ANSWER KEYS

1. (1)	**2.** (4)	**3.** (1)	**4.** (4)	**5.** (2)	**6.** (3)	**7.** (4)	**8.** (1)
9. (1)	**10.** (1)						

1. **(1)** $x^2+2ax+10-3a>0$

Above inequality will satisfy if

$D<0$

$\Rightarrow (2a)^2-4(10-3a)<0$

$\Rightarrow 4a^2-4(10-3a)<0$

$\Rightarrow a^2-10+3a<0$

$\Rightarrow a^2+3a-10<0$

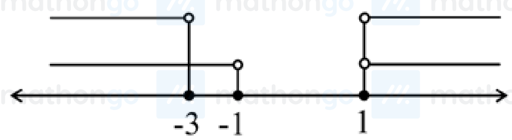
$\Rightarrow a^2+5a-2a-10<0$

$\Rightarrow a(a+5)-2(a+5)<0$

$\Rightarrow (a-2)(a+5)<0$

$\therefore a\in(-5,\ 2)$

2. **(4)**
As $f(x)>0$
$\therefore\quad a^2-1>0 \quad$ and $\quad D<0$
$a\in(-\infty,-1)\cup(1,\infty) \quad \ldots(1)$
For $D<0 \ \Rightarrow\ \{2(a-1)\}^2-\ 8\left(a^2\ -1\right)<0$
$\Rightarrow\quad a^2+1-2a-2a^2+2<0$
$-a^2-2a+3<0$
$a^2+2a\ -3>0$
$(a-1)(a+3)>0$
$a\in(-\infty,-3)\cup(1,\infty)\ \ \&\ \ a\in(-\infty,-1)\cup(1,\infty)$



$\therefore\quad a\le-3$ or $a>1$

3. (1)

$\because$ Quadratic expression is positive, hence $1+2m>0$ and $D<0$

$\Rightarrow m>\frac{-1}{2}$ and

$4(1+3m)^2-16\,(1+m)(1+2m)<0$

$\Rightarrow 9m^2+1+6m-4\left(2m^2+3m+1\right)<0$

$\Rightarrow m^2-6m-3<0$

$\Rightarrow\left(m-3+2\sqrt{3}\right)\left(m-3-2\sqrt{3}\right)<0$

$\Rightarrow m\in\left(3-2\sqrt{3},\ 3+2\sqrt{3}\right)$

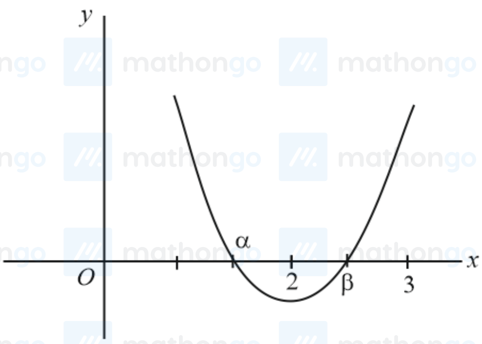
$\therefore m=0,\ 1,\ 2,\ 3,\ 4,\ 5,\ 6$

$\therefore$ Number of integral values $=7$

4. (4)

Since, α and β are the roots of $4x^2-16x+\lambda=0,\ \lambda\in R$ such that $1<\alpha<2$ and $2<\beta<3$.

Therefore, we have



Clearly,

$f(1)>0,\ f(2)<0,\ f(3)>0$

$f(1)=-12+\lambda>0\Rightarrow\lambda>12$

$f(2)=-16+\lambda<0\Rightarrow\lambda<16$

$f(3)=-12+\lambda>0$

And for $x\in R\Rightarrow D>0$

$\Rightarrow(16)^2-16\lambda>0$

$\Rightarrow 16(16-\lambda)>0$

$\therefore\ 12<\lambda<16$

$\therefore\ \lambda\in\{13,14,15\}$.

Hence, three integral solutions.

5.

