

**Question 19:** The difference between the corresponding roots of  $x^2 + ax + b = 0$  and  $x^2 + bx + a = 0$  is same and  $a \neq b$ , then what is the relation between  $a$  and  $b$ ?

**Solution:**

Let  $\alpha, \beta$  and  $\gamma, \delta$  be the roots of the equations  $x^2 + ax + b = 0$  and  $x^2 + bx + a = 0$ , respectively therefore,  $\alpha + \beta = -a$ ,  $\alpha\beta = b$  and  $\delta + \gamma = -b$ ,  $\gamma\delta = a$ .

$$\text{Given } |\alpha - \beta| = |\gamma - \delta| \Rightarrow (\alpha + \beta)^2 - 4\alpha\beta$$

$$= (\gamma + \delta)^2 - 4\gamma\delta$$

$$\Rightarrow a^2 - 4b = b^2 - 4a$$

$$\Rightarrow (a^2 - b^2) + 4(a - b) = 0$$

$$\Rightarrow a + b + 4 = 0 \text{ (Because } a \neq b)$$