$$y^2 + 13y + 36 = y^2 - 12y + 36$$
$$y^2 - y^2 + 13y + 12y + 36 - 36 = 0$$
$$25y = 0$$
$$\Rightarrow \qquad y = 0$$

Put $y = 0$ in $x^2 + x^2 + y$, we get
$$x^2 + 3x = y$$
$$x^2 + 3x = 0$$
$$x^2 + 3x = 0$$
$$x(x + 3) = 0$$

Either $x = 0$ or $x + 3 = 0$

Thus, solution set = $\{-3, 0\}$

SOLVED MISCELLANEOUS EXERCISE - 1

Q1. **Multiple Choice Questions:**

Four possible answers are given for the following questions. Tick (✓) the correct answer.

(i) Standard form of quadratic equation is:

   (a) $bx + c = 0, b \neq 0$ (b) $ax^2 + bx + c = 0, a \neq 0$

   (c) $ax^2 = bx, a \neq 0$ (d) $ax^2 = 0, a \neq 0$

(ii) The number of terms in a standard quadratic equation $ax^2 + bx + c = 0$ is

   (a) 1   (b) 2   (c) 3   (d) 4

(iii) The number of methods to solve a quadrate equation is:

   (a) 1   (b) 2   (c) 3   (d) 4

(iv) The quadratic formula is:

   (a) $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ (b) $\dfrac{b \pm \sqrt{b^2 - 4ac}}{2a}$

   (c) $\dfrac{-b \pm \sqrt{b^2 + 4ac}}{2a}$ (d) $\dfrac{b \pm \sqrt{b^2 + 4ac}}{2a}$

(v) Two linear factors of $x^2 - 15x + 56$ are:

   (a) $(x - 7)$ and $(x + 8)$ (b) $(x + 7)$ and $(x - 8)$

   (c) $(x - 7)$ and $(x - 8)$ (d) $(x + 7)$ and $(x + 8)$

(vi) An equation, which remains unchanged when x is replaced by $\dfrac{1}{x}$ is called a/an

   (a) Exponential equation   (b) Reciprocal equation

   (c) Radical equation   (d) None of these

(vii) An equation of the type $3^x + 3^{2x} + 6 = 0$ is a/an:

   (a) Exponential equation   (b) Radical equation

(c) Reciprocal equation   (d) None of these

(viii) The solution set of equation $4x^2 - 16 = 0$ is:
(a) $\{\pm 4\}$ (b) $\{4\}$ (c) $\{\pm 2\}$ (d) ± 2

(ix) An equation of the form $2x^2 - 3x^3 + 7x^2 - 3x + 2 = 0$ is called   a/an
(a) Reciprocal equation   (b) Radical equation
(c) Exponential equation   (d) None of these

Answers:

(i)	b	(ii)	c	(iii)	c	(iv)	a	(v)	c
(vi)	b	(vii)	a	(viii)	c	(ix)	a		

Q2. Write short answers of the following questions.

(i) Solve $x^2 + 2x - 2 = 0$

Ans:

$x^2 + 2x - 2 = 0$
Compare it with
$ax^2 + bx + c = 0$
Here $a = 2$, $b = 2$, $c = 2$
By using quadratic equation, we get

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

$$x = \frac{-2 \pm \sqrt{(2)^2 - 4(2)(-2)}}{2(2)}$$

$$x = \frac{-2 \pm \sqrt{4 + 16}}{4}$$

$$x = \frac{-2 \pm \sqrt{20}}{4} = \frac{-2 \pm 2\sqrt{5}}{4}$$

$$x = \frac{2(-1 \pm \sqrt{5})}{4} = -1 \pm \sqrt{5}$$

Thus, the solution set $= \left\{-1 \pm \sqrt{5}\right\}$

(ii) Solve by factorization $5x^2 = 15x$

Ans:

$5x^2 = 15x$
$5x^2 - 15x = 0$
$5x(x - 3) = 0$
Either $5x = 0$ or $x - 3 = 0$
$\Rightarrow$ $x = 0$ $x = 0$
Thus, the solution set $= \{0, 3\}$

(iii) Write in standard form $\dfrac{1}{x+4}+\dfrac{1}{x-4}=3$

Ans:

$$\dfrac{1}{x+4}+\dfrac{1}{x-4}=3 \Rightarrow \qquad \dfrac{x-4+x+4}{(x+4)(x-4)}=3$$

$$\dfrac{2x}{x^2-16}=3 \Rightarrow \qquad 3(x^2-16)=2x$$

$$3x^2-48-2x=0$$

$$3x^2-2x-48=0$$

(iv) Write the names of the methods for solving a quadratic equation.

