



(xiv) The given quadric equation is $5x^2 - 4x + 2 + k(4x^2 - 2x - 1) = 0$, and roots are real and equal

Then find the value of k .

Here,

$$5x^2 - 4x + 2 + k(4x^2 - 2x - 1) = 0$$

$$5x^2 - 4x + 2 + 4kx^2 - 2kx - k = 0$$

$$(5 + 4k)x^2 - (4 + 2k)x + (2 - k) = 0$$

So,

$$a = (5 + 4k), b = -(4 + 2k) \text{ and } c = (2 - k)$$

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

Putting the value of $a = (5 + 4k), b = -(4 + 2k) \text{ and } c = (2 - k)$

$$= \{-(4 + 2k)\}^2 - 4 \times (5 + 4k) \times (2 - k)$$

$$= (16 + 16k + 4k^2) - 4(10 + 3k - 4k^2)$$

$$= 16 + 16k + 4k^2 - 40 - 12k + 16k^2$$

$$= 20k^2 + 4k - 24$$

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

Thus,

$$20k^2 + 4k - 24 = 0$$

$$4(5k^2 + k - 6) = 0$$

$$(5k^2 + k - 6) = 0$$

Now factorizing of the above equation

$$(5k^2 + k - 6) = 0$$

$$5k^2 + 6k - 5k - 6 = 0$$

$$k(5k + 6) - 1(5k + 6) = 0$$

$$(5k + 6)(k - 1) = 0$$

So, either

$$(5k + 6) = 0$$

$$k = \frac{-6}{5} \text{ or } (k - 1) = 0$$

$$k = 1$$

Therefore, the value of $k = \left[\frac{-6}{5}, 1\right]$

(xv) The given quadric equation is $(4 - k)x^2 + (2k + 4)x + 8k + 1 = 0$, and roots are real and equal

Then find the value of k .

Here,

$$a = 4 - k, b = (2k + 4) \text{ and } c = 8k + 1$$

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

Putting the value of $a = 4 - k, b = (2k + 4) \text{ and } c = 8k + 1$

$$= (2k + 4)^2 - 4 \times (4 - k) \times (8k + 1)$$

$$= (4k^2 + 16k + 16) - 4(-8k^2 + 31k + 4)$$

$$= 4k^2 + 16k + 16 + 32k^2 - 124k - 16$$

$$= 36k^2 - 108k + 0$$

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

$$36k^2 - 108k + 0 = 0$$

$$36(k^2 - 3k) = 0$$

$$(k^2 - 3k) = 0$$

Now factorizing of the above equation

$$k(k - 3) = 0$$

So, either

$$k = 0 \text{ or } (k - 3) = 0$$

$$k = 3$$

Therefore, the value of $k = [0, 3]$

(xvi) The given quadric equation is $(2k + 1)x^2 + 2(k + 3)x + k + 5 = 0$, and roots are real and equal

Then find the value of k .

Here,

$$a = (2k + 1), b = 2(k + 3) \text{ and } c = k + 5$$

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

Putting the value of $a = (2k + 1), b = 2(k + 3) \text{ and } c = k + 5$

$$= \{2(k + 3)\}^2 - 4 \times (2k + 1) \times (k + 5)$$

$$= \{4(k^2 + 6k + 9)\} - 4(2k^2 + 11k + 5)$$

$$= 4k^2 + 24k + 36 - 8k^2 - 44k - 20$$

$$= -4k^2 - 20k + 16$$

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

$$-4k^2 - 20k + 16 = 0$$

$$-4(k^2 + 5k - 4) = 0$$

$$(k^2 + 5k - 4) = 0$$

Now factorizing the above equation

$$(k^2 + 5k - 4) = 0$$

$$k = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$k = \frac{-5 \pm \sqrt{25 + 16}}{2}$$

$$k = \frac{-5 \pm \sqrt{41}}{2}$$

So, either

$$\text{Therefore, the value of } k = \frac{-5 \pm \sqrt{41}}{2}$$

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

Here,

$$a = 4, b = -2(k+1) \text{ and } c = k + 4$$

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

Putting the value of $a = 4, b = -2(k+1) \text{ and } c = k + 4$

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

$$= \{4(k^2 + 2k + 1)\} - 16(k+4)$$

$$= 4k^2 + 8k + 4 - 16k - 64$$

$$= 4k^2 - 8k - 60$$

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

$$4k^2 - 8k - 60 = 0$$

$$4(k^2 - 2k - 15) = 0$$

$$(k^2 - 2k - 15) = 0$$

Now factorizing of the above equation

$$(k^2 - 2k - 15) = 0$$

$$k^2 + 3k - 5k - 15 = 0$$

$$k(k+3) - 5(k+3) = 0$$

$$(k+3)(k-5) = 0$$

So, either

$$(k+3) = 0 \quad \text{or} \quad (k-5) = 0$$

$$k = -3$$

$$k = 5$$

Therefore, the value of $k = \boxed{-3, 5}$

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

Here,

$$a = 1, b = -2(k+1) \text{ and } c = k^2$$

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

Putting the value of $a = 1, b = -2(k+1) \text{ and } c = k^2$

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

$$= \{4(k^2 + 2k + 1)\} - 4k^2$$

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

$$= 8k + 4$$

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

$$8k + 4 = 0$$

$$8k = -4$$

$$k = \frac{-4}{8}$$

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

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

***** END *****