

QUADRATIC EQUATIONS. (TERM-2)

Type-2 questions

(PULKIT JAWAL)

Q1. Find the roots of the equation by FACTORISATION METHOD.

(a) $3y^2 - 2\sqrt{6}y + 2 = 0$

(b) $\sqrt{2}m^2 + 7m + 5\sqrt{2} = 0$

(c) $-2\sqrt{3} + 5x + 4\sqrt{3}x^2 = 0$

(d) $11x = -6\sqrt{3} - x^2\sqrt{3}$

(e) $x(3\sqrt{7}x + 4) = \sqrt{7}$

(f) $-13x = 2\sqrt{6} - x^2 4\sqrt{6}$

(g) $8x^2 + 8\sqrt{3}x + 6 = 0$

(h) $x^2 - 4\sqrt{2}x^2 + 6x = 0$

(i) $-2x^2 - 5\sqrt{3}x - 6 = 0$

(j) $-2\sqrt{3}x^2 - 20x + 16\sqrt{3} = 0$

(k) $6\sqrt{5}m^2 - 3\sqrt{5} - 9m = 0$

(l) $10x = 8\sqrt{3} - x^2\sqrt{3}$

(m) $x(5\sqrt{5}x + 30) = -8\sqrt{5}$

(n) $8\sqrt{2} = -18x - 2\sqrt{2}x^2$

(o) $3x^2 + 5\sqrt{5}x^2 - 10x$

(p) $-12 - x^2 - 5\sqrt{3}x$

(q) $600x^2 + 700\sqrt{2}x + 2400$

(r) $50\sqrt{3}x^2 + 550x + 300\sqrt{3}$

Q2. Find the roots of equation by factorisation $x^2 - (1+\sqrt{2})x + \sqrt{2} = 0$

Q3. Find the roots of equation $m^2 - \sqrt{2}m - m + \sqrt{2} = 0$

Q4. Find the roots of equation $x^2 = -\sqrt{3} + \sqrt{3}x + x$

Q5. Find the roots of the equation by factorisation method. $5^{x+1} + 5^{2-x} = 126$

Q6. Find the roots of $3^{m+2} - 10 = -3^m$

Q7. Find the roots of $2^{2(x+1)} + 4^{(1-x)} = 10$

Q8. Solve for 'x' by factorisation method $36x^2 - 12ax + (a^2 - b^2)$

Q9. Find the roots of the equation ~~4x^2 + a^2b^2 = 2a^2x + 2b^2x~~

Q10. Find the roots of the quadratic equation $4y^2 - 4a^2y = -(a^4 - b^4)$

Q11. Find the roots of the equation $a^2b^2x^2 + b^2x = 1 + a^2x$

Q12. Find the roots of the equation $\left(\frac{4a-3}{2a+1}\right) - 10\left(\frac{2a+1}{4a-3}\right) = 3$

Q13. Find the roots of the equation $\left(\frac{m}{m+1}\right)^2 = -6 + 5\left(\frac{m}{m+1}\right)$

Q14. Find the roots by using factorisation method.

$$2x^2 - 2\sqrt{6}x + 3 = 0$$

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SOLUTIONS

Q1. (a) $8y^2 - 2\sqrt{6}y + 2 = 0$

$(-8) \times (-2) = 16$

$(\sqrt{6}) + (-\sqrt{6}) = -2\sqrt{6}$

$\Rightarrow 2y^2 - 2\sqrt{6}y + 12 = 0$

$\Rightarrow 3y^2 - \sqrt{6}y - \sqrt{6}y + 12 = 0$

$\Rightarrow y(3y - \sqrt{6}) - \sqrt{6}(3y - \sqrt{6}) = 0$

$? \times 3y = -\sqrt{6}$

$? = \frac{-\sqrt{6}}{3} = \frac{-\sqrt{6}}{3}$

$\Rightarrow y(3y - \sqrt{6}) = \frac{\sqrt{6}}{3}(3y - \sqrt{6})$

$\Rightarrow (y - \frac{\sqrt{6}}{3})(3y - \sqrt{6}) = 0$

$y = \frac{\sqrt{6}}{3}, \frac{\sqrt{6}}{3}$

(b) $\sqrt{2}m^2 + 7m + 5\sqrt{2} = 0$

on solving $(m + \frac{5}{\sqrt{2}})(\sqrt{2}m + 2) = 0$

$m = -\frac{5}{\sqrt{2}}, -\frac{1}{\sqrt{2}}$

(c) $-2\sqrt{3} + 5x + 4\sqrt{3}x^2 = 0$
 $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$