Ans: Solution of quadratic equations:

To find solution set of a quadratic equation, following methods are used:

(i) Factorization (ii) Completing square

(v) Solve $\left(2x-\dfrac{1}{2}\right)^2=\dfrac{9}{4}$

Ans:

$$\left(2x-\dfrac{1}{2}\right)^2=\dfrac{9}{4}$$

Taking square root on both sides, we get

$$2x-\dfrac{1}{2}=\pm\dfrac{3}{2}$$

$$2x=\dfrac{1}{2}\pm\dfrac{3}{2}$$

Either $2x=\dfrac{1}{2}+\dfrac{3}{2}$ or $2x=\dfrac{1}{2}-\dfrac{3}{2}$

$$2x=2 \qquad\qquad 2x=-1$$

$$\Rightarrow \quad x=1 \qquad\qquad x=-\dfrac{1}{2}$$

Thus, the solution set $=\left\{-\dfrac{1}{2},1\right\}$

(vi) Solve $\sqrt{3x+18}=x$

Ans:

$$\sqrt{3x+18}=x$$

Taking square on both sides, we get

$$3x+18=x^2$$

$$x^2-3x-18=0$$

$$x^2 - 6x + 3x - 18 = 0$$
$$x(x - 6) + 3(x - 6) = 0$$
$$(x - 6)(x + 3) = 0$$

Either $\quad x - 6 = 0 \qquad\qquad$ or $\qquad x + 3 = 0$

$$x = 6 \qquad\qquad\qquad\qquad x = -3$$

Thus, the solution set = $\{-3, 6\}$

(vii) Define quadratic equation.

Ans: Quadratic Equation:

An equation, which contains the square of the unknown (variable) quantity, but no higher power, is called a **quadratic equation** or an equation of the second degree.

(viii) Define exponential equation.

Ans: Exponential equations:

In exponential equations, variable occurs in exponent.

For example, $5^{1\cdot\cdot} + 5 x^{1\cdot\cdot} = 26$.

(ix) Define reciprocal equation.

Ans: Reciprocal equations of the type:

$$a\left(x^2 + \frac{1}{x^2}\right) + b\left(x + \frac{1}{x}\right) = c = 0 \text{ or } ax^4 + bx^3 + cx^2 + bx + a = 0$$

An equation is said to be a reciprocal equation, if it remains unchanged, when x is replaced by $\frac{1}{x}$.

Replacing x by $\frac{1}{x}$ in $ax^4 - bx^3 + cx^2$ $bx + a = 0$, we have

$$a\left(\frac{1}{x}\right)^4 - b\left(\frac{1}{x}\right)^3 + c\left(\frac{1}{x}\right)^2 - b\left(\frac{1}{x}\right) + a = 0 \text{ which is simplified as}$$

$a - bx + cx^2 - by^3 + ax^4 = 0$. We get the same equation.

Thus $ax^4 - bx^3 + cx^2 - bx + a = 0$ is a reciprocal equation.

(x) Define radical equation.

Ans: Radical equations:

An equation involving expression under the radical sign is called a **radical equation**.

e.g., $\sqrt{x + 3} = x + 1$ and $\sqrt{x - 1} = \sqrt{x - 2} + 1$

Q3. Fill in the blanks:

(i) The standard form of the quadratic equation is_____.

(ii) The number of methods to solve a quadratic equation are_____.

(iii) The name of the method to derive a quadratic formula is_____.

(iv) The solution of the equation $ax^2 + bx + c = 0$, $a \neq 0$ is_____.

(v) The solution set of $25x^2 - 1 = 0$ is _____.

(vi) An equation of the form $2^{2x} - 3.2^x + 5 = 0$ is called a/an _____ equation.

(vii) The solution set of the equation $x^2 - 9 = 0$ is _____ .

(viii) An equation of the type $x^4 + x^3 + x^2 + x + 1 = 0$ called a/an

(ix) A root of an equation, which do' not satisfy the equation is called _____ root.

(x) An equation involving impression of the variable under _____ is called radical.

Answer

(i)	$ax^2+bx+c=0$	(ii)	3	(iii)	Completing Square
(iv)	$\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	(v)	$\left\{ \pm \dfrac{1}{5} \right\}$	(vi)	Exponential
(vii)	$\{ \pm 3 \}$	(viii)	Reciprocal	(ix)	Extraneous
(x)	Radical sign				

SUMMARY

✔ An equation which contains the square of the unknown (variable) quantity, but no higher power, is called a quadratic equation or an equation of the second degree.

✔ A second degree equation in one variable x, $ax^2 + bx + c = 0$

✔ Where $a \neq 0$ and a, b, care real numbers, is called the general or standard form of a quadratic equation.

✔ An equation is said to be a reciprocal equation, if it remains unchanged, when x is replaced by $\dfrac{1}{x}$.

✔ In exponential equations, variables occur in exponents.

✔ An equation involving expression under the radical sign is called a radical equation.

✔ Quadratic formula for $ox^2 + bx + c = 0$, $a \neq 0$ is $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

✔ Any quadratic equation is solved by the following three methods.

    (i)   Factorization   (ii)   Completing square   (iii) Quadratic formula

✪✪✪✪✪✪✪✪✪✪✪✪