(2)

$a-1<-1$ and $a^2+2>3$

$a<0$ and $a^2>1$

$a<0$ and $a>1$ or $a<-1$

$\Rightarrow a<-1$

6. **(3)** The given equation can be written as

$x^2-(m-1)x-(m+1)x+m^2-1=0$

$\Rightarrow\ x(x-m-1)-(m-1)(x-m-1)=0$

$\Rightarrow (x-m-1)(x-m+1)=0$

$\Rightarrow$ either $x=m-1$ or $x=m+1$.

By given condition $-2<m-1<m+1<4$

$\Rightarrow -1<m<3$

7. **(4)** Let, $f(x)=4x^2-20kx+\left(25k^2+15k-66\right)=0 \ldots\ldots\ldots\ldots\ldots\ldots (i)$

Let the roots of $f(x)=0$ be $\alpha,\ \beta$

Since $\alpha,\ \beta$ are real.

$\therefore\ \Delta\geq 0$

$\Rightarrow 400k^2-4.4\left(25k^2+15k-66\right)\geq 0$

$\Rightarrow\ -15k+66\geq 0 \quad\Rightarrow\quad k\leq\frac{22}{5}\ldots\ldots\ldots\ldots\ldots(ii)$

We have $\alpha,\ \beta<2$

$\therefore\ \ \alpha+\beta<4$

$\Rightarrow\ -\frac{(-20k)}{4}<4\ \ \Rightarrow k<\frac{4}{5}\ldots\ldots\ldots\ldots\ldots(iii)$

$f(x)=4(x-\alpha)(x-\beta)$

$\therefore\quad f(2)=4(2-\alpha)(2-\beta)=4(+)(+)=+\text{ve}$

$\therefore\ \ f(2)=16-40k+\left(25k^2+15k-66\right)>0$

$\Rightarrow 25k^2-25k-50>0\quad\Rightarrow\quad k^2-k-2>0$

$\Rightarrow\ \ (k+1)(k-2)>0\quad\Rightarrow\quad k<-1$ or $k>2\ldots\ldots\ldots\ldots$(iv)

Combining $(ii),\ (iii)\ \&\ (iv),$ we get $k\in(-\infty,-1)$

8. **(1)** Both roots are less than 3

$\Rightarrow D \geq 0, -\frac{B}{2A} < 3,\ f(3) > 0$

$D = 4a^2 - 4\left(a^2 + a - 3\right) = -4(a-3) \geq 0$

$\Rightarrow a \leq 3 \ldots.(i)$

$\frac{-B}{2A} = \frac{2a}{2} = a < 3 \ldots.(ii)$

$f(3) = 9 - 6a + a^2 + a - 3 > 0$

$a^2 - 5a + 6 > 0$

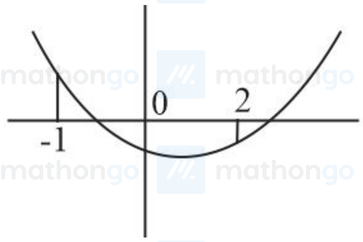
$(a-2)(a-3) > 0 \Rightarrow a < 2$ or $a > 3 \ldots..(iii)$

Taking the intersection of $(i), (ii), (iii)$, we get,

$a < 2$

9. **(1)**

Clearly, $f(-1) > 0,\ f(2) < 0$



since, $f(0) = -4 < 0$

$\Rightarrow 1 - a - 4 > 0 \Rightarrow -a - 3 > 0 \Rightarrow -a > 3$

or $a < -3$

and $4 + 2a - 4 < 0$

$\Rightarrow a < 0$

Hence, $a \in (-\infty, -3)$.

10. **(1)**

$ax^2 + 2bx - 3c = 0$ has no real roots

$f(2) = 4a + 4b - 3c$

$= 4\left(a + b - \frac{3c}{4}\right) > 0$ (given)

So, $f(x) > 0\ \forall x$

$\Rightarrow f(0) > 0$

$\Rightarrow -3c > 0 \Rightarrow c < 0$