$x = \frac{2}{4\sqrt{3}}, x = \frac{-2}{\sqrt{3}}$

(d) $11x = -6\sqrt{3} - x^2\sqrt{3}$

$\Rightarrow x^2\sqrt{3} + 6\sqrt{3} + 11x = 0$

$\Rightarrow x^2\sqrt{3} + 11x + 6\sqrt{3} = 0$

$x = \frac{-2}{\sqrt{3}}, -3\sqrt{3}$

(e) $x(3\sqrt{7}x + 4) = \sqrt{7}$

$\Rightarrow x^2 3\sqrt{7} + 4x = \sqrt{7}$

$x^2(3\sqrt{7}) + 4x - \sqrt{7} = 0$

$x = \frac{1}{\sqrt{7}}, x = \frac{-7}{3\sqrt{7}}$

(f) $-8x = 2\sqrt{6} - x^2 4\sqrt{6}$

$\Rightarrow x^2(4\sqrt{6}) - 8x - 2\sqrt{6} = 0$

$\Rightarrow (4x + \frac{8}{\sqrt{6}})(x\sqrt{6} - 4) = 0$

$\therefore x = \frac{-8}{4\sqrt{6}}, \frac{4}{\sqrt{6}}$

(g) $8x^2 + 8\sqrt{3}x + 6 = 0$

$\Rightarrow 2(4x^2 + 4\sqrt{3}x + 3) = 0$

$\Rightarrow 4x^2 + 4\sqrt{3}x + 3 = 0$

$\Rightarrow (4x^2 + 2\sqrt{3}x) + 2\sqrt{3}x + 3 = 0$

$\Rightarrow 2x(2x + \sqrt{3}) + \sqrt{3}(2x + \sqrt{3}) = 0$

$(2x + \sqrt{3})(2x + \sqrt{3}) = 0$

$x = -\frac{\sqrt{3}}{2}, -\frac{\sqrt{3}}{2}$

(h) $x^2 - 4\sqrt{2}x + 6 = 0$

$\Rightarrow x(x^2 - 4\sqrt{2}x + 6) = 0$

$\Rightarrow x^2 - 4\sqrt{2}x + 6 = 0$

$(x - \sqrt{2})(x - 3\sqrt{2}) = 0$

$x = \sqrt{2}, 3\sqrt{2}$

(i) $-2x^2 - 5\sqrt{3}x - 6 = 0$

$\Rightarrow 2x^2 + 5\sqrt{3}x + 6 = 0$

$\Rightarrow (2x + \sqrt{3})(x + 2\sqrt{3}) = 0$

$x = -\frac{\sqrt{3}}{2}, -2\sqrt{3}$

(j) $-2\sqrt{3}x^2 - 20x + 16\sqrt{3} = 0$

$\Rightarrow -2(\sqrt{3}x^2 + 10x - 8\sqrt{3}) = 0$

$\Rightarrow \sqrt{3}x^2 + 10x - 8\sqrt{3} = 0$

$\Rightarrow (x - \frac{2}{\sqrt{3}})(x\sqrt{3} + 12) = 0$

$x = \frac{2}{\sqrt{3}}, x = -\frac{12}{\sqrt{3}}$

(k) $6\sqrt{5}m^2 - 3\sqrt{5} - 9m = 0$

$\Rightarrow 3(2\sqrt{5}m^2 - \sqrt{5} - 3m) = 0$

$\Rightarrow 2\sqrt{5}m^2 - 3m - \sqrt{5} = 0$

$\Rightarrow (2m - \frac{5}{\sqrt{5}})(\sqrt{5}m + 1) = 0$

$m = \frac{5}{2\sqrt{5}}, -\frac{1}{\sqrt{5}}$

(l) $10x = 8\sqrt{3} - x^2\sqrt{3}$

