Chapter 03

Quadratic Equation

TOPIC WISE QUESTIONS

ROOTS OF QUADRATIC EQUATION

Q.1 The roots of the equation $(x+2)^2 = 4(x+1) - 1$ are-
(1) ±1 (2) ± i (3) 1,2 (4) – 1, –2

Q.2 The roots of quadratic equation $x^2 + 14x + 45 = 0$ are -
(1) – 9, 5 (2) 5, 9 (3) – 5, 9 (4) – 5, – 9

Q.3 The roots of the equation $x^4 - 8x^2 - 9 = 0$ are-
(1) ±3, ±1 (2) ±3, ±i
(3) ±2, ±i (4) None of these

Q.4 Which of the following equations has 1 and –2 as the roots -
(1) $x^2 - x - 2 = 0$ (2) $x^2 + x - 2 = 0$
(3) $x^2 - x + 2 = 0$ (4) $x^2 + x + 2 = 0$

Q.5 Roots of $3^x + 3^{-x} = 10/3$ are-
(1) 0, 1 (2) 1, – 1
(3) 0, – 1 (4) None of these

Q.6 If x + 1 is a factor of the equation $x^4 + (p-3)x^3 - (3p-5)x^2 + (2p-9)x + 6 = 0$, then the value of p is-
(1) 1 (2) 2 (3) 3 (4) 4

SUM AND PRODUCT OF ROOTS

Q.7 For what value of 'a' the difference of roots of the equation $(a-2)x^2 - (a-4)x - 2 = 0$ is equal to 3
(1) 3, $\frac{3}{2}$ (2) 3, 1
(3) 1, $\frac{3}{2}$ (4) None of these

Q.8 If α, β are roots of the equation $x^2 + px - q = 0$ and γ, δ are roots of $x^2 + px + r = 0$, then the value of $(\alpha - \gamma)(\alpha - \delta)$ is-
(1) p + r (2) p – r (3) q – r (4) q + r

Q.9 If α, β are roots of the equation $2x^2 - 35x + 2 = 0$, then the value of $(2\alpha - 35)^3 . (2\beta - 35)^3$ is equal to-
(1) 1 (2) 8
(3) 64 (4) None of these

Q.10 If α, β are roots of the equation $px^2 + qx - r = 0$, then the value of $\frac{\alpha}{\beta^2} + \frac{\beta}{\alpha^2}$ is equal to-
(1) $-\frac{p}{qr^2}(3pr + q^2)$ (2) $-\frac{q}{pr^2}(3pr + q^2)$
(3) $-\frac{q}{pr^2}(3pr - q^2)$ (4) $\frac{p}{pr^2}(3pr + q)$

Q.11 If the sum of the roots of the equation $(a+1)x^2 + (2a+3)x + (3a+4) = 0$ is –1, then the product of the roots is -
(1) 0 (2) 1 (3) 2 (4) 3

Q.12 Sum of roots is – 1 and sum of their reciprocals is $\frac{1}{6}$, then equation is –
(1) $x^2 + x - 6 = 0$ (2) $x^2 - x + 6 = 0$
(3) $6x^2 + x + 1 = 0$ (4) $x^2 - 6x + 1 = 0$

Q.13 If α, β are roots of the equation $2x^2 - 5x + 3 = 0$, then $\alpha^2\beta + \beta^2\alpha$ is equal to-
(1) 15/2 (2) – 15/4 (3) 15/4 (4) – 15/2

Q.14 If α, β be the roots of the equation $p(x^2 + n^2) + pnx + qn^2x^2 = 0$ then the value of $p(\alpha^2 + \beta^2) + p\alpha\beta + q\alpha^2\beta^2$ is -
(1) $\alpha + \beta$ (2) 0
(3) p + q (4) $\alpha + \beta + p + q$

Q.15 If α and β are roots of $ax^2 - bx + c = 0$, then $(\alpha + 1)(\beta + 1)$ is equal to -

(1) $\frac{a-b+c}{a}$ (2) $\frac{a+b-c}{a}$

(3) $\frac{a+b+c}{a}$ (4) $\frac{b-a+c}{a}$

Q.16 If difference of roots of the equation $x^2 - px + q = 0$ is 1, then $p^2 + 4q^2$ equals-

(1) $2q + 3$ (2) $(1 - 2q)^2$

(3) $(1 + 2q)^2$ (4) $2q - 3$

Q.17 If α and β are the roots of the equation $x^2 + (\sqrt{\alpha})x + \beta = 0$ then the values of α and β are

