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

Then find the value of *k*.

Here,

$$5x^2-4x+2+k\left(4x^2-2x-1\right)=0$$
$$5x^2-4x+2+4kx^2-2kx-k=0$$
$$(5+4k)x^2-(4+2k)x+(2-k)=0$$

So,

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

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

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

$$=\{-(4+2k)\}^2-4\times(5+4k)\times(2-k)$$
$$=(16+16k+4k^2)-4\left(10+3k-4k^2\right)$$
$$=16+16k+4k^2-40-12k+16k^2$$
$$=20k^2+4k-24$$

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

Thus,

$$20k^2+4k-24=0$$
$$4\left(5k^2+k-6\right)=0$$
$$\left(5k^2+k-6\right)=0$$

Now factorizing of the above equation

$$\left(5k^2+k-6\right)=0$$
$$5k^2+6k-5k-6=0$$
$$k(5k+6)-1(5k+6)=0$$
$$(5k+6)(k-1)=0$$

So, either

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

Therefore, the value of $k=\boxed{\frac{-6}{5},1}$

(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 $D = 0$

$$36k^2 - 108k + 0 = 0$$
$$36\left(k^2 - 3k\right) = 0$$
$$\left(k^2 - 3k\right) = 0$$

Now factorizing of the above equation

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

So, either

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

$k = 3$

Therefore, the value of $k = \boxed{0, 3}$

(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 $D = 0$

$$-4k^2 - 20k + 16 = 0$$
$$-4\left(k^2 + 5k - 4\right) = 0$$
$$\left(k^2 + 5k - 4\right) = 0$$

Now factorizing the above equation

$$\left(k^2 + 5k - 4\right) = 0$$
$$k = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$k = \frac{-5 \pm \sqrt{25 + 16}}{2}$$
$$k = \frac{-5 \pm \sqrt{41}}{2}$$

So, either

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

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

$$=\{-2(k+1)\}^2-4\times4\times(k+4)$$
$$=\{4(k^2+2k+1)\}-16(k+4)$$
$$=4k^2+8k+4-16k-64$$
$$=4k^2-8k-60$$

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

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

$k=-3$ $k=5$

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

$$=\{-2(k+1)\}^2-4\times1\times k^2$$
$$=\{4(k^2+2k+1)\}-4k^2$$
$$=4k^2+8k+4-4k^2$$
$$=8k+4$$

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 **********