price and a fall in the equilibrium quantity.

(c) The imposition of tax of Rs 3 per unit of salt sold will raise the cost of producing salt. This will shift the supply curve leftwards and the quantity supplied equation will become

$$y^s = 700 + 2\,(p - 3)$$

At equilibrium

$$y^d = y^s$$

$$1000 - p = 700 + 2\,(p - 3)$$

$$1000 - p = 700 + 2p - 6$$

$$306 = 3p$$

$$\frac{306}{3} = p$$

$$p = \text{Rs } 102$$

Substituting the value of p in equation (1)

$$y^d = 1000 - p$$

$$y^d = 1000 - 102$$

$$y^d = 898 \text{ units}$$

Thus, the imposition of tax of Rs 3 per unit of salt sold will result in an increase in the price of salt from Rs 100 to Rs 102. The equilibrium quantity falls from 900 units to 898 units.

********** END **********