(1) $\alpha = 1, \beta = -2$ (2) $\alpha = 2, \beta = -2$

(3) $\alpha = 1, \beta = -1$ (4) $\alpha = -1, \beta = 1$

Q.18 If roots α and β of the equation $x^2 + px + q = 0$ are such that $3\alpha + 4\beta = 7$ and $5\alpha - \beta = 4$, then (p, q) is equal to -

(1) (1, 1) (2) (– 1, 1)

(3) (– 2, 1) (4) (2, 1)

Q.19 If one root of $ax^2 + bx + c = 0$ be square of the other, then the value of $b^3 + ac^2 + a^2c$ is-

(1) 3 abc (2) – 3abc

(3) 0 (4) None of these

Q.20 The roots of the equation $(b - c)x^2 + (c - a)x + (a - b) = 0$ are

(1) $\frac{c-a}{b-c}, 1$ (2) $\frac{a-b}{b-c}, 1$

(3) $\frac{b-c}{a-b}, 1$ (4) $\frac{c-a}{a-b}, 1$

FORMATION OF QUADRATIC EQUATION WITH GIVEN ROOTS

Q.21 The quadratic equation with one root 2i is-

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

(3) $x^2 + 2 = 0$ (4) $x^2 - 2 = 0$

Q.22 The sum of the roots of a equation is 2 and sum of their cubes is 98, then the equation is -

(1) $x^2 + 2x + 15 = 0$ (2) $x^2 + 15x + 2 = 0$

(3) $2x^2 - 2x + 15 = 0$ (4) $x^2 - 2x - 15 = 0$

Q.23 If α and β are roots of $2x^2 - 3x - 6 = 0$, then the quadratic equation whose roots are $\alpha^2 + 2$ and $\beta^2 + 2$ will be-

(1) $4x^2 + 49x - 118 = 0$

(2) $4x^2 - 49x - 118 = 0$

(3) $4x^2 - 49x + 118 = 0$

(4) $4x^2 + 49x + 118 = 0$

Q.24 If α and β are roots of $2x^2 - 7x + 6 = 0$, then the quadratic equation whose roots are $-\frac{2}{\alpha}, -\frac{2}{\beta}$ is-

(1) $3x^2 + 7x + 4 = 0$ (2) $3x^2 - 7x + 4 = 0$

(3) $6x^2 + 7x + 2 = 0$ (4) $6x^2 - 7x + 2 = 0$

Q.25 If roots of quadratic equation $ax^2 + bx + c = 0$ are α and β then symmetric expression of its roots is

(1) $\frac{\alpha}{\beta} + \frac{\beta^2}{\alpha}$ (2) $\alpha^2\beta^{-2} + \alpha^{-2}\beta^2$

(3) $\alpha^2\beta + 2\alpha\beta^2$ (4) $\left(\alpha + \frac{1}{\alpha}\right)\left(\beta + \frac{1}{\alpha}\right)$

Q.26 The quadratic equation having real coefficient with one root $\frac{1}{2}(1 + \sqrt{-3})$ is-

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

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

Q.27 The quadratic equation with one root $\frac{1}{1+i}$ is-

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

(3) $2x^2 + 2x - 1 = 0$ (4) $2x^2 - 2x - 1 = 0$

Q.28 If roots of the equation $\ell x^2 + mx - 2 = 0$ are reciprocal of each other, then-

(1) $\ell = 2$ (2) $\ell = -2$ (3) $m = 2$ (4) $m = -2$

Q.29 Two real numbers α & β are such that $\alpha + \beta = 3$, $\alpha - \beta = 4$, then α & β are the roots of the quadratic equation:

(1) $4x^2 - 12x - 7 = 0$ (2) $4x^2 - 12x + 7 = 0$

(3) $4x^2 - 12x + 25 = 0$ (4) none of these

NATURE OF ROOTS

Q.30 If roots of the equation $ax^2 + 2(a+b)x + (a + 2b + c)$ are imaginary, then roots of the equation $ax^2 + 2bx + c = 0$ are -

(1) rational (2) irrational

(3) equal (4) imaginary

Q.31 If a and b are the odd integers, then the roots of the equation $2ax^2 + (2a + b)x + b = 0$, $a \neq 0$, will be-