$\Rightarrow x^2\sqrt{3} + 10x - 8\sqrt{3} = 0$

$x = \frac{-12}{\sqrt{3}}, x = \frac{2}{\sqrt{3}}$

(m) $x(5\sqrt{5}x + 30) = -8\sqrt{5}$

$\Rightarrow 5\sqrt{5}x^2 + 30x = -8\sqrt{5}$

$\Rightarrow 5\sqrt{5}x^2 + 30x + 8\sqrt{5} = 0$

$\Rightarrow (5x + 2\sqrt{5})(\sqrt{5}x + 4) = 0$

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

(n) $8\sqrt{2} = -18x - 2\sqrt{2}x^2$

$\Rightarrow 2\sqrt{2}x^2 + 18x + 8\sqrt{2} = 0$

$\Rightarrow \sqrt{2}x^2 + 9x + 4\sqrt{2} = 0$

$\Rightarrow (x + 4\sqrt{2})(\sqrt{2}x + 1) = 0$

$x = -4\sqrt{2}, -\frac{1}{\sqrt{2}}$

(o) $3x^2 + 5\sqrt{5}x^2 - 10x = 0$

$x(3x^2 + 5\sqrt{5}x - 10) = 0$

$\Rightarrow 3x^2 + 5\sqrt{5}x - 10 = 0$

$\Rightarrow (3x - \sqrt{5})(x + 2\sqrt{5}) = 0$

$x = \frac{\sqrt{5}}{3}, -2\sqrt{5}$

(p) $-12 - x^2 - 5\sqrt{x} = 0$

$\Rightarrow -x^2 - 5\sqrt{x} - 12 = 0$

$\Rightarrow x^2 + 5\sqrt{x} + 12 = 0$

$\Rightarrow (x + \sqrt{3})(x + 4\sqrt{3}) = 0$

$x = -\sqrt{3}, -4\sqrt{3}$

(q) $600x^2 + 700\sqrt{2}x + 400 = 0$

$100(6x^2 + 7\sqrt{2}x + 4) = 0$

$\Rightarrow 6x^2 + 7\sqrt{2}x + 4 = 0$

$\Rightarrow 6x^2 + 4\sqrt{2}x + 3\sqrt{2}x + 4 = 0$

$\Rightarrow 2x(3x + 2\sqrt{2}) + \sqrt{2}(3x + 2\sqrt{2}) = 0$

$\Rightarrow (2x + \sqrt{2})(3x + 2\sqrt{2}) = 0$

$x = -\frac{\sqrt{2}}{2}, -\frac{2\sqrt{2}}{3}$

(r) $50\sqrt{3}x^2 + 550x + 300\sqrt{3} = 0$

$\Rightarrow 50(\sqrt{3}x^2 + 11x + 6\sqrt{3}) = 0$

$\Rightarrow \sqrt{3}x^2 + 11x + 6\sqrt{3} = 0 \Rightarrow (x + \frac{9}{\sqrt{3}})(\sqrt{3}x + 2) = 0$

$x = \frac{-9}{\sqrt{3}}, -\frac{2}{\sqrt{3}}$

(s) $x^2 - (1 + \sqrt{2})x + \sqrt{2} = 0$

$\Rightarrow x^2 - x - \sqrt{2}x + \sqrt{2} = 0 \Rightarrow x(x-1) - \sqrt{2}(x-1) = 0$

$\Rightarrow (x - \sqrt{2})(x + 1) = 0$

$x = \sqrt{2}, -1$

(t) $x^2 - \sqrt{2}x - x + \sqrt{2}$ (same as above)

