



(vi) The given quadric equation is $9x^2 - 24x + k = 0$, and roots are real and equal
Then find the value of k .

Here, $a = 9, b = -24$ and, $c = k$

As we know that $D = b^2 - 4ac$

Putting the value of $a = 9, b = -24$ and, $c = k$

$$\begin{aligned} &= (-24)^2 - 4 \times 9 \times k \\ &= 576 - 36k \end{aligned}$$

The given equation will have real and equal roots, if $D = 0$

Thus,

Therefore, the value of $k = \boxed{16}$

(vii) The given quadric equation is $4x^2 - 3kx + 1 = 0$, and roots are real and equal
Then find the value of k .

Here, $a = 4, b = -3k$ and, $c = 1$

As we know that $D = b^2 - 4ac$

Putting the value of $a = 4, b = -3k$ and, $c = 1$

$$\begin{aligned} &= (-3k)^2 - 4 \times 4 \times 1 \\ &= 9k^2 - 16 \end{aligned}$$

The given equation will have real and equal roots, if $D = 0$

Thus,

$$9k^2 - 16 = 0$$

$$9k^2 = 16$$

$$\begin{aligned} k &= \sqrt{\frac{16}{9}} \\ &= \pm \frac{4}{3} \end{aligned}$$

Therefore, the value of $k = \boxed{\pm \frac{4}{3}}$

(viii) The given quadric equation is $x^2 - 2(5 + 2k)x + 3(7 + 10k) = 0$, and roots are real and equal
Then find the value of k .

Here, $a = 1, b = -2(5 + 2k)$ and, $c = 3(7 + 10k)$

As we know that $D = b^2 - 4ac$

Putting the value of $a = 1, b = -2(5 + 2k)$ and, $c = 3(7 + 10k)$

$$\begin{aligned} &= (-2(5 + 2k))^2 - 4 \times 1 \times 3(7 + 10k) \\ &= 4(25 + 20k + 4k^2) - 12(7 + 10k) \\ &= 100 + 80k + 16k^2 - 84 - 120k \\ &= 16 - 40k + 16k^2 \end{aligned}$$

The given equation will have real and equal roots, if $D = 0$

Thus,

$$16 - 40k + 16k^2 = 0$$

$$8(2k^2 - 5k + 2) = 0$$

$$(2k^2 - 5k + 2) = 0$$

Now factorizing of the above equation

$$(2k^2 - 5k + 2) = 0$$

$$2k^2 - 4k - k + 2 = 0$$

$$2k(k-2) - 1(k-2) = 0$$

$$(k-2)(2k-1) = 0$$

So, either

$$(k-2) = 0 \quad \text{or} \quad (2k-1) = 0$$
$$k = 2 \quad \text{or} \quad k = \frac{1}{2}$$

Therefore, the value of $k = \boxed{2, \frac{1}{2}}$

(ix) The given quadric equation is $(3k+1)x^2 + 2(k+1)x + k = 0$, and roots are real and equal

Then find the value of k .

Here, $a = (3k+1)$, $b = 2(k+1)$ and $c = k$

As we know that $D = b^2 - 4ac$

Putting the value of $a = (3k+1)$, $b = 2(k+1)$ and $c = k$

$$= (2(k+1))^2 - 4 \times (3k+1) \times k$$

$$= 4(k^2 + 2k + 1) - 4k(3k+1)$$

$$= 4k^2 + 8k + 4 - 12k^2 - 4k$$

$$= -8k^2 + 4k + 4$$

The given equation will have real and equal roots, if $D = 0$

Thus,

$$-8k^2 + 4k + 4 = 0$$

$$-4(2k^2 - k - 1) = 0$$

$$(2k^2 - k - 1) = 0$$

Now factorizing of the above equation

$$(2k^2 - k - 1) = 0$$

$$2k^2 - 2k + k - 1 = 0$$

$$2k(k-1) + 1(k-1) = 0$$

$$(k-1)(2k+1) = 0$$

So, either

$$(k-1) = 0$$

$$k = 1$$

or

$$(2k+1) = 0$$

$$k = \frac{-1}{2}$$

Therefore, the value of $k = \boxed{1, \frac{-1}{2}}$

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