(1) rational (2) irrational

(3) non-real (4) equal

Q.32 If the roots of the equation $6x^2 - 7x + k = 0$ are rational then k is equal to -
(1) – 1 (2) –1, –2
(3) – 2 (4) 1, 2

Q.33 The roots of the quadratic equation $(a^2 + b^2) x^2 - 2(bc + ad) x + (c^2 + d^2) = 0$ are equal, if-
(1) ab = cd (2) ac = bd
(3) ad+ bc = 0 (4) None of these

Q.34 For what value of m, the roots of the equation $x^2 - x + m = 0$ are not real-
(1) $\left(\frac{1}{4}, \infty\right)$ (2) $\left(-\infty, \frac{1}{4}\right)$
(3) $-\left(-\frac{1}{4}, \frac{1}{4}\right)$ (4) None of these

Q.35 Roots of the quadratic equation
$(a + b - c)x^2 - 2ax + (a - b + c) = 0$,
$(a, b, c \in Q)$ are –
(1) rational (2) irrational
(3) complex (4) none of these

Q.36 The roots of the equation $x^2 - x - 3 = 0$ are-
(1) Imaginary (2) Rational
(3) Irrational (4) None of these

Q.37 The roots of the equation $x^2 + 2\sqrt{3}\, x + 3 = 0$ are-
(1) Real and equal
(2) Rational and equal
(3) Irrational and equal
(4) Irrational and unequal

Q.38 If the roots of the quadratic equation $ax^2 + x + b = 0$ be real & distinct then the roots of the equation
$x^2 - 4\sqrt{ab}\, x + 1 = 0$ will be -
(1) Rational (2) Irrational
(3) Real (4) Imaginary

Q.39 The factors of $2x^2 - x + p$ are rational if -
(1) p = 3 (2) p = – 8
(3) p = 6 (4) p = – 6

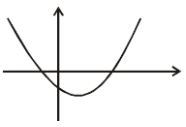
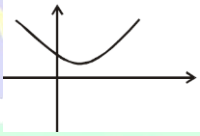
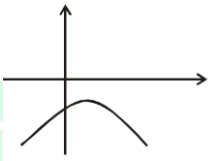
Q.40 If p and q are positive then the roots of the equation $x^2 - px - q = 0$ are-
(1) imaginary
(2) real & of opposite sign
(3) real & both negative
(4) real & both positive

Q.41 If a > 0, b > 0, c > 0, then both the roots of the equation $ax^2 + bx + c = 0$ -
(1) Are real and negative
(2) Have negative real parts
(3) Are rational numbers
(4) None of these

Q.42 The roots of the quadratic equation $ax^2 + bx + c = 0$ will be imaginary if -
(1) a > 0, b = 0, c < 0
(2) a > 0, b = 0, c > 0
(3) a = 0, b > 0, c > 0
(4) a > 0, b > 0, c = 0

PROBLEMS BASED ON GRAPHS

Q.43 The set of values of p for which both roots of the equation $3x^2 + 2x + p(p - 1) = 0$ are positive is
(1) $p \in \left(\frac{1}{3}, \frac{2}{3}\right)$ (2) $p \in \phi$
(3) $p \in (0, 1)$ (4) none of these

Q.44 Which of the following graph represents expression $f(x) = ax^2 + bx + c$ $(a \neq 0)$ when a > 0, b < 0 & c < 0 ?
(1)  (2) 
(3)  (4) 

Q.45 Let $f(x) = x^2 + 4x + 1$. Then
(1) f(x) > 0 for all x
(2) f(x) > 1 when $x \geq 0$
(3) $f(x) \geq 1$ when $x \leq -4$
(4) f(x) = f(–x) for all x

Q.46 The entire graph of the expression $y = x^2 + kx - x + 9$ is strictly above the x–axis if and only if
(1) k < 7 (2) –5 < k < 7

(3) k > –5 (4) None of these

Q.47 The equation $\pi^x = -2x^2 + 6x - 9$ has
(1) no solution (2) one solution
(3) two solutions (4) infinite solutions

Q.48 Let a, b and c are real numbers such that 4a + 2b + c = 0 and ab > 0. Then the equation $ax^2 + bx + c = 0$ has
(1) real roots (2) imaginary roots
(3) exactly one root (4) None of these

Q.49 The expression $y = ax^2 + bx + c$ has always the same sign as of 'a' if
(1) $4ac < b^2$ (2) $4ac > b^2$
(3) $ac < b^2$ (4) $ac > b^2$