(u) $x^2 = -\sqrt{3} + \sqrt{3}x + x$ OR $x^2 - x - \sqrt{3}x + \sqrt{3} = 0$

$\Rightarrow x(x-1) - \sqrt{3}(x-1) = 0 \Rightarrow (x - \sqrt{3})(x + 1) = 0$

$x = \sqrt{3}, -1$

(v) $5^{x+1} + 5^{2-x} = 126$

$\Rightarrow 5^x \cdot 5 + 5^2 \cdot \frac{1}{5^x} = 126$

$\Rightarrow (5^x) \cdot 5 + \frac{25}{5^x} = 126$ Now put $5^x = m$

$\Rightarrow 5m + \frac{25}{m} = 126$ OR $5m^2 - 126m + 25 = 0$

$\Rightarrow (5m+1)(m-25) = 0$ OR $m = \frac{1}{5}$ and $m = 25$

$\therefore 5^x = \frac{1}{5} = 5^{-1} \therefore x = -1$

& $5^x = 25 \Rightarrow 5^x = 5^2 \therefore x = 2$

(w) $3^{m+2} - 10 = -3^m$

(3^m) $3^2 - 10 = -3^m$ put $3^m = x$

$9x - 10 = -\frac{1}{x} \Rightarrow 9x^2 - 10x = -1$

$\Rightarrow 9x^2 - 10x + 1 = 0 \Rightarrow (3x+1)(x-1) = 0$

$\Rightarrow x = \frac{1}{3}$ and $x = 1$ OR $3^m = \frac{1}{3} \Rightarrow 3^m = 3^{-2}$

$\therefore m = -2$ & $3^m = 1$

only possible when $m = 0$

Quadratic Equations

(PULKIT JAWAL)

Q7 $2^{2(x+1)} + 4^{(1-x)} = 10$

$$\Rightarrow 2^{2x+2} + 2^{2(1-x)} = 10$$

$$\Rightarrow 2^{2x} \cdot 2^2 + (2^{2-2x}) = 10$$

$$\Rightarrow 2^{2x} \cdot (4) + 2^2 \cdot (2^{-2x}) = 10$$

$$\Rightarrow 4 \cdot (2^{2x}) + 4 \cdot (2^{-2x}) = 10$$

Now put $2^{2x} = y$

$$4y + \frac{4}{y} = 10 \text{ OR } 4y^2 - 10y + 4 = 0$$

$$\Rightarrow 2y^2 - 5y + 2 = 0 \Rightarrow (2y-1)(y-2) = 0$$

$$y = \frac{1}{2}, y = 2 \text{ \& } 2^{2x} = \frac{1}{2} = 2^{-1}$$

$$\therefore 2x = -1 \quad \therefore x = -\frac{1}{2}$$

and $2^{2x} = 2$ OR $2^{2x} = 2^1$ OR $2x = 1$

OR $x = \frac{1}{2}$

So $x = -\frac{1}{2}, \frac{1}{2}$

Q8 $36x^2 - 12ax + (a^2 - b^2)$

$$(-6ab) \times (-6ab) = 36(a+b)(a-b)$$

$$(-6ab) + (-6ab) = -12a$$

$$\Rightarrow 36x^2 - 12ax + (a^2 - b^2) = 0$$

$$\Rightarrow 36x^2 - 6(a+b)x - 6(a-b)x + (a^2 - b^2) = 0$$

$$\Rightarrow 6x(6x - (a+b)) - (a-b)(6x - (a+b)) = 0$$

$$\Rightarrow (6x - (a+b))(6x - (a+b)) = 0$$

$$6x = (a+b) \text{ OR } x = \frac{a+b}{6}$$

$$6x = (a-b) \text{ OR } x = \frac{a-b}{6}$$

Q9 $4x^2 + a^2b^2 = 2a^2x + 2b^2x$

$$\Rightarrow 4x^2 + a^2b^2 - 2a^2x - 2b^2x = 0$$

$$\Rightarrow 4x^2 - 2x(a^2+b^2) + a^2b^2 = 0$$

$$\Rightarrow (-2a^2) \times (-2b^2) = 4a^2b^2$$

$$(-2a^2) + (-2b^2) = -2(a^2+b^2)$$

$$\Rightarrow 4x^2 - 2a^2x - 2b^2x + a^2b^2 = 0$$

$$\Rightarrow 2x(2x - a^2) - b^2(2x - a^2) = 0$$

$$\Rightarrow (2x - b^2)(2x - a^2) = 0 \Rightarrow x = \frac{b^2}{2}, \frac{a^2}{2}$$