Q.50 If $a, b \in R$, $a \neq 0$ and the quadratic equation $ax^2 - bx + 1 = 0$ has imaginary roots then a + b + 1 is
(1) positive
(2) negative
(3) zero
(4) depends on the sign of b

THEORY OF EQUATIONS

Q.51 If two roots of the equation $x^3 - px^2 + qx - r = 0$, $(r \neq 0)$ are equal in magnitude but opposite in sign, then:
(1) pr = q (2) qr = p
(3) pq = r (4) None of these

Q.52 If $\alpha, \beta, \gamma, \delta$ are the roots of the equation $x^4 - Kx^3 + Kx^2 + Lx + M = 0$, where K, L & M are real numbers, then the minimum value of $\alpha^2 + \beta^2 + \gamma^2 + \delta^2$ is
(1) 0 (2) –1 (3) 1 (4) 2

Q.53 If the roots of the equation $x^3 + Px^2 + Qx - 19 = 0$ are each one more than the roots of the equation $x^3 - Ax^2 + Bx - C = 0$, where A, B, C, P & Q are constants, then the value of A + B + C is equal to
(1) 18 (2) 19
(3) 20 (4) None of these

Q.54 For what value of a and b the equation $x^4 - 4x^3 + ax^2 + bx + 1 = 0$ has four real positive roots ?
(1) (–6, –4) (2) (–6, 5)
(3) (–6, 4) (4) (6, –4)

Q.55 If α, β & γ are the roots of the equation $x^3 - x - 1 = 0$ then, $\frac{1+\alpha}{1-\alpha} + \frac{1+\beta}{1-\beta} + \frac{1+\gamma}{1-\gamma}$ has the value equal to:
(1) zero (2) -1 (3) -7 (4) 1

Q.56 If α, β, γ are the roots of the equation $x^3 + ax + b = 0$ then value of $\frac{\alpha^3+\beta^3+\gamma^3}{\alpha^2+\beta^2+\gamma^2}$ is equal to :
(1) $\frac{3b}{2a}$ (2) $\frac{-3b}{2a}$ (3) 3b (4) 2b

Q.57 If two of the roots of equation $x^4 - 2x^3 + ax^2 + 8x + b = 0$ are equal in magnitude but opposite in sign, then value of 4a + b is equal to :
(1) 16 (2) 8 (3) –16 (4) –8

CONDITION FOR COMMON ROOTS

Q.58 If the equation $x^2 - ax + b = 0$ and $x^2 + bx - a = 0$ have a common root, then-
(1) a = b (2) a + b = 0
(3) a – b = 1 (4) a – b + 1 = 0

Q.59 If the equation $k(6x^2 + 3) + rx + 2x^2 - 1 = 0$ and $6k(2x^2 + 1) + px + 4x^2 - 2 = 0$ have both roots common, then the value of (2r – p) is
(1) 0 (2) 1/2
(3) 1 (4) None of these

Q.60 If the quadratic equations $3x^2 + ax + 1 = 0$ and $2x^2 + bx + 1 = 0$ have a common root, then the value of the expression $5ab - 2a^2 - 3b^2$ is

(1) 0 (2) 1
(3) –1 (4) None of these

Q.61 If one of the roots of $x^2 + ax + bc = 0$ and $x^2 + bx + ca = 0$ is common, then their other roots are -
(1) a, b (2) b, a (3) b, c (4) c, a

Q.62 The equation $ax^2 + bx + a = 0$ & $x^3 - 2x^2 + 2x - 1 = 0$ have two root in common, then (a + b) is equal to -
(1) 1 (2) 0 (3) –1 (4) 2

Q.63 If one of the factors of $ax^2 + bx + c$ and $bx^2 + cx + a$ is common, then -
(1) a = 0
(2) $a^3 + b^3 + c^3 = 3abc$
(3) a = 0 or $a^3 + b^3 + c^3 = 3abc$
(4) None of these

MAXIMUM, MINIMUM VALUES AND RANGE OF THE QUADRATIC EQUATIONS

Q.64 For all real values of x, the maximum value of the expression $\frac{x}{x^2-5x+9}$ is-
(1) 1 (2) 45
(3) 90 (4) None of these

Q.65 If x is real, then the value of the expression $\frac{x^2+34x-71}{x^2+2x-7}$ does not exist between-
(1) –5 and 9 (2) 5 and –9
(3) –5 and –9 (4) 5 and 9

Q.66 The maximum value of the function $y = \frac{1}{4x^2+2x+1}$ is-
(1) $\frac{4}{3}$ (2) $\frac{5}{2}$
(3) $\frac{13}{4}$ (4) None of these

Q.67 If a and b are the non-zero distinct roots of $x^2 + ax + b = 0$, then the least value of $x^2 + ax + b$ is
(1) $\frac{3}{2}$ (2) $\frac{9}{4}$ (3) $-\frac{9}{4}$ (4) 1

Q.68 If $y = -2x^2 - 6x + 9$, then
(1) maximum value of y is –11 and it occurs at x = 2
(2) minimum value of y is –11 and it occurs at x = 2
(3) maximum value of y is 13.5 and it occurs at x = –1.5
(4) minimum value of y is 13.5 and it occurs at x = –1.5

Q.69 If $f(x) = x^2 + 2bx + 2c^2$ and $g(x) = -x^2 - 2cx + b^2$ are such that min f(x) > max g(x), then the relation between b and c, is
(1) no relation (2) $0 < c < b/2$
(3) $c^2 < 2b$ (4) $c^2 > 2b^2$

QUADRATIC EXPRESSION IN TWO VARIABLES

Q.70 If $x^2 + 2xy + 2x + my - 3$ have two rational factors then m is equal to -
(1) 6, 2 (2) – 6, 2 (3) 6, –2 (4) –6, –2

Q.71 If $2x^2 + mxy + 3y^2 - 5y - 2$ have two rational factors then m is equal to-
(1) ± 7 (2) ± 6
(3) ± 5 (4) None of these

INEQUALITY

Q.72 If x be real then $2x^2 + 5x - 3 > 0$ if -
(1) x < –2 (2) x > 0
(3) x > 1 (4) $-3 < x < \frac{1}{2}$

Q.73 The solution of the equation $2x^2 + 3x - 9 \le 0$ is given by-
(1) $\frac{3}{2} \le x \le 3$ (2) $-3 \le x \le \frac{3}{2}$
(3) $-3 \le x \le 3$ (4) $\frac{3}{2} \le x \le 2$

Q.74 If for real values of x, $x^2 - 3x + 2 > 0$ and $x^2 - 3x - 4 \le 0$, then-
(1) $-1 \le x < 1$
(2) $-1 \le x < 4$
(3) $-1 \le x < 1$ and $2 < x \le 4$
(4) $2 < x \le 4$

LOCATION OF THE ROOTS

Q.75 If b > a, then the equation (x – a) (x – b) – 1 = 0, has:
(1) both roots in [a, b]
(2) both roots in $(-\infty, a)$
(3) both roots in $[b, \infty)$
(4) one root in $(-\infty, a)$ & other in (b, ∞)

Q.76 If α, β are the roots of the quadratic equation $x^2 - 2p(x - 4) - 15 = 0$, then the set of values of 'p' for which one root is less than 1 & the other root is greater than 2 is:
(1) $(7/3, \infty)$ (2) $(-\infty, 7/3)$

(3) $x \in R$ (4) none of these

Q.77 If α, β be the roots of $4x^2 - 16x + \lambda = 0$, where $\lambda \in R$, such that $1 < \alpha < 2$ and $2 < \beta < 3$, then the number of integral solutions of λ is
(1) 5 (2) 6 (3) 2 (4) 3

Q.78 Set of real values of k if the equation $x^2 - (k-1)x + k^2 = 0$ has atleast one root in (1,2) is
(1) (2, 4) (2) [–1, 1/3]
(3) {3} (4) ϕ

Q.79 If the inequality $(m - 2)x^2 + 8x + m + 4 > 0$ is satisfied for all $x \in R$, then least integral m is
(1) 4 (2) 5
(3) 6 (4) None of these

ANSWER KEY

TOPIC WISE QUESTIONS

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	2	4	2	2	2	4	1	4	3	2	3	1	3	2	3
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	3	1	3	1	2	1	4	3	1	2	4	2	2	1	4
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	1	4	2	1	1	3	1	4	4	4	2	2	2	2	3
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	2	1	1	2	1	3	2	1	4	3	1	3	3	1	2
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	2	2	3	1	4	1	3	3	4	3	1	3	2	3	4
Que.	76	77	78	79											
Ans.	2	4	4	2											