Type-2 Solutions

Q10.

$$4y^2 - 4ay = -(a^4 - b^4)$$

$$\Rightarrow 4y^2 - 4ay + (a^4 - b^4) = 0$$

$$(-2(a+b^2)) \times (-2(a^2-b^2)) = 4(a^4 - b^4)$$

$$(-2(a+b^2)) + (-2(a^2-b^2)) = -4a^2$$

$$\Rightarrow 4y^2 - 4ay + (a^4 - b^4) = 0$$

$$\Rightarrow 4y^2 - 2(a+b^2)y - 2(a^2-b^2)y + (a^4 - b^4) = 0$$

$$\Rightarrow 2y(2y - (a+b^2)) - (a^2-b^2)(2y - (a+b^2)) = 0$$

$$\Rightarrow [2y - (a+b^2)][2y - (a^2-b^2)] = 0$$

$$\Rightarrow y = \frac{a^2-b^2}{2}, \frac{a^2+b^2}{2}$$

Q11. $a^2bx^2 + b^2x = 1 + a^2x$

$$\Rightarrow x^2(ab^2) + x(b^2 - a^2) - 1 = 0$$

$$b^2 \times (-a^2) = -a^2b^2$$

$$b^2 + (-a^2) = (b+a)(b-a) \text{ OR } (b^2 - a^2)$$

$$\Rightarrow (ab^2)x^2 + x(b^2 - a^2) - 1 = 0$$

$$\Rightarrow x(b^2(x^2 + 1)) - 1(a^2 + 1) = 0$$

$$\Rightarrow (x^2 + 1)(b^2x - a^2) = 0 \text{ OR } x = \frac{1}{b^2} \text{ \& } x = \frac{-1}{a^2}$$

Q12. $\left(\frac{4a-3}{2a+1}\right) - 10\left(\frac{2a+1}{4a-3}\right) = 3$ (put $\frac{4a-3}{2a+1} = x, \frac{2a+1}{4a-3} = \frac{1}{x}$)

$$\Rightarrow x - \frac{10}{x} = 3 \Rightarrow x^2 - 3x - 10 = 0 \Rightarrow (x-5)(x+2) = 0$$

$$\Rightarrow x = 5, \frac{4a-3}{2a+1} = 5 \text{ then } a = -\frac{4}{3}$$

$$\Rightarrow x = -2, \frac{4a-3}{2a+1} = -2 \text{ then } a = \frac{1}{8}$$

Q13. $\left(\frac{m}{m+1}\right)^2 = -6 + 5\left(\frac{m}{m+1}\right)$ (put $\frac{m}{m+1} = x$)

$$\Rightarrow x^2 = -6 + 5x \text{ OR } x^2 - 5x + 6 = 0 \text{ OR } x = \frac{2}{3}$$

$$\Rightarrow \frac{m}{m+1} = 2 \Rightarrow m = 2m+2 \text{ OR } m = -2$$

$$\Rightarrow \frac{m}{m+1} = 3 \Rightarrow m = 3m+3 \text{ OR } m = -\frac{3}{2}$$

Q14. $2x^2 - 2\sqrt{6}x + 3 = 0$

$$(-\sqrt{6}) \times (\sqrt{6}) = 6$$

$$(-\sqrt{6}) + (\sqrt{6}) = -2\sqrt{6}$$

$$\Rightarrow x = \frac{\sqrt{6}}{2}, \frac{\sqrt{6}}{2}$$

$$2x^2 - 2\sqrt{6}x + 3 = 0$$

$$2x^2 - \sqrt{6}x - \sqrt{6}x + 3 = 0$$

$$x(2x - \sqrt{6}) - \sqrt{6}(2x - \sqrt{6}) = 0$$

$$(x - \frac{\sqrt{6}}{2})(2x - \sqrt{6}) = 0$$